EMERGENCY CARRIER TELEPHONE TERMINAL

TYPE EB TWO-CHANNEL BANK

CONTENTS

1. GENERAL

1.01 This section describes the equipment and the characteristics of the 2-channel bank - Type EB.

1.02 This issue replaces Issue 1, Provisional, which was given limited distribution.

1.03 The associated 4-wire terminating circuits and ringing equipment which form a part of the overall circuits employing the 2-channel bank equipment are described in other sections of the Bell System Practices in the E40 series.

1.04 2-channel bank equipment provides a means of splitting a circuit transmitting a broad band of frequencies into two circuits, each transmitting a narrow band. When the circuit of normal band width passes voice frequencies in the range from 200 to 3500 cycles, the overall circuits derived by use of type EB equipment pass speech frequencies in the range from about 200 to about 1750 cycles (slightly higher for the A channel). These bands will appear at the input to the wide band channel as frequencies from 200 to 1750 and from 1950 to 3500 cycles, the latter band being inverted with respect to its normal arrangement by means of a 3700-cycle carrier frequency.

1.05 The reduction in the channel band width results in a loss in apparent loudness, intelligibility, and naturalness, the effective impairment for optimum conditions being about 9 db.

1.06 The transmitting levels on the toll line are reduced roughly 8 db to lower the cross modulation between the two narrow band channels. This makes necessary the use of receiving gain and increases the noise and the crosstalk from wide band channels operating at normal levels.

1.07 When echo suppressors are required, only the terminal type in each channel

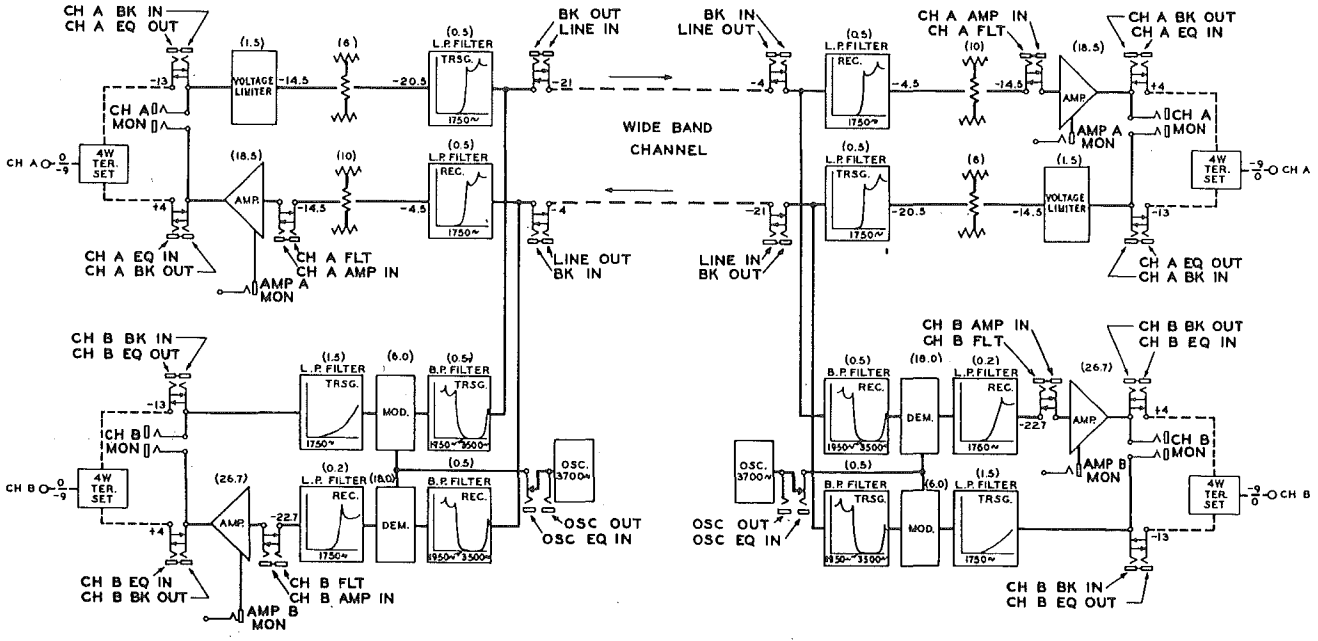


Fig. 1 - Simplified Overall Circuits Using Type EB 2-Channel Banks

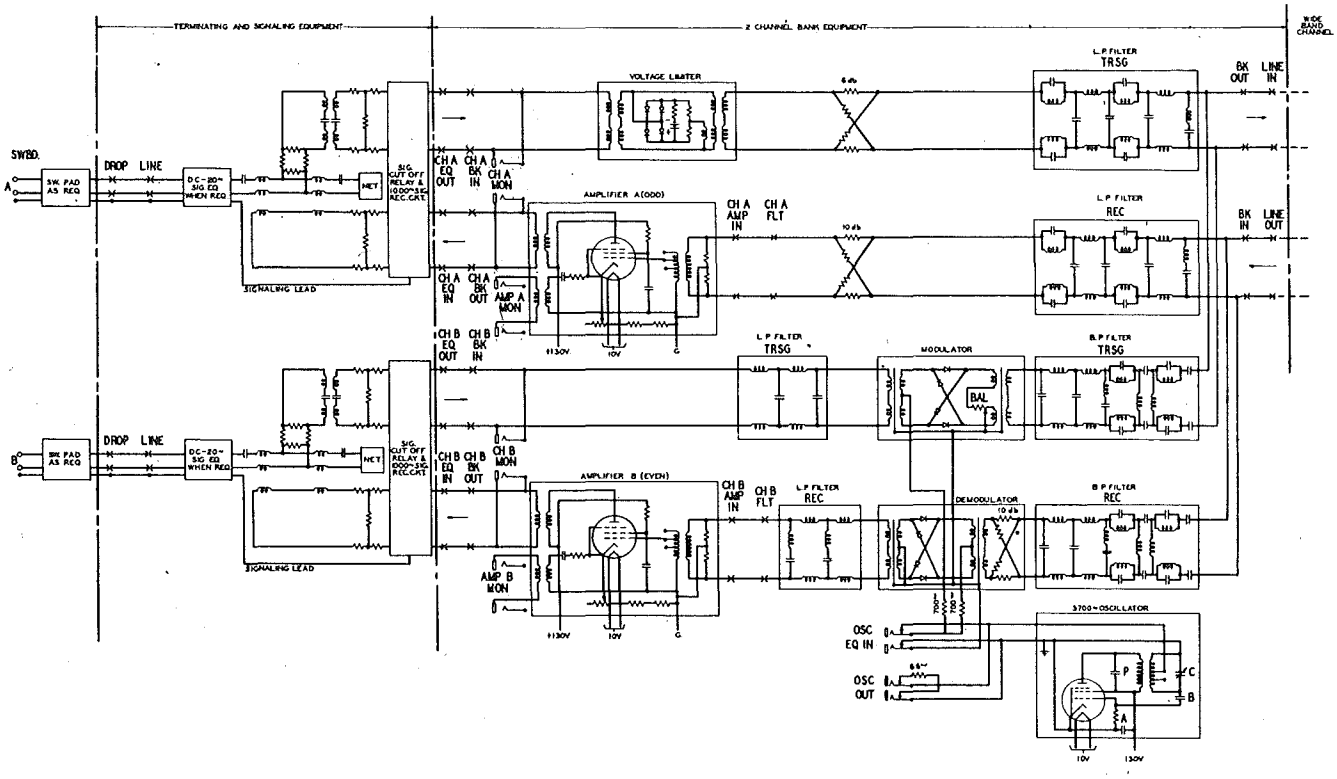


Fig. 2 - Schematic Emergency Terminal Type EB

may be used. Use of a suppressor which operates in the circuits which are common to both channels would result in the interruption of the currents in one channel by the currents flowing in the other.

2. GENERAL CIRCUIT DESCRIPTION

2.01 A simplified application schematic of the type EB 2-channel bank is shown in Fig. 1. In addition to block designations of the major components, the normal operating levels at successive points in the terminal equipment and the connecting facilities are noted, including the gains and losses of the individual components. The impedances throughout the circuit are nominally 600 ohms.

2.02 The 4-wire terminating sets and connecting facilities as shown are for 9 db circuits and have transmitting and receiving losses of 13 db. They provide the usual 2-wire terminations for the two 4-wire channels provided by the 2-channel bank. Each terminating circuit includes a hybrid coil, signaling cut-off relays, ringing equipment, level adjusting pads and impedance improving pads, as shown in Fig. 2. Occasionally when the terminating circuit has been associated with a circuit of normal band width requiring a transmitting filter of the "C" type this filter will be included.

2.03 The frequency allocations of the two channels are shown in Fig. 3.

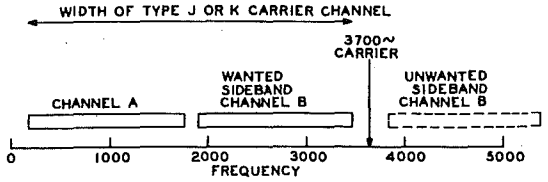


Fig. 3 - Frequency Allocation

(A) Channel A Transmitting

2.04 The transmitting equipment for channel A includes a voltage limiter, a pad and a filter, these being between the CH A BK IN jacks and the BK OUT jacks. The input to the voltage limiter from the 4-wire terminating set is normally at a level of -13 db with respect to the transmitting toll switchboard. The voltage limiter prevents high outgoing speech voltages from producing excessive interchannel crosstalk in channel B due to modulation in the wide band channel which is connected to the LINE IN jacks. The voltage limiter compresses the speech by increasingly larger amounts as the talker volume increases above, roughly, 0 vu, at the transmitting toll switchboard.

2.05 The output of the limiter passes thru a 6 db pad and a low-pass filter. The pad serves to reduce the transmission level at the output of the channel A transmitting equipment to -21 db. This is approximately equal to that present at the output of channel B transmitting equipment. The low-pass filter attenuates the line frequencies of channel B and provides a pass band for the frequencies of channel A.

(B) Channel B Transmitting

2.06 The transmitting equipment for channel B includes a low-pass filter, a modulator and a band-pass filter, these being between the CH B BK IN jacks and the BK OUT jacks. As in channel A, the input to the 2-channel bank equipment from the 4-wire terminating set is at a level of -13 db relative to the transmitting toll switchboard. The insertion loss (1000 cycles) is about 1.5 db for the low-pass filter, 6.0 db for the modulator and 0.5 db for the band filter. These three circuits and an oscillator, which furnishes a 3700-cycle carrier frequency to the modulator, serve to translate an input band of frequencies within the range 200 to 1750 cycles from its normal location into the range 1950 to 3500 cycles. This band lies above the 200 to 1750-cycle band occupied by channel A at the output of the 2-channel bank equipment and is inverted with respect to channel A. The low-pass filter attenuates frequencies which are above the desired input band while the band filter attenuates the unwanted sideband and other products of modulation present in the output of the modulator. The modulator is of the double balanced, bridge type similar to that used in the group modulator and demodulator associated with the J and K Carrier Equipment. The volume in channel B is limited by the action of the modulator circuit to about the same extent as by the voltage limiter in channel A. A BAL potentiometer (see Fig. 7) is provided for balancing the modulator circuit to avoid excessive carrier leak.

(C) Channel A Receiving

2.07 The channel A receiving circuit operates between the BK IN and the CH A BK OUT jacks. This circuit consists of a low-pass filter which selects the 200 to 1750-cycle band for channel A from the 200 to 3500-cycle band present at the output of the wide band channel, a 10 db pad and an amplifier. The amplifier compensates for the loss introduced in the over-all circuit by the transmitting and receiving equipment of the 2-channel banks. Its gain is roughly 18.5 db since the loss in the channel A transmitting equipment is 8 db and the combined loss of the low-pass filter and pad in the receiving equipment is approximately

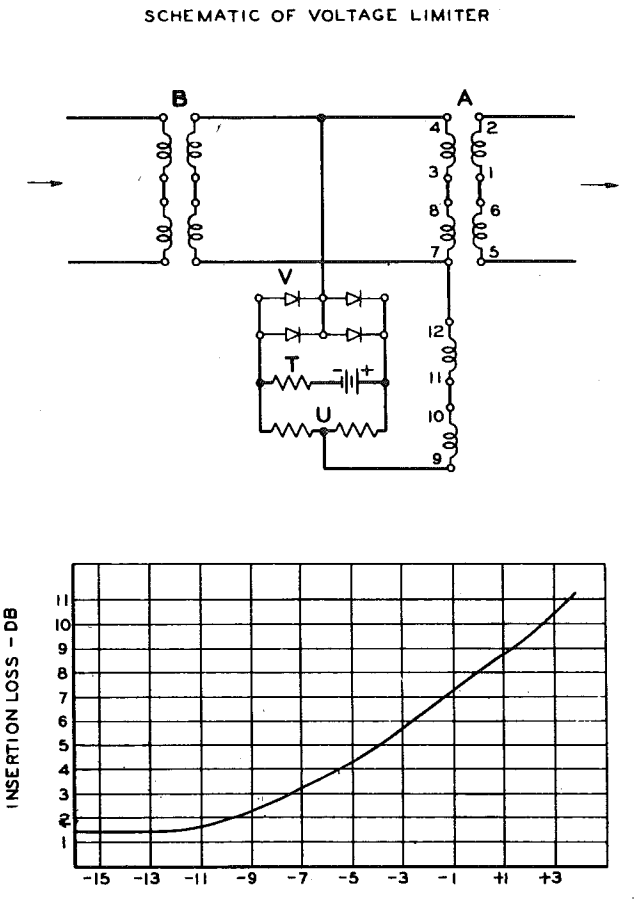


Fig. 4 - Schematic and Load Characteristic of the Voltage Limiter Circuit

10.5 db. The 10 db pad is necessary to obtain the correct range of adjustment of the channel net loss with the gain steps on the amplifier which are available.

(D) Channel B Receiving

2.08 The channel B receiving circuit includes the equipment between the BK IN and the CH B BK OUT jacks. Except for the amplifier the channel B receiving circuit is similar to the channel B transmitting circuit. The band pass filter selects the desired band, 1950 to 3500 cycles, for channel B from the output of the wide band channel. By means of the 3700-cycle carrier which is supplied to the demodulator this band is translated to its normal position 200 to 1750 cycles. The low-pass filter attenuates the unwanted sideband, carrier leak, and other unwanted products of modulation. The combined channel B transmitting and receiving losses amount to roughly 27 db and these are effectively compensated for by an equivalent gain in the amplifier.

3. DETAILED DESCRIPTION OF TRANSMITTING AND RECEIVING CIRCUITS AND EQUIPMENT

(A) Voltage Limiter

3.01 The schematic and a typical load characteristic of the voltage limiter in channel A is given in Fig. 4. The voltage limiter has been designed to have approximately the same load characteristic as the modulator in channel B. This is necessary to prevent the interchannel crosstalk from channel A into channel B or vice versa from becoming excessive for the higher volume talkers.

3.02 The operation of the voltage limiter is dependent upon the nonlinear characteristic of the varistor. When the input to the limiter is below the breaking point transmission is almost entirely from the B coil through the 4-3-8-7 and 2-1-6-5 winding of the A coil. At inputs above the breaking point transmission is present through the varistors and the 12-11-10-9 winding. The polarity of the latter is such as to balance out the transmission through the 4-3-8-7 winding. Only a peak of the wave is removed by

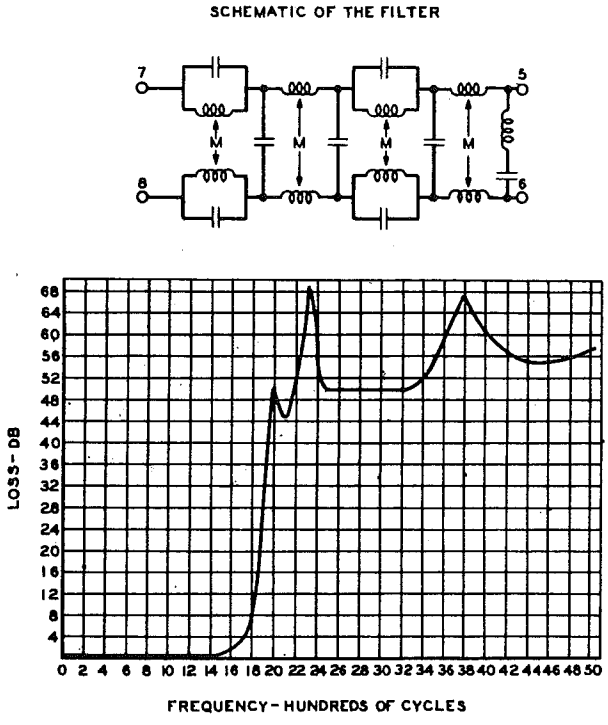


Fig. 5 - Schematic and Typical Loss Frequency Characteristic of the Channel A Transmitting and Receiving Low-Pass Filter

this device and, therefore, it is considered to be a "peak chopper". Since it is these peak voltages which are instrumental in producing excessive interchannel crosstalk from one narrow channel to the other the limiter is effective against this type of interference.

(B) Transmitting Filters

3.03 Three separate filters are used in the two transmitting circuits all assembled in a single unit which is coded 208A. It is mounted on the panel with the modulator. All filters have been designed to operate between 600-ohm impedances each being brought out to separate terminals and are applied as follows:

(1) Low-pass filter for channel A.

(2) Low-pass filter for channel B.

(3) Band pass filter for channel B.

The loss characteristics given below for the filters are typical of what is expected and characteristics of individual filters may vary from those shown.

3.04 The transmitting low-pass filter in channel A provides a passing range for the currents of channel A. It has been designed to operate in parallel with the line side of the band pass filter in channel B without introducing appreciable loss over the pass band in either filter. A schematic of the circuit and a typical loss characteristic is given in Fig. 5.

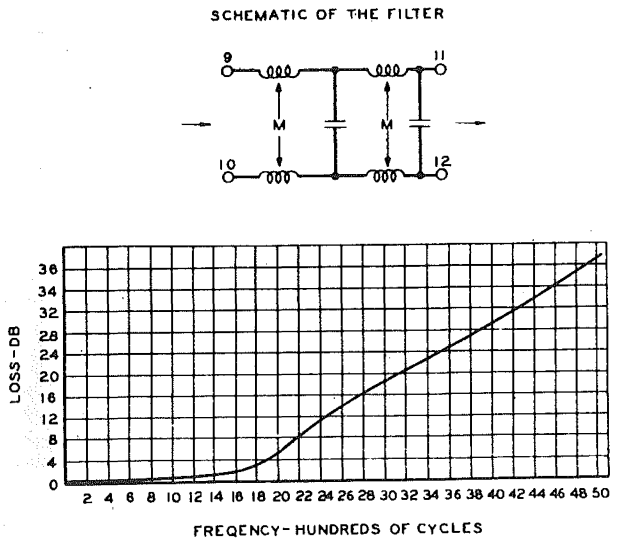


Fig. 6 - Schematic and Typical Loss Frequency Characteristic of the Channel B Transmitting Low-Pass Filter

3.05 The transmitting low-pass filter in channel B at the input to the modulator is a comparatively simple structure having the insertion loss characteristics and schematic circuit given in Fig. 6. This filter serves two functions. (1) It attenuates the line frequencies of channel B and therefore avoids near-end interference from the 3700-cycle carrier supply back through the near-end terminating set. (2) It also attenuates those frequencies which would otherwise be transmitted without modulation from the input to the output of the modulator and result in quality impairment.

3.06 The transmitting band pass filter in channel B at the output of the modulator is designed to transmit the line frequencies of channel B with small losses. It also attenuates the line frequencies of channel A, thereby reducing unintelligible near-end crosstalk from channel A to channel B. A typical insertion loss characteristic and the filter schematic are given in Fig. 8.

(C) Modulator (Ch B)

3.07 A simplified schematic of the modulator is given in Fig. 7. This double balanced bridge type modulator includes a copper oxide varistor element, two repeating coils and a balancing potentiometer. This type of modulator balances out the carrier supply current and certain other undesired products of modulation in its output which would otherwise require a more complex and expensive band filter. The carrier supplied to the modulator is 3700 cycles and as a result of modulation two sidebands (see Fig. 3) are produced in the output of the modulator, 1950 to 3500 and 3900 to 5450 cycles. Of these the 3900 to 5450-cycle band is suppressed in the band pass filter. The modulator introduces

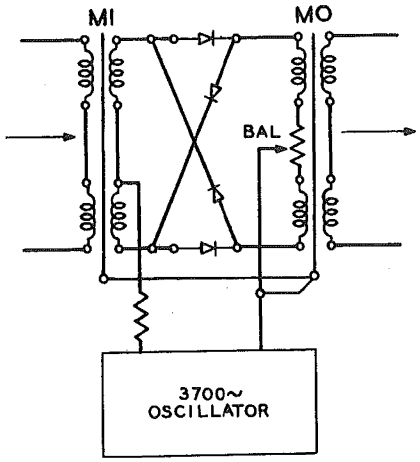


Fig. 7 - Schematic of the Modulator

a loss of about 6 db. A corresponding loss is introduced in channel A by a resistance pad.

3.08 In addition to the inherent carrier leak balance of the modulator circuit it is found necessary to more fully balance out the carrier currents from the modulator by means of the BAL potentiometer. Without a carrier leak balancing control it would be possible with extreme varistor elements to obtain intelligible crosstalk from channel B into channel A.

(D) Receiving Filters

3.09 Three separate filters are used in the two receiving circuits all assembled in a single unit which has been coded 208B. It is mounted on the panel with the demodulator. All filters have been designed to operate between 600-ohm impedances each being brought out to separate terminals and are applied as follows:

(1) Low-pass filter for channel A.

(2) Band pass filter for channel B.

(3) Low-pass filter for channel B.

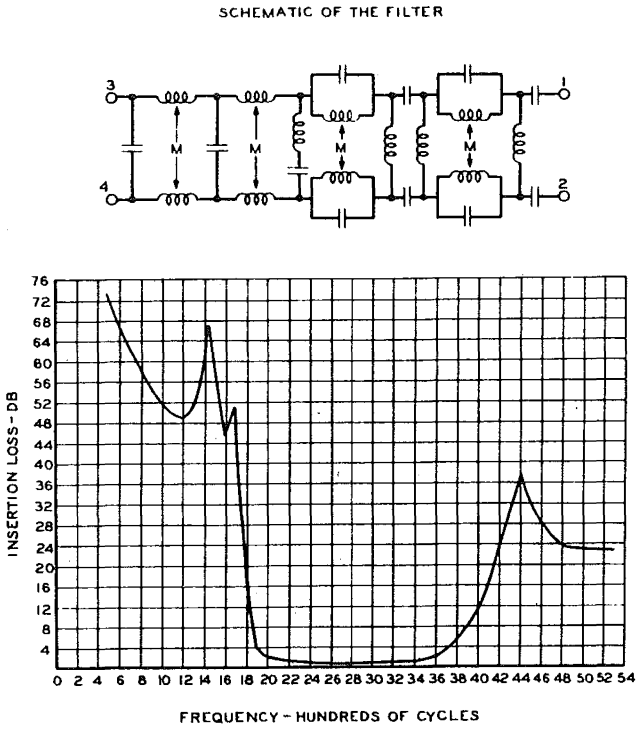


Fig. 8 - Schematic and Typical Loss Frequency Characteristic of the Channel B Transmitting and Receiving Band Pass Filter

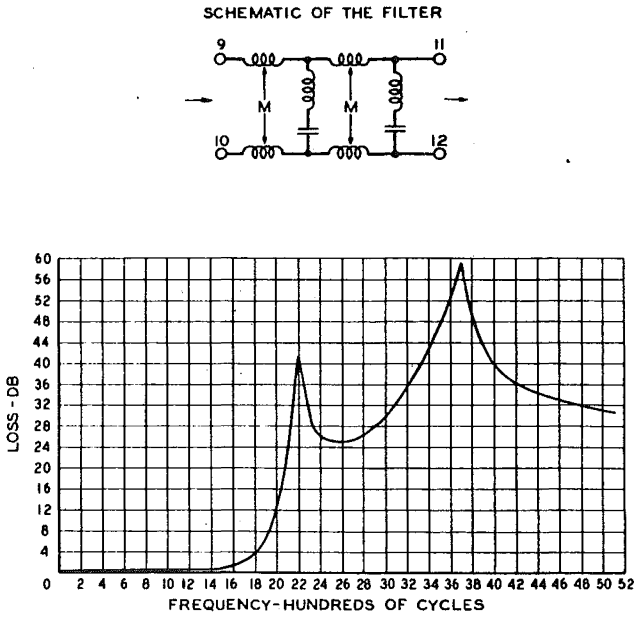


Fig. 9 - Schematic and Typical Loss Frequency Characteristic of the Channel B Receiving Low-Pass Filter

The loss characteristics given below for the filters are typical of what is expected and characteristics of individual filters may vary from those shown.

3.10 The receiving low-pass filter in channel A has the same characteristics as one in the transmitting circuit as shown in Fig. 5. It provides a passing range for the currents of channel A and an attenuating range for the currents from channel B which are present on the line. If these were not suppressed they would produce unintelligible crosstalk in channel A.

3.11 The receiving band pass filter provided at the input to the demodulator in channel B has the same characteristics as the one in the transmitting circuit as shown in Fig. 8. It provides an attenuating range for the line frequencies of channel A and thereby reduces the far-end unintelligible crosstalk.

3.12 The receiving low-pass filter provided after the demodulator in channel B attenuates the unwanted sideband and the carrier leak. Insertion loss characteristics and a schematic circuit for this filter are shown in Fig. 9.

(E) Demodulator (Ch B)

3.13 The circuit and operation of the demodulator is similar to that of the modulator shown in Fig. 7. No carrier balancing potentiometer is provided since the

carrier leak is removed by the low-pass filter, and a 12 db pad is provided in the demodulator input circuit to prevent overloading in the demodulator. As a result of demodulation the frequency band for channel B as received from the line is restored to the normal position below 1750 cycles.

(F) Amplifier

3.14 A standard voice amplifier of the V1 Telephone Repeater type is used in each receiving branch of the 2-channel bank to compensate for loss introduced by the bank equipment. These amplifiers also provide a reasonably good impedance resulting in a satisfactory return loss at the 2-wire input to the 4-wire terminating circuit. Since the gain required in channel A is only about 8 db, which is less than the minimum gain of the amplifier, a 10 db pad is provided at the output of the receiving low-pass filter. Adjustment of the gain in the amplifier in channel B may be necessary from time to time to correct for differences between the 1000-cycle and 2700-cycle transmission over the wide band channel. Jacks are provided at both the input and output of the amplifiers for testing and maintenance purposes.

(G) 3700-Cycle Oscillator

3.15 A schematic of the oscillator is given in Fig. 10. It employs plate circuit tuning and generates a 3700-cycle carrier voltage for use with the modulator and demodulator circuits. It operates in the usual manner by feeding a certain portion of the output back to the input. The main tuning capacity is provided by the P condenser and is supplemented by an adjustable condenser C on which the normal value for 3700-cycle tuning is stencilled. The frequency is stable with respect to time and supply voltage. The oscillator output operates on a voltage basis supplying approximately 2 volts carrier to each modulator and demodulator circuit. As many as 12 B channels may be operated from a single oscillator. No adjustment of the 3700-cycle output from the oscillator is provided since the carrier voltage supplied to each 2-channel bank changes very little with load. When two oscillators are provided in a single bay one is connected for supplying the odd numbered B channels and the other the even numbered B channels. This arrangement permits one oscillator to be disconnected from the circuit for maintenance and testing purposes after transferring its load to the other oscillator. A protective and limiting load resistance is placed between the output of the oscillator and the carrier input to each modulator or demodulator.

(H) Patching Facilities

3.16 The arrangements provide for emergency application of the 2-channel bank equipment to the wide band channels on the type J and K carrier systems. The a-c operated single units can be conveniently connected to an a-c outlet and the six other connections by patch cords when the bank equipment is located near the voice frequency patching bay. Similar connections for voice frequency H44-25 facilities can be made when the bank equipment is located near the 44A1 repeater bays. The emergency application of additional terminating and signaling equipment to the bank equipment requires additional connections to the fuse panels, to the distributing frame or to other terminating and signaling circuit bays.

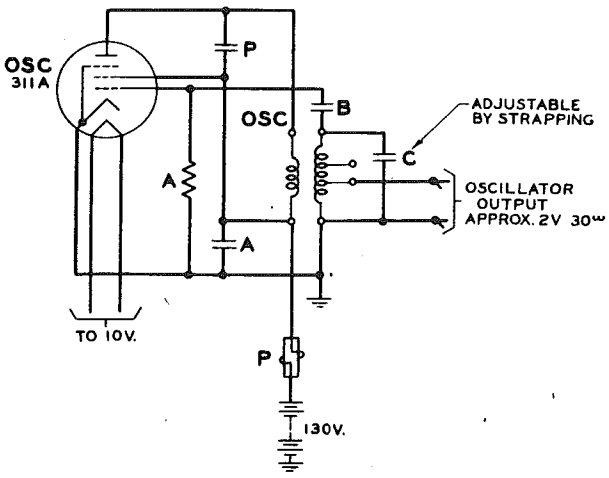


Fig. 10 - Schematic of the 3700-Cycle Oscillator

3.17 Patching jacks are provided on the drop side of the auxiliary terminating and signaling equipment to provide flexibility in its application. The line equipment can be connected if necessary to the switchboard by means of temporary patching facilities which depend upon local conditions. These jacks are shown in Fig. 2.

(I) Monitoring Arrangements

3.18 Monitoring arrangements have been provided in the multi-unit installation which require the use of a 4-wire monitoring and talking circuit of the type normally associated with the J and K carrier terminal circuits. The 4-wire talking set includes a 1000-cycle ringing key for calling the circuit terminals as covered in a separate section in this series of practices. The connection between the monitoring jacks and this talking circuit is made using a 4-conductor patch cord. Additional jacks for monitoring only by means of an operator's telephone set are available in the single unit installation.

In this case when the plug associated with the operator's telephone set is inserted into the amplifier monitoring jacks the receiver is connected across a winding of the output transformer associated with the amplifier. Because the near-end voice passes through the hybrid coil in the 4-wire terminating set to the monitoring winding of the output transformer this arrangement permits 4-wire monitoring, unless cut off by a terminal echo suppressor.

4. POWER SUPPLY

4.01 The 2-channel bank multi-unit circuits are designed to operate from the usual regulated 24-volt and 130-volt office battery supplies. The single unit circuit can be operated from the regulated office battery supply if equipped with a d-c battery supply circuit or from the 50-60 cycle power supply unit.

(A) 24-Volt and 130-Volt Battery

4.02 The 24-volt and 130-volt battery drains due to vacuum tube and voltage limiter requirements are as follows:

Equipment Unit	Current Drain Amps 24V Bat	130V Bat
Single Unit Arrangement		
2 - Amplifiers	0.32	0.014
1 - 3700-Cycle Oscillator	0.64	0.028
1 - Voltage Limiter	0.01	-
Total	0.97	0.042
Multi-Unit Arrangement (12 Circuits)		
24 - Amplifiers	3.84	0.168
2 - 3700-Cycle Oscillators	1.28	0.056
12 - Voltage Limiters	.16	-
Total	5.28	0.224
Auxiliary Terminating and Signaling Equipment		
2 - 1000-Cycle Signal Receiving Circuits	0.25	0.017

(B) A-C Power Supply

4.03 The power required to operate the single 2-channel bank unit from a-c power supply is approximately 25 watts.

5. TRANSMISSION PERFORMANCE

(A) Transmission Frequency Characteristics

5.01 Typical transmission frequency characteristics for the 2-channel bank equipment indicate about the following as regards frequency bands (10 db attenuation with respect to the 1000-cycle point).

Channel A - 100-1800 cycles

Channel B - 150-1750 cycles

These characteristics are determined by the filters and the repeating coil circuits of the voltage limiter, the modulator and the demodulator. They do not include the effect of the wide band channel or the 4-wire terminating set.

5.02 Additional transmission distortion or reduction of band width at the lower frequency cut-off is introduced in channel A by the 4-wire terminating sets and the low frequency cut-off of the line facilities. In channel B the additional transmission distortion or reduction of band width at the low frequency cut-off is due to the 4-wire terminating sets and the high frequency cut-off of the line facilities. The high frequency cut-off of both channels is almost entirely determined by the filters at the two terminals.

5.03 With voice frequency facilities the over-all characteristics will show the lower frequency cut-off raised to 200 cycles or more. In the case of operation over the wide band type J or K carrier facilities the band width is reduced also, because of the 4-wire terminating sets and the upper frequency cut-off of the carrier facilities. With these facilities the 10 db points are at about 150 and 3550 cycles for a single link and at about 200 and 3350 cycles for a 5-link connection. The latter frequency corresponds to about 350 cycles in channel B. The effect of the 4-wire terminating sets with carrier facilities, as with voice frequency facilities, is to sharpen the cut-off below 200 cycles and reduce the band width accordingly.

(B) Load Characteristics

5.04 The 1000-cycle load characteristic for channel B is given in Fig. 11. The

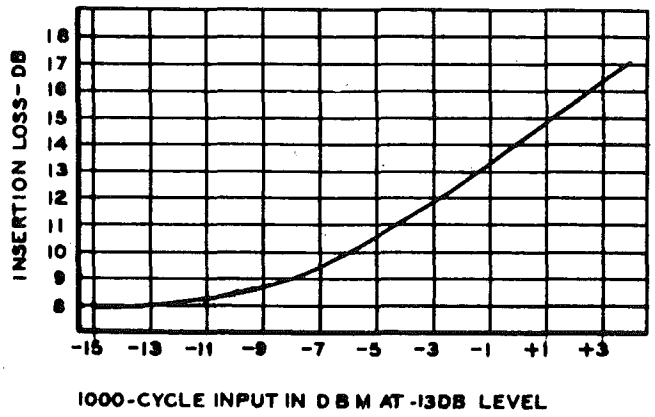


Fig. 11 - Channel B Load Characteristic

limiting action at the higher input powers is due principally to the low carrier voltage applied to the modulator in this channel and it serves to limit the maximum interchannel crosstalk from this channel into channel A. This load characteristic is similar to that of channel A as determined by the voltage limiter. As an example, it shows that if the 1000-cycle input is increased by 10 db from -13 to -3 dbm, the output increase will be only about 6 db.

(C) Return Loss

5.05 Typical return loss characteristics for the bank equipment vs. 600 ohms resistance as measured at the CH A BK IN, CH B BK IN, BK IN and BK OUT jacks are given in Fig. 12. The impedance at the CH A BK OUT and CH B BK OUT jacks is determined by the output impedance of the amplifiers. This is described in another section in the E43 series covering the V1 Telephone Repeater. This impedance is nearly 600 ohms at all frequencies except in the region below about 300 cycles.

5.06 The return loss characteristics at the 2-wire input of the 4-wire terminating sets is better than 20 db over a frequency range of 200 to 3000 cycles.

(D) Crosstalk

5.07 There are several types of intelligible and unintelligible crosstalk to be considered. These are: (1) Crosstalk from other circuits into the circuits equipped with the bank equipment, (2) Crosstalk from the bank equipped circuits into other circuits, (3) Crosstalk between the two channels in the bank equipment, (4) Crosstalk from bank equipped circuits to other bank equipped circuits (A to A, etc.). The volume of the first type of crosstalk will be greater than between two normal circuits because of the lowering of the line levels by roughly 8 db when the bank equipment is used. The volume of the second type of crosstalk will be less for the same reason. The third type is partly due to incomplete suppression by the filters of frequencies in the nonpass bands and partly due to modulation in the wide band facilities. The latter, while improved by the 8 db lowering of line levels, may become fairly appreciable when a high disturbing volume is present. The volume of the fourth type is comparable to that obtained with normal circuits, except for B channels when employing H44-25 facilities. In this case it is several db higher since the frequencies on the line are higher than for A channels. The maximum crosstalk to other channels is lowered because of the reduced level on the line facilities and the nonlinear load characteristic of the voltage limiter in channel A and the modulator in channel B.

5.08 The background noise due to either a-c or d-c supply to the 2-channel bank is normally less than 15 db when measured with line weighting at a -9 db level point. Fig. 13 gives measured values of unintelligible crosstalk. These characteristics change with poling in the repeaters and variation in the apparatus in the modulators and demodulators. It is not expected, however, that actual results will seriously exceed the amounts indicated by Fig. 13 even for 4-wire circuits

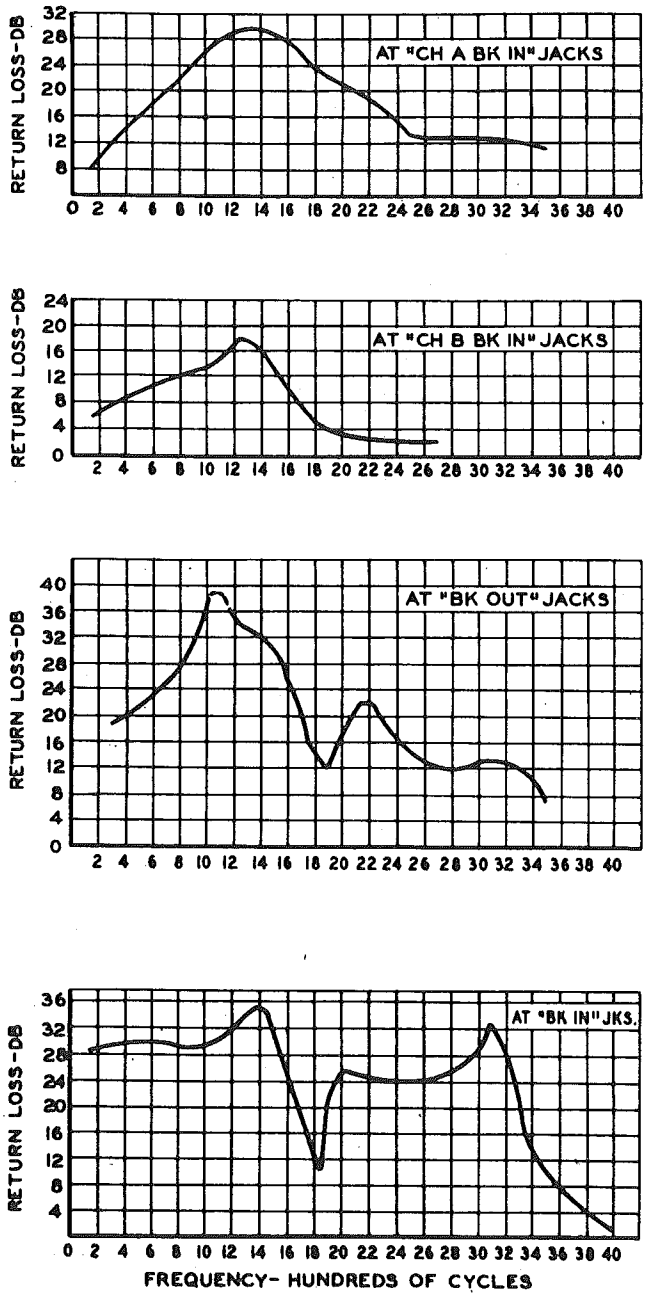


Fig. 12 - Typical Return Loss Characteristics vs. 600 Ohms Resistance

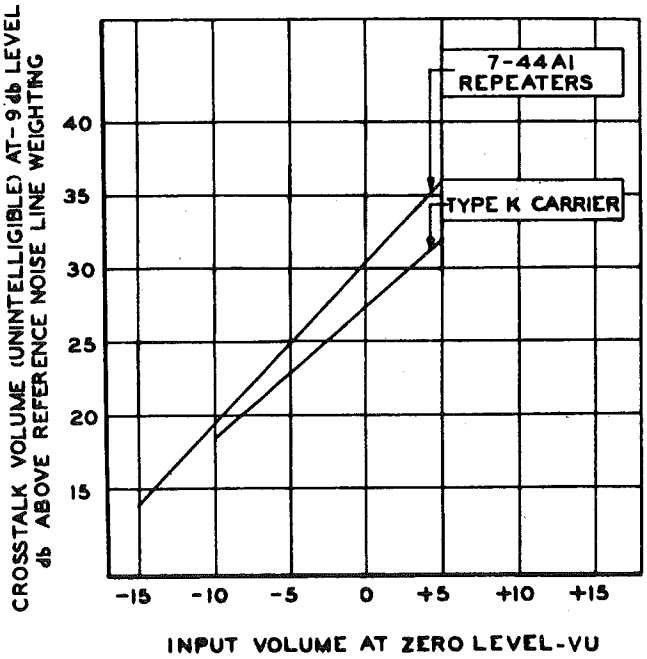


Fig. 13 - Interchannel Crosstalk Characteristics

involving more than seven repeaters. In any case, the high values of input volume occur infrequently.

6. EQUIPMENT ARRANGEMENTS

(A) Two-Channel Bank

6.01 The 2-channel bank equipment is available in two arrangements: (1) A single 2-channel bank unit is provided on a semi-portable basis for emergency or small installations. A portable apparatus cabinet is available for this unit. The unit arrangement provides for operation from office battery when equipped with battery supply resistances or from 50-60 cycle supply when equipped with a power supply unit. (2) A shop wired bay having a maximum capacity of 12 banks is provided for larger installations. This bay accommodates equipment which is 23" wide and is arranged on relay racks 10' 6" high for flexibility in connection with its installation in offices with various ceiling heights. It is arranged for operation from office battery only.

6.02 The single unit of 2-channel bank incorporates several 19" panels and mounting plates as shown in Fig. 14. A transmitting panel includes the transmitting filters, the modulator and the voltage limiter equipment. A receiving panel includes the receiving filters and the demodulator. Two amplifiers are provided on separate panels. A jack panel provides the jacks which are necessary for patching and maintenance, including separate monitoring jacks for each amplifier. A power supply panel is provided as an option for installations where office battery is not

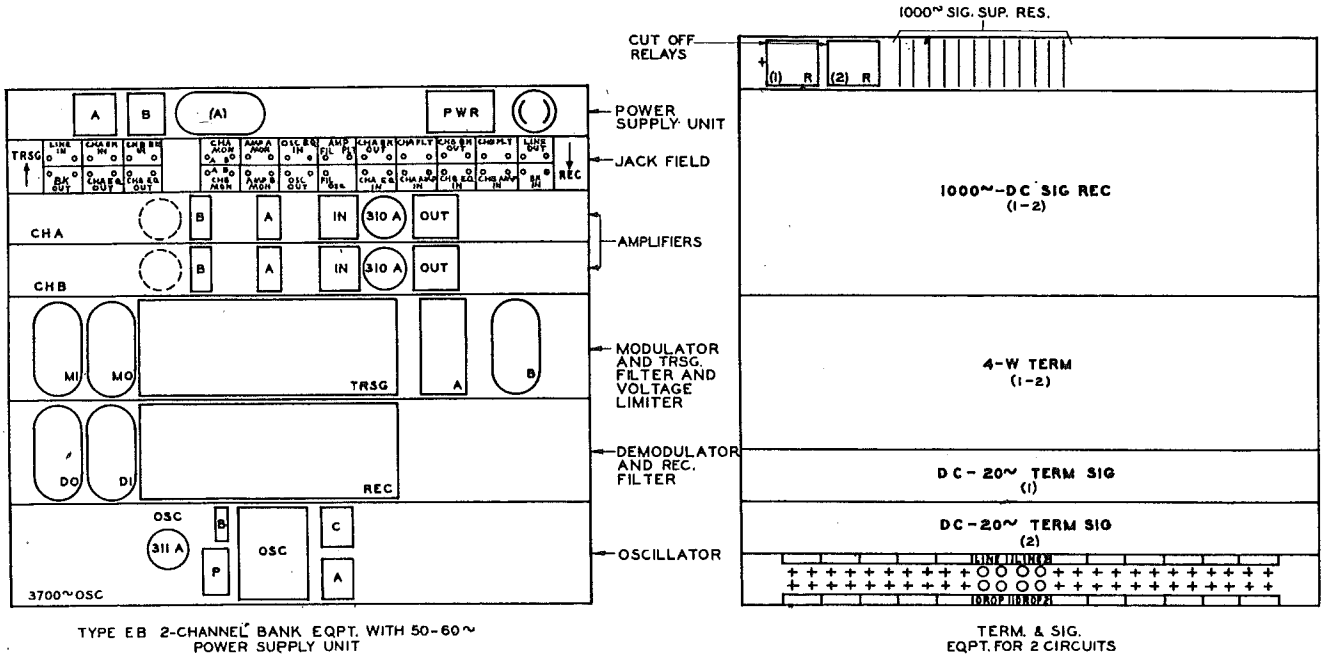


Fig. 14 - Emergency Terminal Single Unit Arrangements

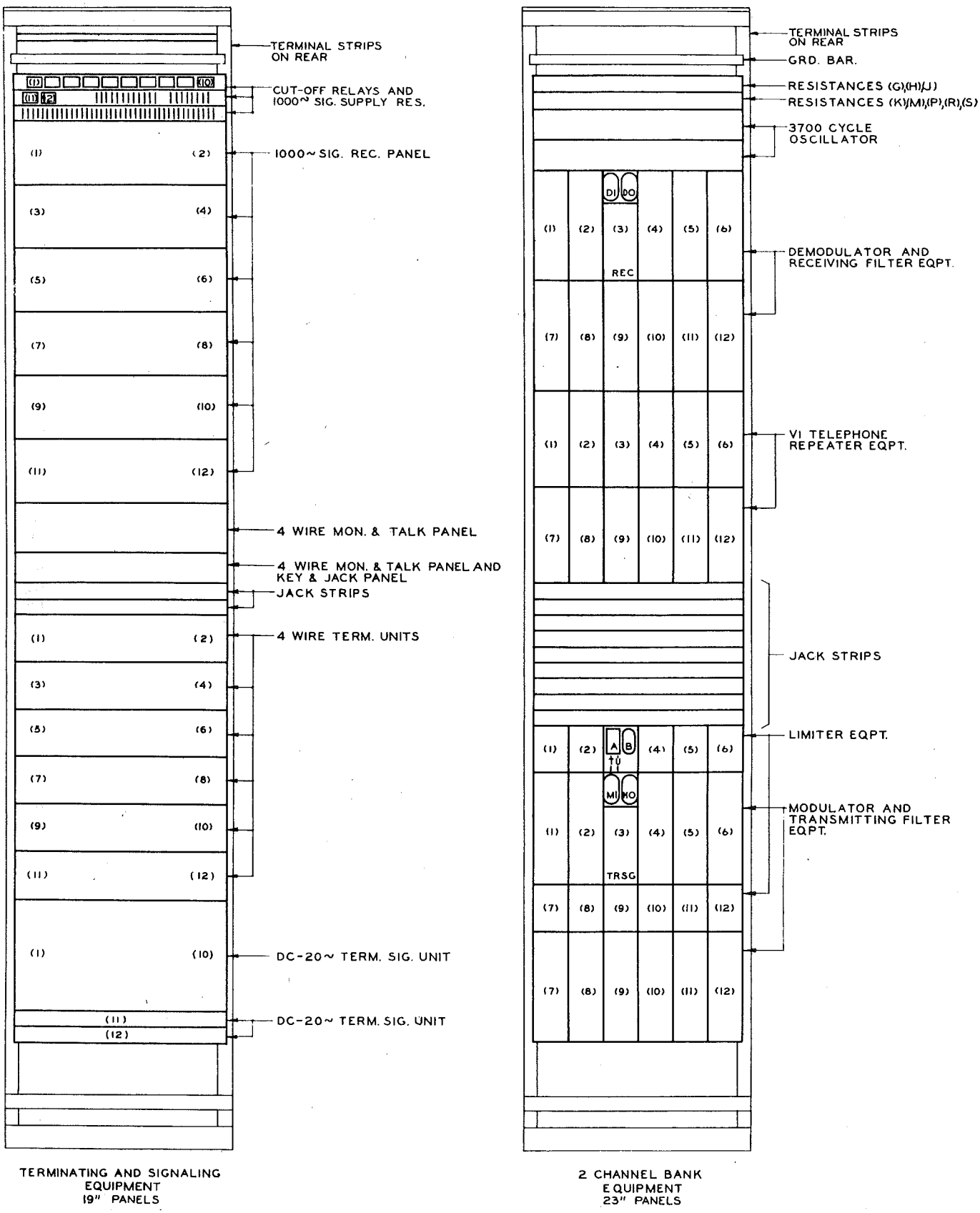
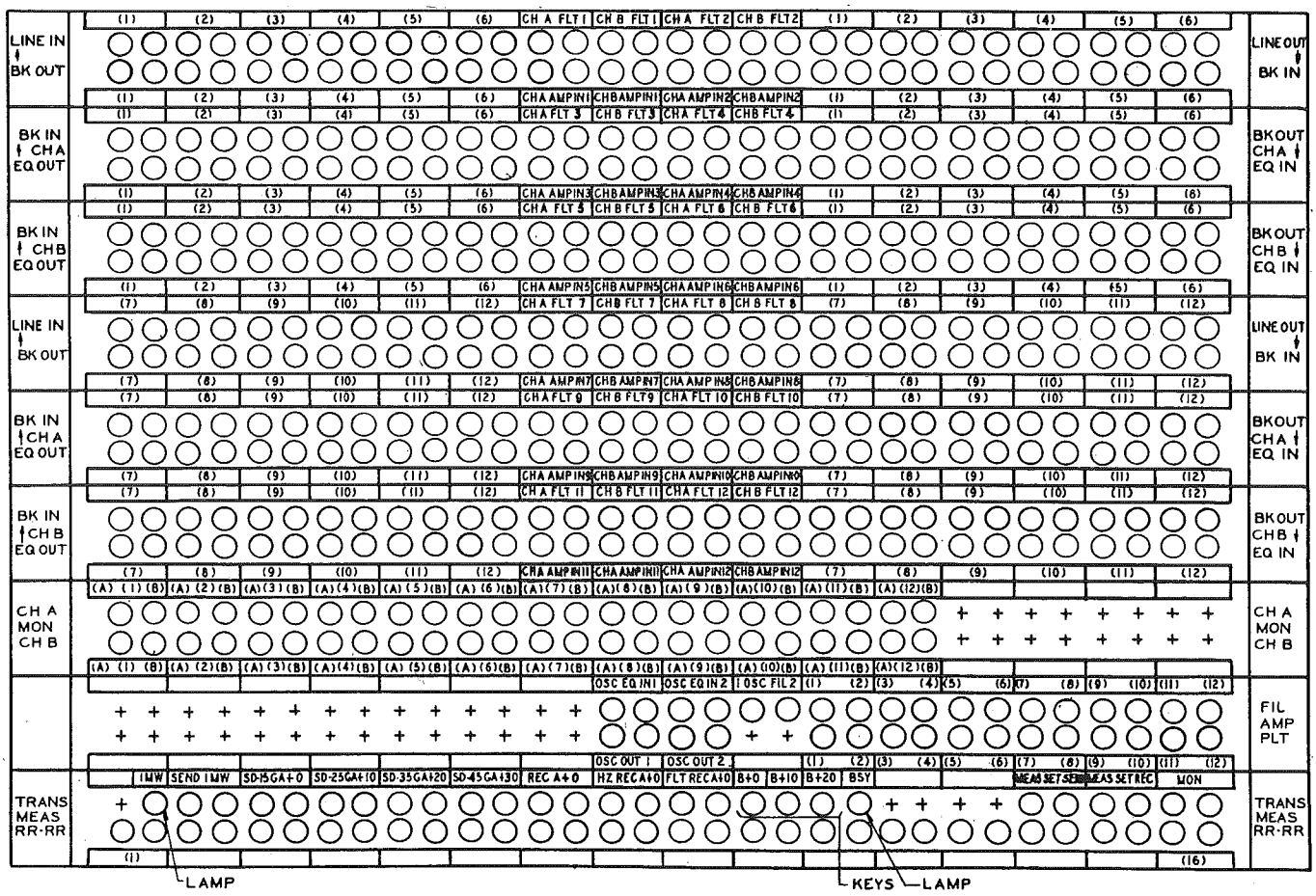
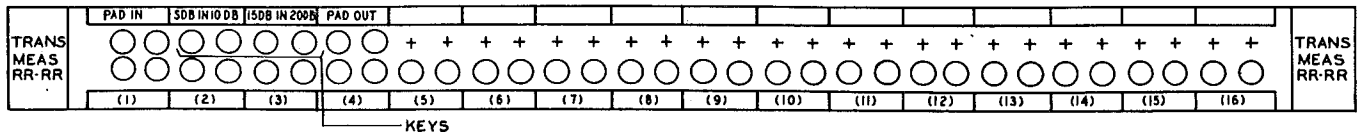


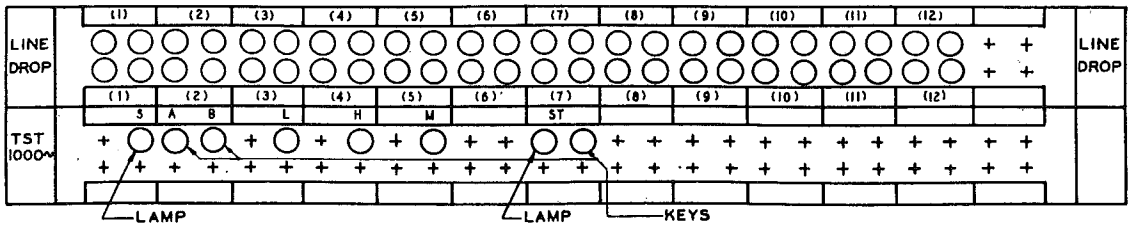
Fig. 15 - Emergency Terminal Multi-Unit Bay Arrangements



JACK FIELD FOR
2 CHANNEL BANK EQUIPMENT



ALTERNATE JACK EQUIPMENT FOR
PORTABLE TRANS. MEAS. EQUIPMENT



JACK FIELD FOR AUXILIARY
TERMINATING AND SIGNALING EQUIPMENT

Fig. 16 - Jack Fields for Multi-Unit Arrangements

available. The 3700-cycle oscillator is provided on an optional basis and may be omitted where it is desired to provide oscillators in only two units and to supply additional units, up to a maximum of 12 banks from the two oscillators.

6.03 The 10'6" shop wired bay is shown in Fig. 15. The equipment is assembled on a multi-circuit unit basis to facilitate application to bay assembly. The amplifiers are likewise provided on a group unit basis. Complete jack field equipment is provided for patching and maintenance as shown in Fig. 16. The monitoring jacks are provided on a 4-wire bridging basis only, for use with 4-wire monitoring and talking facilities.

(B) Terminating and Signaling

6.04 Since the 2-channel bank doubles the number of speech channels available over existing facilities, additional terminating equipment may be required. This consists essentially of 4-wire terminating and signaling equipment plus trunk facilities directly associated with the testboard or switchboard.

6.05 The signaling equipment consists of 1000-cycle d-c signaling for signaling over the line. Optional d-c 20-cycle terminal signaling equipment connected on a "back to back" basis with the 1000-cycle d-c equipment is available for applications which require 20-cycle signaling towards the switchboard. These cases include the older type of No. 3 toll switchboard and No. 11 switchboard which are not arranged for direct signaling to the switchboard.

6.06 Auxiliary terminating and signaling equipment for use with the 2-channel bank is provided in two arrangements similar to the bank equipment as indicated in Figs. 14 and 15: (1) A two-circuit unit for use where a small number is required. This unit is on a two-circuit basis since two of the component equipments, namely, the 1000-cycle signal receiving panel and the 4-wire terminating unit, are two-circuit arrangements. Separate portable apparatus cabinets are available for this equipment. It is not equipped with the auxiliary units required for a-c operation. (2) A 10'6" wired bay having a capacity of 12 circuits to serve the additional derived channels (channel B) from a bay of 2-channel bank equipment. It is arranged for operation on office battery only.

6.07 The auxiliary bay of terminating and signaling equipment provides a maximum of 12 terminating and signaling circuits in units of two. A full bay includes twelve 1000-cycle signal receiving circuits and associated 1000-cycle signaling cut-off relay equipment for application on the 4-wire side of the terminating circuit, and twelve 4-wire terminating circuits. The bay is equipped with one 1000-cycle signal receiving test circuit for maintenance purposes. Patching jacks are provided on the drop side of the 4-wire terminating equipment. Space is provided in this bay for 4-wire monitoring and talking equipment when it is provided for use with the bank equipment. The bay accommodates 19" mounting plate equipment.

6.08 The small unit of auxiliary terminating and signaling equipment provides two terminating and signaling circuits for use with the 2-channel bank unit equipment. This unit is similar to the bay arrangement except for the number of circuits. It occupies the space of eleven 1-3/4" x 19" mounting plates and is arranged for office battery only. For those installations employing a-c operated 2-channel bank equipment and in which a-c operation of signaling equipment is desired, it will be necessary to provide other panels which include the 4-wire terminating equipment, 1000-cycle ringer-oscillator with power supply panel, and 20-cycle applique unit (when required), suitable for operation from the a-c power.

7. DRAWINGS

(A) SD Drawings (Not Attached)

Number	Title
SD-55392-01	1000-Cycle Signal Receiving Circuit
SD-55393-01	Cut-Off Relay Circuit for 1000-Cycle Signal Receiving Circuit
SD-55481-01	1000-Cycle Signal Receiving Test Circuit
SD-55491-01	Application Schematic of Auxiliary Terminating and Signaling Circuit
SD-55560-01	D-C 20-Cycle Signaling Circuit
SD-59097-01	Application Schematic - 2-Channel Bank Type EB
SD-59098-01	3700-Cycle Oscillator Circuit
SD-62488-01	Interbay Trunk Circuit
SD-64048-01	4-Wire Monitor and Talking Circuit
SD-64304-01	4-Wire Terminating Circuit
SD-64355-01	Transmission Measuring Circuit
SD-64384-01	Voice Amplifier Circuit
SD-95017-01	Transmission Measuring Sending Pad Circuit
SD-95100-01	Transmission Measuring Test Trunk Circuit

(B) ED Drawings (Not Attached)

ED-59097-01	2-Channel Bank Unit Equipment - Single System
ED-59098-01	3700-Cycle Oscillator - Panel Equipment
ED-62231-01	2-Channel Bank Bay Equipment
ED-62239-01	Auxiliary Terminating and Signaling Bay Equipment
ED-62241-01	Auxiliary Terminating and Signaling Equipment - 2 Circuits