SUBSCRIBER LINE CARRIER SYSTEMS
ADDED MAIN LINE AND THE SEISCOR SUBSCRIBER LINE CARRIER TELEPHONE SYSTEMS
GENERAL DESCRIPTION AND ADMINISTRATIVE PROCEDURES

CONTENTS — PAGE

1. GENERAL

1.01 This section covers the general description and administration of the "Added Main Line" and the "Seiscor Subscriber Line" carrier telephone systems on exchange cable pairs.

1.02 The "Added Main Line" referred to as the "AML" system, and the "Seiscor Subscriber Line" referred to as the SSC-1 system, are two systems which have compatible components that may be interchanged. What is said of one system is applicable to the other; therefore, the general term "system" is used in this section to mean either one of the carrier systems.

1.03 The "derived" voice-frequency circuit covered in this practice refers to the demodulated output from the carrier system.

1.04 The subscriber "physical" voice-frequency circuit described in this practice refers to the circuit over which carrier frequencies are transmitted in both directions and from which the systems subscriber terminal obtains charging current for its internal nickel-cadmium battery. The "physical" circuit must be a working line (connected to a working subscriber number in the central office).

2. SYSTEM FEATURES

2.01 The AML or the SSC-1 systems are single channel carrier systems designed to provide a second private line derived voice channel over an existing, working cable pair. Dial or "Touch Tone" service can be used on the derived channel. This "doubling" of usage for the cable pair is gained by superimposing the system's carrier frequencies on the same pair as the physical subscriber without affecting, in any way, the operating characteristics of the physical subscriber's telephone set. The loop must be within the normal design criteria for a non-loaded subscriber loop and will also be further restricted by bridged tap and carrier frequency cable losses.

2.02 The equipment is so designed that no external adjustments are required. There is no common circuit equipment associated with the central office terminal, other than a common rack for a number of C.O. terminals. Therefore, no economic penalty is involved in applications where only a small number of these channels are needed. The equipment can be installed on a circuit-by-circuit basis.

2.03 The system subscriber terminal is designed for use as a private line only. No party line service can be provided on the system channel. The physical circuit associated with the added carrier line may be party line operation. Any number of extensions can be derived from the channel circuit, but they are designed to ring a maximum of three standard straightline 20-Hertz ringers.

2.04 Each system consists of two terminals; one mounted in the central office on the horizontal main frame or in a relay rack; the other mounted on the customer's premises. A separate isolation filter may be mounted either on the AML customer's premises (or pole mounted) for a second line application or pole mounted near the physical-circuit customer's premises when there are more than one. (See Figures 2, 3, and 4)

3. SYSTEM APPLICATION

3.01 In general, AML or SSC-1 may have application -

(a) To provide a second line for the subscriber served by a physical circuit.

(b) As a means for providing primary service to a subscriber other than the one(s) served by the physical circuit.

Each of these cases is discussed in some detail in the paragraphs following.

3.02 Second Line Service

(a) A system may be used to provide a second line for an existing subscriber; however, give careful consideration to initial equipment cost and the undesirable maintenance situation created in the outside plant. These undesirable factors may be outweighed by the following:

(1) Cost Savings - Installation of a second line via a system fully utilizes existing facilities including the cable pair, drop wire, and station protector.

(2) Second line service is less likely to be of a permanent nature. If the service is discontinued, the carrier equipment can be salvaged and reused.

(b) In dedicated plant areas, where facilities have been dedicated on a pair-per-living unit basis and second lines are not dedicated, the use of a system may eliminate multiple visits to access points, and possible control points, as second lines are added and removed. (See Figure 2)

3.03 Primary Service

(a) Either AML or SSC-1 can be used to derive a private line to provide primary service to a new subscriber. The carrier can be added on a physical circuit which is being used to provide any class of telephone service (the physical circuit must be connected to a subscriber telephone number in the central office). In this type of application, the system is a means of deriving a private line circuit via carrier in lieu of providing a cable pair. In areas close (within 18 KF subject to other transmission considerations) to a central office, where spare facilities are not available, or are available only at a premium cost due to required rearrangements and changes, the system may prove to be an economical means of providing service.

3.04 The system(s) may be considered as an expedient in areas where a cable project is programmed to provide relief at a later date. In such cases, the temporary system(s) can be salvaged for reuse. In slow-growing areas where facility shortages exist and demand is not sufficient to warrant the scheduling of a relief project, which might involve a larger cable and a considerable expenditure, a system may be considered for a permanent installation.

3.05 AML or SSC-1 is not an answer to all problems. It should, however, be considered as one available "tool" which may be used, when appropriate, to help get the job done.

4. GENERAL TECHNICAL DESCRIPTION

4.01 The system derived circuit uses a double side band amplitude-modulated signal. The system uses frequency division for the two directions of transmission. Automatic gain control is used to maintain a substantially constant VF output with a wide range of signal power input levels, without need for external field adjustments.

4.02 No external power source is required for the subscriber terminal. The equipment is powered directly from the "central office battery" supplied by the central office switching equipment to the physical subscriber circuit. This is done in a way that it does not interfere with the normal utilization of this power for operating the switching relays and providing telephone set transmitter current.

4.03 The AML or SSC-1 central office terminal is powered from a 48-volt central office battery and requires approximately 35 ma per terminal. The only connections required are the two pairs from the central office equipment line terminals and the connections to the desired transmission cable pair.

5. DESIGN CHARACTERISTICS

5.01 Both the AML or SSC-1 are completely transistorized single channel, double side band amplitude modulated systems.

5.02 The frequencies used are: Transmission from the central office - 76 KHz. Transmission from the subscriber terminal - 28 KHz.

5.03 The power source for operation of each system is derived completely from the physical pair over which it is applied. The central office 48-volt battery on the physical circuit is the power source for both the physical and the system's circuits.

5.04 The subscriber terminal contains a rechargeable nickel-cadmium battery. The battery is trickle-charged from the C.O. battery on the physical pair during idle circuit conditions. During talking conditions, an electronic switch isolates the system channel from the physical circuit. The system channel then operates from the nickel-cadmium battery.

5.05 Ringing on system is through detection of the presence of ringing voltage at the C.O. terminal and connecting, through appropriate circuitry, the 6-volt nickel-cadmium battery to an inverter which, in turn, provides a nominal 70 volts AC to ring standard straight-line 20-Hertz ringers.

5.06 The system subscriber terminal is installed indoors at the carrier subscribers location. It is contained in a molded plastic box 4-1/2" wide by 6" high by 1-1/2" deep.

5.07 Central office terminals (COT) are normally relay rack mounted. The following central office racking is available, depending upon the number of system lines planned:

12 - COT on a 23" rack - single shelf cab.
60 - COT on a 23" rack - 5 shelf cabinet
10 - COT on a 19" rack - single shelf cab.
50 - COT on a 19" rack - 5 shelf cabinet
10 - COT in a portable housing (For quick mounting on the horizontal or vertical side of the M.D.F.)

Individual COT may be mounted to the horizontal side of the M.D.F. (For small installations - 9 or less system lines)

5.08 The only connections required at the subscriber terminal are to the telephone physical circuit. No connections to the subscriber power supply are required. The central office terminal requires connections to the physical circuit and to the appropriate central office group and terminal connections (for both the system circuit and the associated physical circuit) and 48-volt central office battery.

6. TRANSMISSION CONSIDERATIONS

6.01 Cable Attenuation

(a) Limiting transmission is based upon the 76 kHz carrier frequency used for transmission from the central office terminal to the subscriber terminal. Although the system has been operated in tests with measured line losses as high as 50 db, the average background noise level measured 20 dbrnC with switching peaks averaging 23 dbrnC at the carrier derived input to the subscriber's set. The ability of the subscriber terminal to "key on" the ringing signal with such a low incoming 76 kHz signal was taxed to the limit, however, and thus some margin was needed to provide reliable ringing. As a result of tests, a recommended maximum design loss of 43 dB including the effects of bridged tap and average summer ambient temperatures upon cable loss should be observed. This will provide about 4 dB margin to care for higher temperature conditions and some relatively minor transmitted carrier level variations, and an additional operating margin of about 4 dB for operations under more severe noise conditions.

(b) The following table may be used for loss computations:

Cable	76 KHz loss in dB/fk			
Gauge	26	24	22	19
MDF/Mile	(.079)	(.084)	(.082)	(.084)
55 F. Loss	3.10	2.33	1.60	1.09
Variation for ± 30 F. change in temperature	±.16	±.13	±.08	±.05

(c) Assuming no bridged tap, the following length loops could be served using AML equipment:

SOLID 26 Gauge - 13.5 kf
SOLID 24 Gauge - 18.0 kf
SOLID 22 Gauge - 26.2 kf*
SOLID 19 Gauge - 38.5 kf*

*Physical loops longer than 18 kf require loading. Therefore, the maximum practical limit is 18 kf for all gauges.

Drop wire in excess of 250 feet should be included in loss calculations. Assume a 76 kHz loss of 0.3 dB / 100'.

6.02 Bridged Tap

(a) As can be derived from the maximum recommended distance tables shown in the previous paragraph, bridged tap will limit the application of system equipment.

(b) Generally, it does not seem feasible to remove existing bridged taps or to provide resistive or reactive terminations at the far end of a bridged tap - although such action is theoretically possible as a loss-reducing measure.

(c) The attached Figures 1A through 1D provide a means of estimating bridged tap loss at 76 kHz, based upon a computer printout of bridging loss. One important difference is the method of calculations from the linear method of computing bridged tap used at voice frequencies must be observed. Instead of computing the loss by adding up all the bridged tap and then multiplying by a single factor in dB per kilofoot, each individual length of bridged tap should be converted to its corresponding loss by reading directly off the graph(s) of Figure 1. Then, these 76 kHz bridged tap losses should be added to determine the total bridged tap loss. This is so because of the open quarter wave "stub effect" occurring at about 2000 feet and somewhat less pronounced changes in shunt impedance at other lengths of bridged tap.

(d) Where bridged tap is encountered, it does not necessarily mean that a system cannot be used. It depends on the loss of the facility make-up to the subscriber plus the total loss due to all bridged tap. As can be seen from Figure 1B, a relatively short bridged tap may add more loss than a long one. Theoretically, a single bridged tap of infinite length would add exactly 4 dB loss but a single tap only 2000' long would add about 6.2 dB loss, and two bridged taps each exactly 2000' long would add 6.2 + 6.2 = 12.4 dB of bridging loss.

(e) 12.4 dB of bridging loss could reduce the maximum 24 gauge loop to 13 kilofeet.

(f) The bridging loss curves given in Figures 1A through 1D are based upon the insertion of bridged tap on the physical circuit. The special case of bridged tap on bridged tap has not been investigated.

6.03 Overall Loss Computation

(a) Upon completion of the overall computation, provided the answer is 43 db or less, the AML or SSC-1 system can be installed. No adjustments are necessary either at the central office or at the subscriber terminal.

6.04 Measured Overall 1000-Hertz

Circuit equivalent as a function of carrier frequency line loss.

(a)

C.O. TO SUBSCRIBER

76 kHz Carrier Line Loss in dB	Circuit Equivalent at 1000 Hertz
0	2.8 dB
12.4	3.0 dB
27.5	3.4 dB
42.3	3.8 dB
45.6	4.4 dB

SUBSCRIBER TO C.O.

28 kHz Carrier Line Loss in db	Circuit Equivalent at 1000 Hertz
0	0.7 dB
6.8	0.9 dB
15.0	1.4 dB
22.5	1.5 dB

6.05 Measured Overload Characteristics

(a)

C.O. TO SUBSCRIBER - 1000Hz.

Sending +2.0 dBm -0.2 db compressions at received terminal.

(b)

SUBSCRIBER TO C.O. - 1000Hz.

Sending +2.0 dBm -0.1 db compression at received terminal.

6.06 Crosstalk and Cable Fill

(a) Computed 76 kHz far-end crosstalk for an 18 kf loop indicates an equal level coupling loss of about 62 dB rms. The computed single disturber level at the subscriber's set is estimated at 18.8 dBx.

(b) For one measurement, of 76 kHz crosstalk coupling sending the equivalent of 0 dbm test tone into a double side band modulated system with transmitted carrier at +3 dbm; the measured demodulated level at the subscriber terminal output was 23 dbrn. From this, the correction for voice instead of sine wave may be compared with the 18.8 dBx computed in the previous paragraph. Note, however, that the 18.8 dbx is a median rms value and does not represent the worst individual coupling that can occur.

(c) 28 KHz coupling should typically prove to be from -2 to about +8 db worse than 76 KHz coupling depending upon separation of AML channels within the same feeder cable. 28 kHz crosstalk between widely separated channels can be reduced by assigning them to a different binder groups within the cable.

(d) It is recommended that each cable not exceed a 80% fill of carrier systems.

6.07 Effects of AML or SSC-1 Battery Feed Arrangements

(a) The AML or SSC-1 subscriber terminal draws less than 3 ma from the physical line, which corresponds to a leak of approximately 20,000 ohms when physical subscriber's phone is in an on-hook condition. This apparent leak increases to over 50,000 ohms when the physical circuit is in an off-hook condition.

(b) The current drawn from a physical subscriber's line by the system subscriber terminal is used to power a DC to DC inverter circuit, which furnishes approximately 8 ma of charging current to the nickel-cadmium battery during the time the physical subscriber's circuit is in an on-hook condition.

(c) The transmitter current furnished by the system subscriber terminal is 19-21 ma. This 19-21 ma is the value measured into a standard 500 type telephone set with a 51 ohm resistor replacing the transmitter carbon.

(d) Normal operation of an AML or SSC-1 unit on a physical cable pair causes the physical line to test from the central office as though it had a "short" to ground of about 43,000 ohms. A "line" test to the AML carrier telephone number appears as a 100,000 ohm "short".

(e) By way of comparison, other loops with special equipment also show a typical value of leakage. For example, a ground start PBX trunk will measure a line leakage equivalent to about 16,000 ohm "short".

6.08 Protection

(a) Both the AML or SSC-1 central office unit as well as the subscriber unit are provided with built-in auxiliary protection from lightening surges as well as voltages below the breakdown point of standard 3-mil carbon blocks. This auxiliary protection is furnished in the form of gas tubes and zener diodes to protect the transistors. All auxiliary protection is provided as an integral part of the circuit cards.

(b) Prototype models have been tested successfully with a 5000 volt discharge from a 60 MFD capacitor between line and drop. Every production unit receives a 1200 volt breakdown test before being shipped.

(c) The built-in auxiliary protection does not replace the need for standard station and central office protection. Standard station and central office protection must be provided with both the system subscriber and the associated physical subscriber(s).

6.09 Longitudinal to Metallic Balance

(a) The isolation filter used externally with the subscriber terminal and internally with the central office terminal has a measured balance of 65 dB at voice frequencies. This is sufficient to assure no measurable increase in noise on the physical line due to installation of the system.

6.10 Extensions from AML or SSC-1 Subscriber Terminals

(a) A 25 ohm loop resistance capability is available with system subscriber units. However, all cable or inside wiring extensions must use three wires to the telephone set. The yellow lead (to telephone ringer) can be connected to ground as desired. A maximum of three ringers can be powered from a single system subscriber terminal.

6.11 Field of Application for AML or SSC-1 Systems

(a) It seems advisable, upon initial introduction of AML or SSC-1 into a given central office, to selectively apply carrier system equipment in those locations where it will fit with little or no cable rearrangements.

(b) Special line treatment in the form of removed bridged taps may be warranted where a relatively large number of second line or primary service orders are being held in a specific location pending extensive cable relief (e.g. a relatively large requirement for additional primary or second line service in an apartment building where insufficient cable pairs are available).

6.12 In summary, the AML or SSC-1 equipment provides a highly flexible method of providing primary or second line service where cable pairs are insufficient for demand. It appears to be ideally suited to being integrated smoothly into exchange plant with minimum effort on the part of engineering, installation and maintenance personnel.

7. CIRCUIT DESCRIPTION

7.01 "Central Office Terminal"

The AML or SSC-1 central office terminal is powered by a normal 48 volt central office battery. This voltage is supplied through drop resistors to power regulation and control circuits.

7.02 Voltages derived from the power regulation and control circuit are used to:

(a) Power the standby circuit of the receiver on an "on-hook" condition.

(b) Turn on the transmitter when a carrier frequency signal is received from the subscriber terminal.

(c) Turn on the transmitter when ringing voltage is applied to the drop of the carrier-derived circuit and the subscriber terminal telephone is "on-hook".

7.03 When the subscriber terminal is in an "on-hook" condition, no carrier is transmitted from the subscriber terminal to the central office terminal. In this condition the contacts of the receive relay in the C.O. terminal are open. The 48 volt central office battery is filtered and regulated to a value of 9 volts and applied to the receiver carrier frequency amplifier and detector circuits. Under this condition the transmitting oscillator is not turned on and carrier frequency is not transmitted from the central office terminal. The central office terminal draws approximately 28 ma from the central office battery under all conditions. Here, it is regulated to a value of 8 volts and then applied to the receiver carrier frequency amplifier and detector circuits. These circuits under this condition draw approximately 3 ma from the central office equipment when the carrier circuit is idle.

7.04 When a carrier frequency signal is received from the subscriber terminal (carrier subscriber handset "off-hook") the received signal causes the receiver relay to close. This causes the line relay associated with the central office equipment to close, thus giving an "off-hook" indication to the central office equipment. The transistor which causes the receive relay to close also activates a control circuit, which turns on the transmit oscillator in the terminal and causes carrier current to be transmitted toward the subscriber terminal.

7.05 Thus, when the carrier subscriber handset goes "off-hook" it causes the central office transmitter to turn on; fully activates the receiver in the carrier terminal, making the complete terminal operative; and gives an indication to the central office dial equipment that the subscriber carrier terminal handset is in an "off-hook" condition.

7.06 When the subscriber carrier terminal handset is in an "on-hook" condition (receive relay in the C.O. terminal not energized) and ringing voltage is applied to the carrier drop, the ringing voltage is applied to the control circuit and causes the transmit oscillator to be turned on, thus causing carrier frequency to be transmitted toward the subscriber terminal.

7.07 When the subscriber terminal receives carrier current from the central office terminal and the subscriber terminal handset is in an "on-hook" condition, the subscriber terminal closes a circuit, which activates a 6 volts DC to 70 volts AC inverter to the subscriber terminal. Thus, the application of ringing current to the central office terminal when the carrier subscriber terminal handset is in an "on-hook" condition will cause the bell at the carrier subscriber terminal to ring.

7.08 Central office battery to the telephone on the normal physical circuit, over which the normal subscriber telephone is operated, is applied through a voice-band low pass filter (part of the central office terminal) to the physical circuit. This filter isolates the carrier frequency currents on the transmission pair from the normal physical circuit drop and central office equipment.

7.09 "Subscriber Terminal"

The subscriber terminal is completely powered by normal C.O. battery current which is supplied from the central office line relay circuit connected to the cable pair associated with the normally connected subscriber telephone on the physical circuit.

7.10 When the normally-connected subscriber telephone set is in an "on-hook" condition, C.O. battery is connected through a DC/DC inverted circuit to charge a nickel-cadmium battery, which is contained in the subscriber carrier terminal.

7.11 When the subscriber carrier terminal is in an on-hook condition, approximately 1.5 ma of current is supplied from the battery supply power to the receiver section of the subscriber carrier terminal. The receiver section consists of the receive carrier frequency amplifier and the detector circuit.

7.12 When the subscriber carrier terminal receives the carrier frequency from the central office carrier terminal (and the carrier subscriber handset is in an "on-hook" condition) the ring control circuit supplies power to an inverter which puts out a 20 hertz ringing voltage (nominal 70 volts) for application to the telephone set ringer.

7.13 When the telephone set connected to the carrier terminal is placed in an "off-hook" condition, power is applied to the transmitter section and to the voice frequency section of the receiver, placing the subscriber terminal in full operating condition.

7.14 When the subscriber terminal telephone set is in an "on-hook" condition and ringing current is not being applied at the central office terminal, total standby current of less than 3 ma is being drawn from the physical subscriber line. This current is used to operate a DC/DC inverter which furnishes approximately 8 ma at 6.8 volts to charge the nickel-cadmium battery. During standby 6 to 6.5 ma of charge current is flowing into the battery. The balance of this current is used to power the standby current drain of the subscriber terminal.

7.15 When the telephone connected to the physical circuit is in an "off-hook" condition, the DC/DC inverter is inactivated and the drain from the physical circuit drops to below 0.5 ma, which will not degrade the normally connected subscriber circuit.

7.16 Carrier frequency is supplied from the central office terminal when the subscriber terminal telephone set is in an "on-hook" condition (central office ringing applied to the central office terminal). This signal is applied to the ring control circuit, which applies power to the bell in the telephone set associated with the carrier terminal.

7.17 When the telephone set associated with the carrier terminal is placed in an "off-hook" condition, it deactivates the ringing control circuit and applies power to the transmitter in the subscriber terminal and the VF output stage in the receiver. The current drawn by these stages passes through the telephone set and provides talking battery.

7.18 Dialing the telephone set causes the transmitter to turn on and off in accordance with the dial pulses, and transmits signaling information to the central office terminal. The various tones from the subscribers handset in "Touch Tone" operation, also causes the transmitter to turn on and transmit the individual tones for signaling information.

8. SYSTEM PERFORMANCE SPECIFICATIONS

8.01 Method of transmission - double sideband amplitude modulated.

8.02 Frequency allocation - central office to subscriber = 76 KHz, subscriber to central office = 28 KHz.

8.03 Maximum system loss = 43 db at 76 KHz.

9. ADMINISTRATION

9.01 Prior to the installation of AML or SSC-1 in a given central office the District Plant and Engineering heads should become familiar with the features of the system and the benefits to be derived from its use.

9.02 The District Engineer will coordinate the planning of the use of the carrier systems with the concurrence of the District Plant Superintendent. The District Engineer should exercise control over administration of the AML or SSC-1 carrier based on the Present Worth Study as outlined in paragraph 3.04.

9.03 The administration of the use of the carrier systems in providing second line service may be governed by locally agreed to guide lines or ground rules, subject to approval of the District Engineer and the District Plant Superintendent. A study should be made to determine areas in which the systems can be used to advantage for second line service. When this is done the District Engineer should specify the cable complements for system carrier.

9.04 The application of AML or SSC-1 on working subscriber lines to provide primary service to other customers should be closely controlled. Close interdepartmental coordination is a must if proper economical administration of the use of the carrier systems are to be achieved. The District Engineer and the District Plant Superintendent will jointly determine those areas where conjested facility conditions may make the use of AML or SSC-1 attractive as a temporary measure to avoid the holding of orders pending relief on a scheduled project. In any event, individual carrier system assignments will not be made without concurrence of the Plant Engineer.

9.05 When interdepartmental agreement has been reached regarding the use of AML or SSC-1 in a given central office the following procedures are required:

(a) The District Engineer will request the Equipment Engineer, through a properly approved central office equipment recommendation, to issue a work order to install the number of C.O. terminals required to cover the immediate anticipated needs. The District Engineer will also advise the Equipment Engineer the future needs (3 year growth) to enable the Equipment Engineer to order the proper amount of C.O. mountings.

(b) The District Engineer shall notify the District Plant Superintendent of the number of C.O. terminals to be installed and the date they will be available for service.

(c) The District Plant Superintendent will arrange to order and stock the required number of subscriber terminals and filters required to handle service needs. The field units normally should not exceed the central office units. Transfer of units from one location to another is discouraged but when absolutely necessary, a form SN-65 must be prepared to cover the transfer.

(d) An inventory control record of the AML or SSC-1 equipment must be maintained. The record, Miscellaneous Central Office Facilities, Form E-4052, to be maintained in the Assignment office, is adequate for inventory control of the central office terminals. A record of the subscriber terminals and filters shall be kept for each location by the District Plant Superintendent. It should consist of the following items:

- Number of field units now installed
- Number of field units in stock
- Number of field units in process of being replaced or repaired
- Number of field units now on order

Copies of the inventory control records, both central office terminals and field units, shall be forwarded to the General Plant Manager as of the end of each quarter. The General Plant Manager shall summarize and forward a copy to the Building & Equipment Engineer.

(e) When the equipment is made available for use, Plant Assignment will establish Miscellaneous Equipment records as provided in the Assignment Practices.

10. ORDERING INFORMATION

10.01 All Central Office Terminals (COT) and Channel Racks will be ordered by the Equipment Engineer.

10.02 All orders for AML or SSC-1 systems will be placed through the Western Electric Company in the usual manner. Requisitions for subscriber terminal equipment should be approved by the District Plant Superintendent.

10.03 Ordering information for the Subscriber terminal and the Isolation Filter are as follows:

For AML System

(Quantity) AML-3 ST Subscriber Terminal
(Quantity) Isolation Filter AML-3 IF

Place on requisition the following statement "The above items to be obtained from Continental Telephone Electronics Corporation, 130 Casa Linda Plaza, Dallas, Texas 75218."

For SSC-1 System

(Quantity) 9960-1505 SSC-1 ST Subscriber Terminal

(Quantity) 9960-1507 SSC-1 IF Isolation Filter

(Quantity) 9960-3142 SSC-1 Pole Mounted Isolation Filter Housing equipped with Connecting Block and Isolation Filter

(Quantity) 9960-1694 SSC-1 Subscriber Terminal Nicad Battery

(Quantity) 9960-1763 SSC-1 Subscriber Terminal Base

(Quantity) 9960-1777 SSC-1 Subscriber Terminal Cover

Western Electric Company has a national quantity discount contract with P.E.D./ Seiscor Division. Therefore, place on your requisition the following statement:

"The above items to be obtained from P.E.D./ Seiscor Division, P.O. Box 1590, 7727 East 41st Street, Tulsa, Oklahoma 74145".

11. REFERENCE SECTIONS

11.01 Assignment procedures for AML or SSC-1 are covered in Section V66.203.3.

11.02 The general description and installation of the central office terminal is covered in Section 201-829-902SW.

11.03 The AML or SSC-1 Subscriber Terminal description and installation may be found in Section 640-200-901SW.

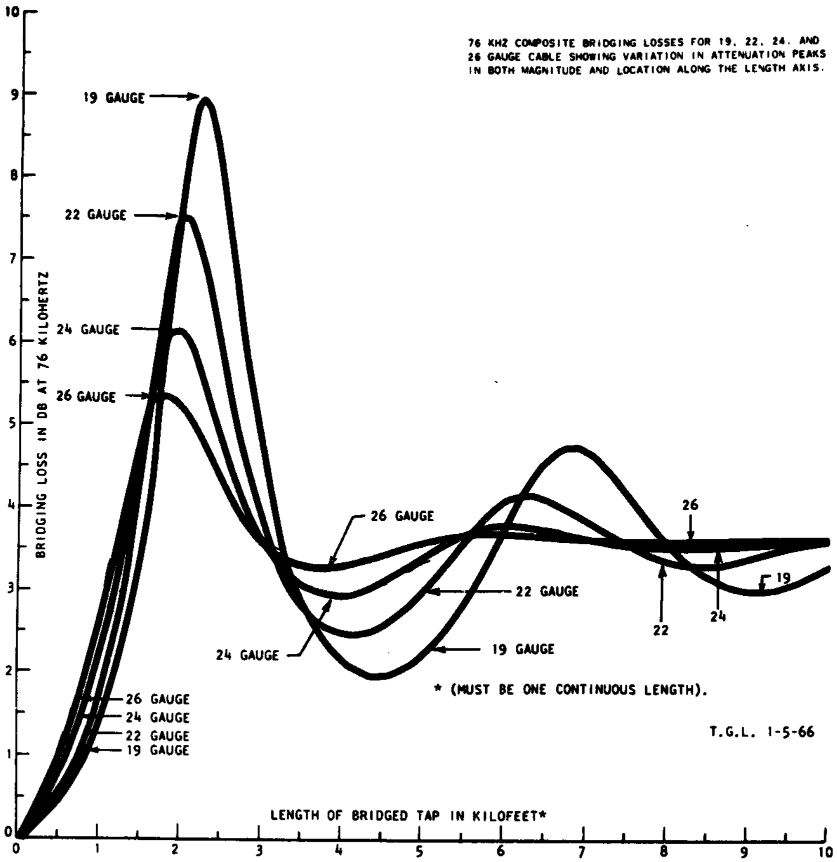

76 KHZ COMPOSITE BRIDGING LOSSES FOR 19, 22, 24, AND 26 GAUGE CABLE SHOWING VARIATION IN ATTENUATION PEAKS IN BOTH MAGNITUDE AND LOCATION ALONG THE LENGTH AXIS.
BRIDGING LOSS IN DB AT 76 KILOHERTZ
LENGTH OF BRIDGED TAP IN KILOFEET*
19 GAUGE
22 GAUGE
24 GAUGE
26 GAUGE
26 GAUGE
22 GAUGE
24 GAUGE
19 GAUGE
26
22
24
19
26 GAUGE
24 GAUGE
22 GAUGE
19 GAUGE
0
1
2
3
4
5
6
7
8
9
10
* (MUST BE ONE CONTINUOUS LENGTH).
T.G.L. 1-5-66

FIGURE 1

FIGURE 1A

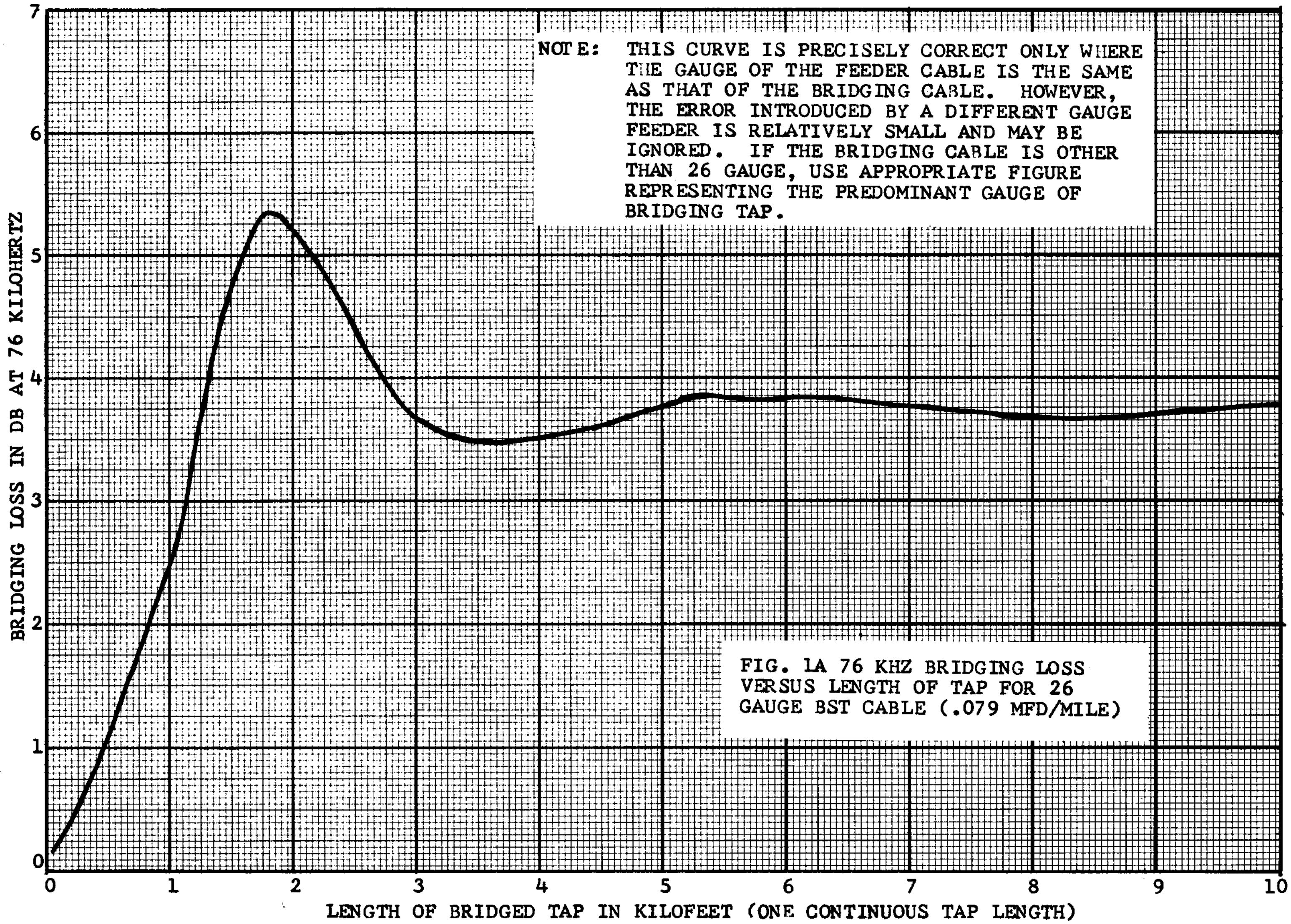


FIG. 1A 76 KHZ BRIDGING LOSS VERSUS LENGTH OF TAP FOR 26 GAUGE BST CABLE (.079 MFD/MILE)

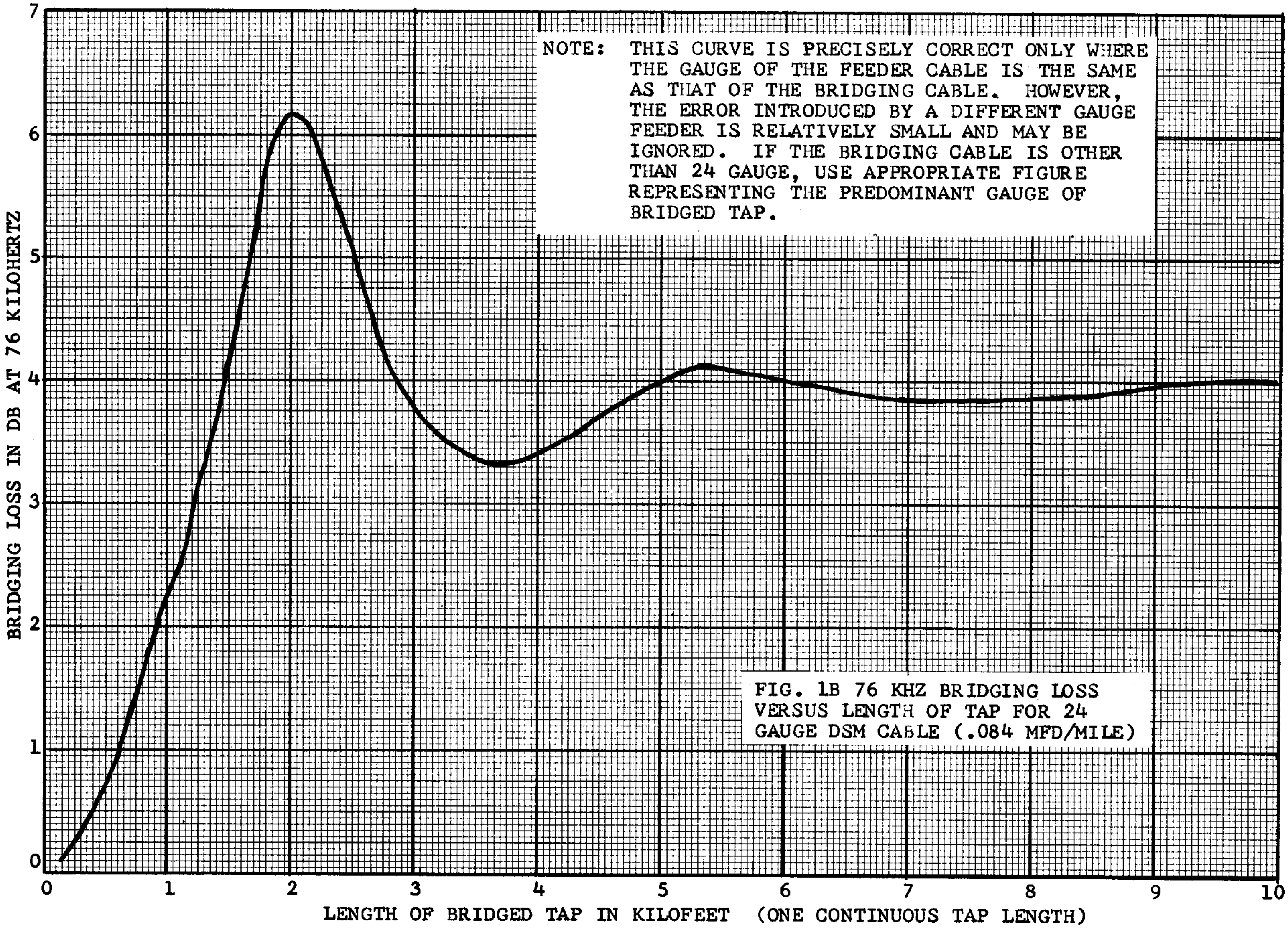


FIG. 1B 76 KHZ BRIDGING LOSS VERSUS LENGTH OF TAP FOR 24 GAUGE DSM CABLE (.084 MFD/MILE)

FIGURE 1B

FIGURE 1C

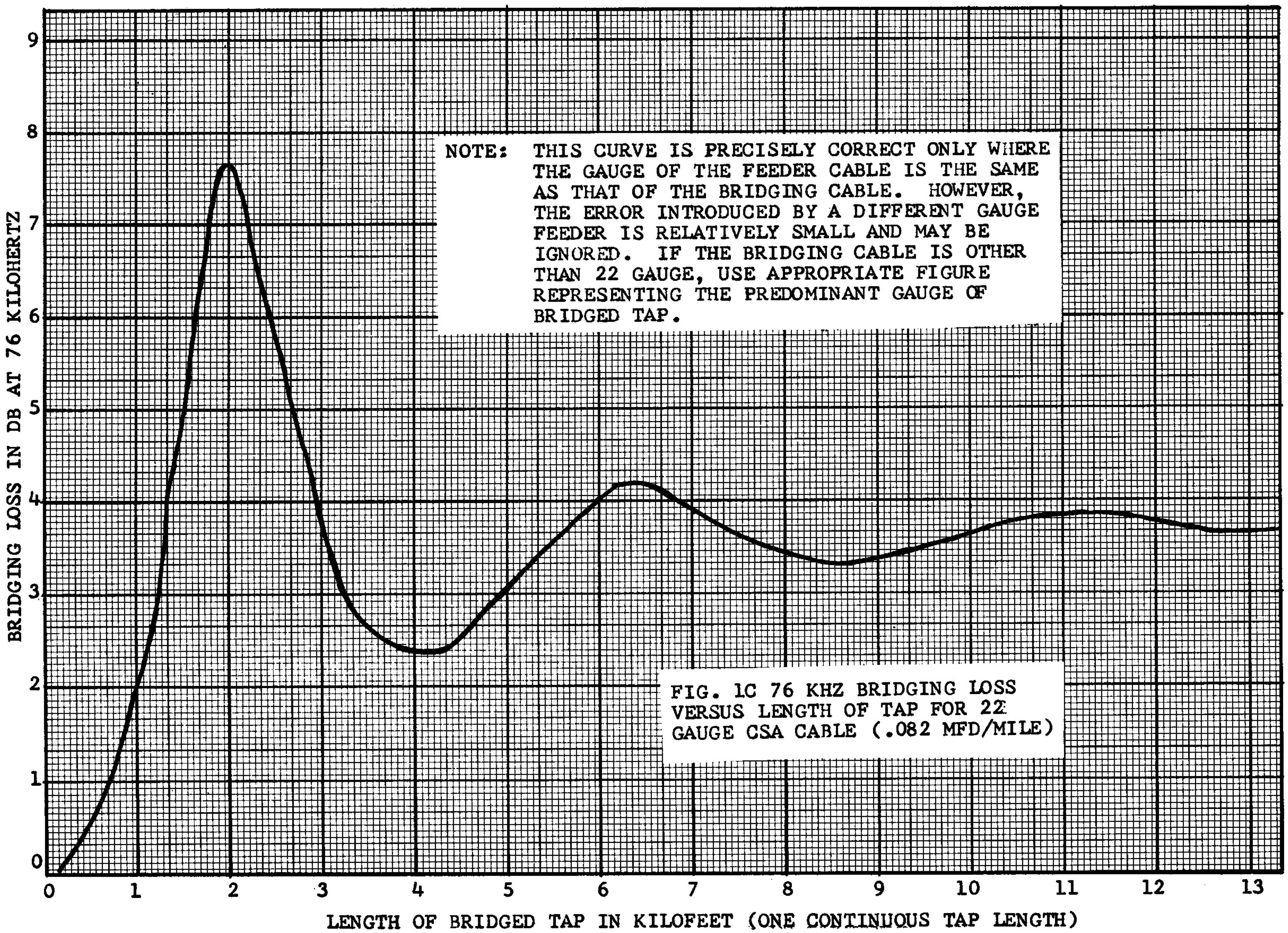


FIG. 1C 76 KHZ BRIDGING LOSS VERSUS LENGTH OF TAP FOR 22 GAUGE CSA CABLE (.082 MFD/MILE)

FIGURE 1D

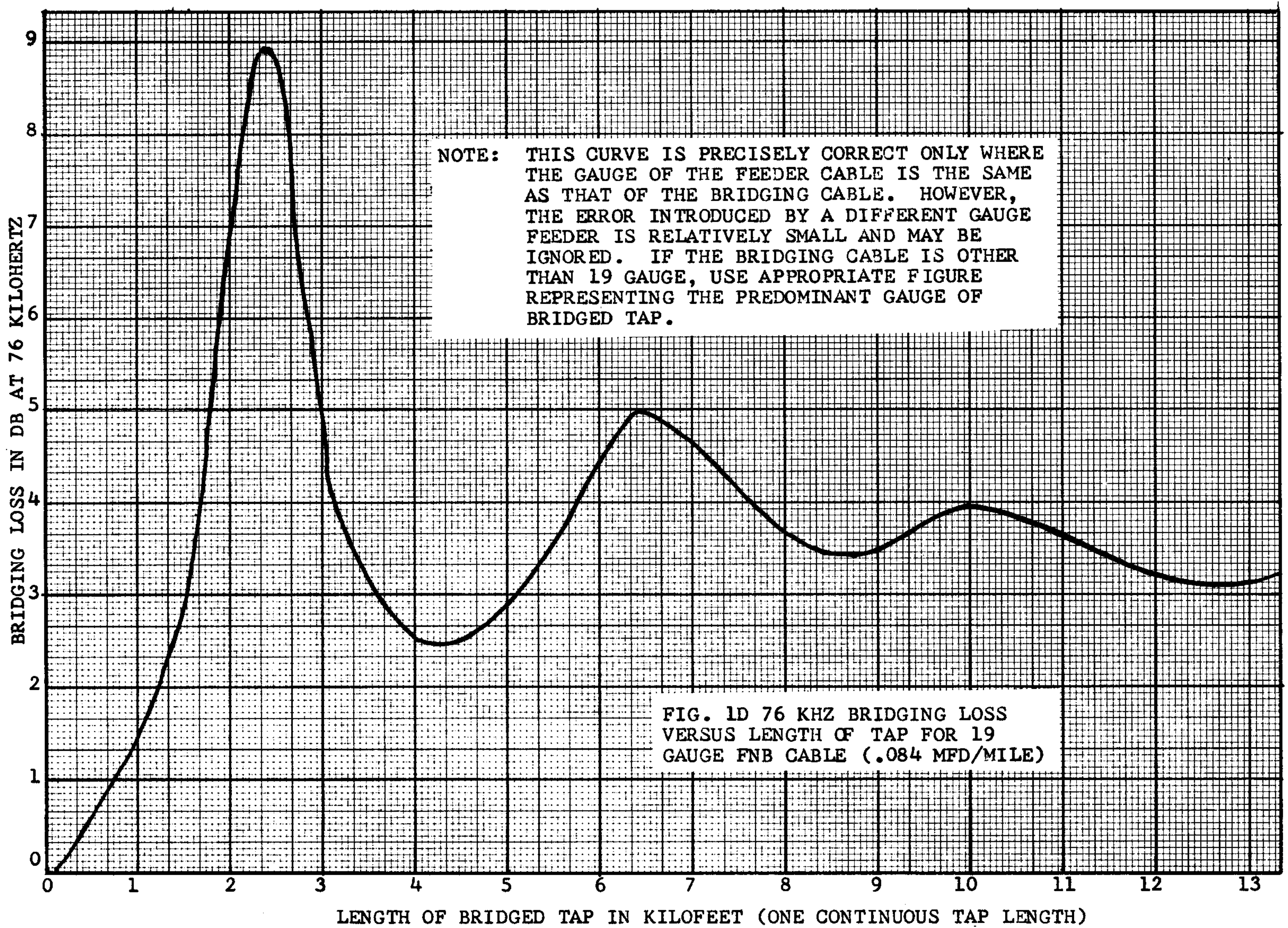
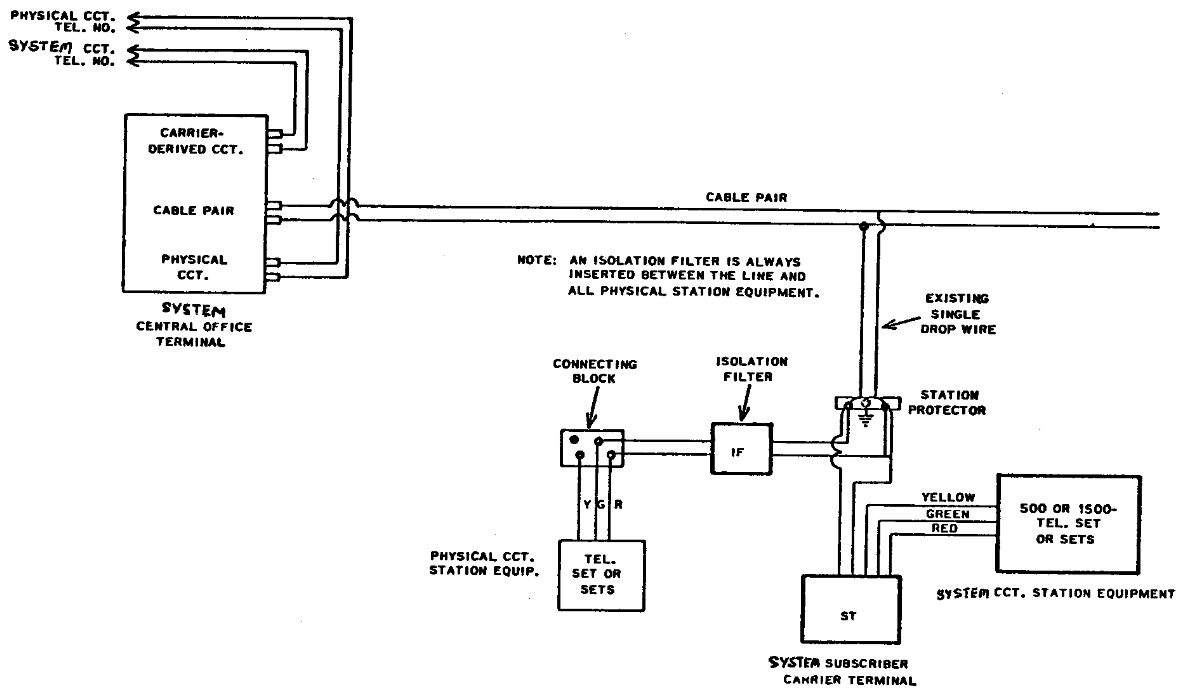
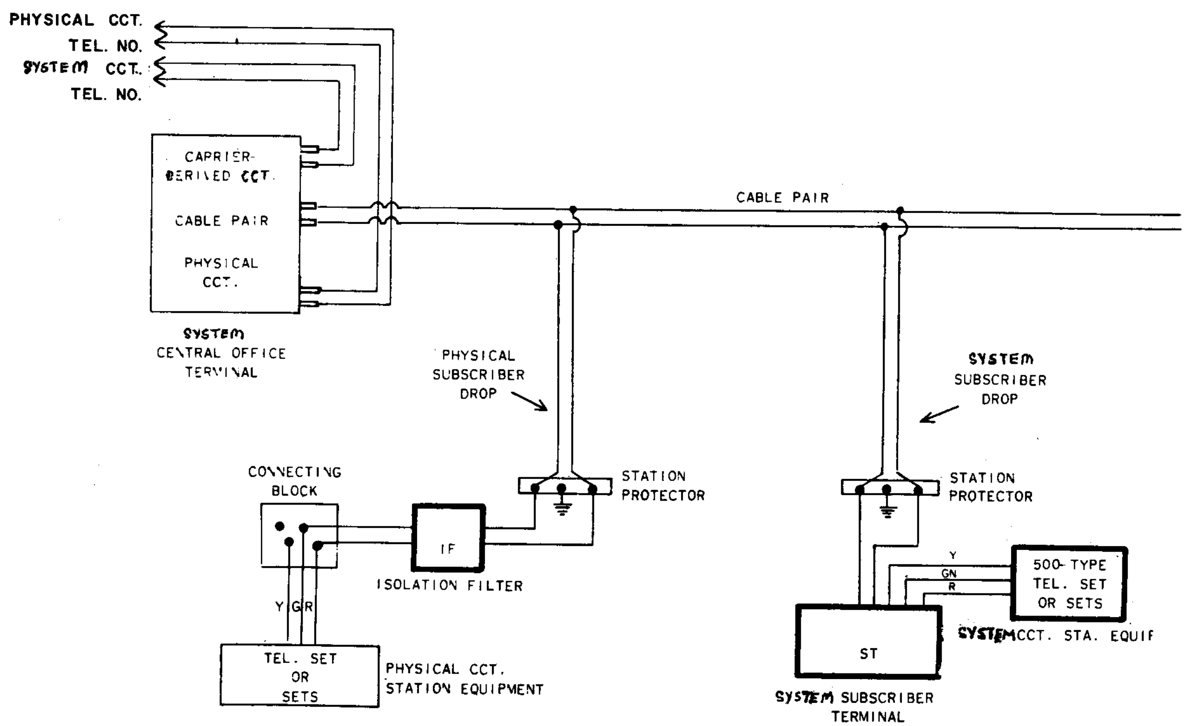


FIG. 1D 76 KHZ BRIDGING LOSS VERSUS LENGTH OF TAP FOR 19 GAUGE FNB CABLE (.084 MFD/MILE)

FIGURE 2



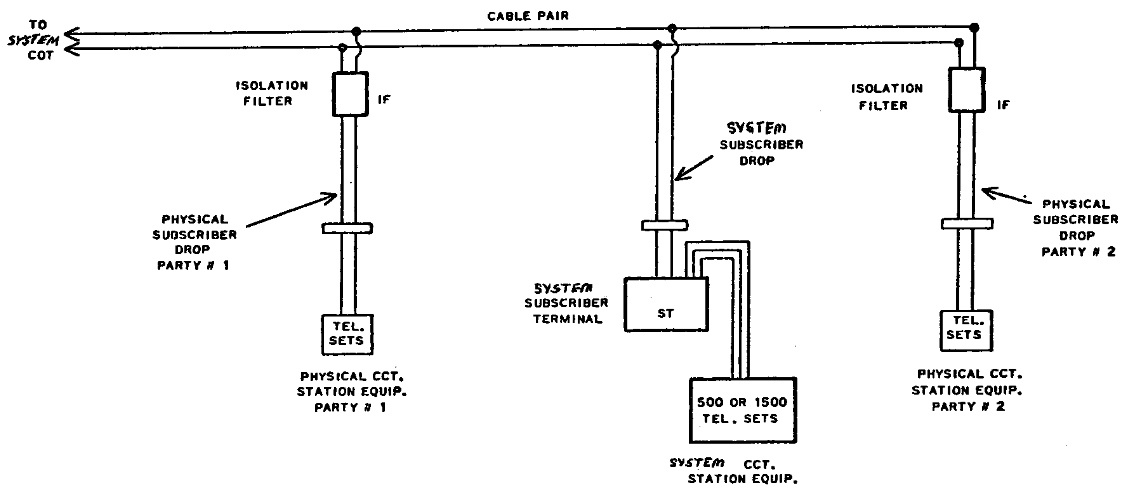
CARRIER SYSTEM - TYPICAL APPLICATION AS A SECOND LINE ON SAME PREMISES.



CARRIER SYSTEM - TYPICAL APPLICATION FOR PROVIDING PRIMARY SERVICE ON SEPARATE PREMISES FROM PHYSICAL-CIRCUIT STATION EQUIPMENT.

FIGURE 3

FIGURE 4



CARRIER SYSTEM - TYPICAL APPLICATION: ADDED PRIMARY SERVICE ON AN EXISTING TWO-PARTY LINE.