

SUBSCRIBER LINE CARRIER SYSTEMS-ADDED MAIN LINE SYSTEM
INSTALLATIONS AND CONNECTIONS
CENTRAL OFFICE AND SUBSCRIBER TERMINALS

1. GENERAL

1.01 This section includes information on the installation of both the central office and the subscriber terminal of an "Added Main Line" carrier telephone system.

1.02 This section is reissued to include information on an improved version of the "Added Main Line" carrier system designated "AML-3". Information on the earlier system, now designated "AML-2", has been retained for reference and maintenance purposes.

1.03 In the paragraphs that follow, the "AML-3" version will usually be given first, followed by paragraphs covering the older "AML-2" version of the equipment. If the subject matter is such that it applies to both AML-3 and AML-2, then the equipment will be referred to in general terms as "Added Main Line" or "AML".

1.04 The AML-2 central office terminal, "COT", will continue to be supplied where single-channel mounting on the horizontal main frame is required. It may also be obtained for purposes of "filling out" remaining spaces on relay rack mounting bars. The AML-2 subscriber terminal, "ST", is now "manufacture discontinued".

2. AML-3 CENTRAL OFFICE TERMINAL -
DESCRIPTION AND GENERAL INSTAL-
LATION PROCEDURE

2.01 The mounting for AML-3 COT's is by means of a relay rack mounted card rack with provisions for plugging in individual AML-3 COT's. Each AML-3 COT consists of a single printed circuit card which contains both the carrier circuitry and the low pass filter used to isolate the physical telephone circuit from the carrier line.

2.02 The rack mounted card holder for 23" rack uses 3 mounting spaces and is designed to accommodate 12 AML-3 COT cards. Another version of the 23" rack mount occupies 14 rack spaces and accommodates 60 AML-3 COT's. 19" rack mounts occupy 4 rack spaces or 7" for 10 COT units with the second option occupying 16 rack units or 28" and housing 50 AML-3 COT units.

2.03 All connections are made to the rear of the rack mounted card housing to wire wrap terminals on the card plugs. Wiring is as shown in Figure 1.

2.04 An optional mounting for AML-3 COT terminals to permit mounting on the MDF is now under development. Details will be provided in suitable addenda as the equipment becomes available.

2.05 Cabling from relay rack COT's to the bunching block on the horizontal frame should follow standard practices with regard to numbering of channels, fanning out and dressing of leads, and lashing of the finished wiring. Special care should be taken to insure that the color code is strictly followed and that no split pairs occur in the cabling. (See Figure 1)

2.06 48 volt central office power is necessary for the operation of AML-3 COT units. Each unit draws 25 milliamperes which amounts to 300 milliamperes per 12 channel shelf. The central office battery is applied through a 1360 ohm dropping resistor which is a part of each channel card. For this reason, failure of the electronic portion cannot blow a central office fuse so that the number of channels powered from one fuse is optional.

3. AML-2 CENTRAL OFFICE TERMINAL - DESCRIPTION AND GENERAL INSTALLATION PROCEDURE

3.01 The AML-2 COT unit consists of a molded plastic enclosure containing a single printed-wiring board. It is designed for mounting on the horizontal main frame where only a relatively small number, say, up to about 50 AML channels, are needed. With suitable horizontal mounting bars attached to a 19 or 23 inch bay, standard relay rack mounting for larger numbers of AML central office terminals can also be accommodated.

3.02 The plastic enclosure contains the complete central office terminal. No power feed or common equipment needs to be associated with the AML channel. Gas tube

protectors and zener diodes are built in which coordinate with the main frame protectors. A terminal strip is provided on top of the unit for connection of the three pairs of wires needed to complete the installation.

3.03 Physical dimensions of the AML-2 central office terminal are 6" X 6" X 1½". Figure 9 shows the AML central office terminal mounted on the horizontal main frame. The wiring lugs protrude in front of the horizontal ironwork to a distance equal to or less than that of standard bunching blocks. All lugs are plainly marked and wiring is as shown in Figure 9.

3.04 Although AML-2 lends itself very easily to installation of one system at a time in the central office, the preferred procedure is to have perhaps 10, 20 or even 50 of these units furnished and mounted on a job authorization. Then, final wiring to specific number groups and terminals can be provided via service order advice from the Plant Assignment office.

3.05 Preferred locations for horizontal frame mounted units are to be found generally in miscellaneous space near the top of the frame and usually at a location where the minimum number of jumpers will have to be laid by these units at a later date. A location near the end of the frame is usually most suitable. The lugs on the AML central office terminal have been strengthened compared to prototype models but special precaution appears to still be justified. Thus, tension should be relieved on the jumper wires by tying them off in the most convenient manner.

3.06 Relay rack mounting is provided by the use of special mounting bars manufactured by the Superior Cable Corporation. Figure 11 provides a manufacturing drawing of the relay rack mounting.

(A) For 19-inch mountings, the bar is part number 71-809-01. The 19-inch mounting bar provides space for 11 AML central office terminals in five 1 3/4" vertical mounting spaces or 8 3/4" inches.

(B) For 23-inch mountings, the bar is part number 71-809-02. The 23-inch mounting bar provides space for 14 AML units in the same vertical space.

3.07 Cabling from relay rack mounted central office terminals to the bunching blocks on the horizontal frame should follow standard practices with regard to numbering of channels, fanning out and dressing of leads, and lashing of the finished wiring. The lugs on the bunching block should correspond in position (front-to-back) with those on the AML unit itself. Special care should be taken to insure that the color code is strictly followed and that no "split" pairs occur in the cabling. See Figure 12 for details.

4. AML-2 CENTRAL OFFICE TERMINAL - INSTALLATION INSTRUCTIONS

4.01 Mount the central office terminal or "AML-2 COT" unit on the iron work of frame or mounting bar using the mounting plate and screw provided. Refer to Figure 10 for the following steps.

4.02 Using jumper wire connect the two rear terminals to the

group and terminal of the private line subscriber to be served by AML.

4.03 Using jumper wire connect the two middle terminals to the protector and physical cable pair.

4.04 Using jumper wire, connect the two front terminals to the group and terminal of the subscriber(s) served on the physical.

4.05 At this point, it is well to temporarily connect an AML subscriber terminal to the physical pair terminals and check operation by dialing up the AML subscriber number. A ringer can be used to verify ringing and a test set to verify talking. If the unit does not operate, check wiring, C.O. line assignment, etc. If trouble cannot be found, substitute another AML subscriber terminal and/or COT. This step saves disturbing subscribers and facilitates rapid installation and check out of AML at the station.

5. AML-3 COT INSTALLATION INSTRUCTIONS

5.01 Mount the card holder for the AML-3 COT units on designated relay rack. Refer to Figure 2 for the following steps.

5.02 Wire wrap connections on the socket pins of the AML-3 card rack reading from top to bottom are designated as A, B, C, D, E, F, H, J, K & L. Cabling from relay rack to bunching blocks should correspond in position, front to back, with wire wrap socket pins on the AML-3 card rack reading from top to bottom. The top two terminals on the AML-3 card rack designated A & B are the carrier derived

circuit tip and ring. The next two terminals C & D are the physical circuit tip and ring. The next two, E & F, go to the cable pair tip and ring. The first terminal below this, H, is vacant. The next terminal, J, is ground and central office positive battery. The bottom terminal, L, is minus 48 volt central office battery and goes to the fuse block assigned to the AML-3 terminal.

5.03 Using jumper wire, connect the two rear terminals of the bunching block to the protector and physical cable pair.

5.04 Using jumper wire, connect the two middle terminals of the bunching block to the group and terminal of the subscriber(s) served by the physical.

5.05 Using jumper wire, connect the two front terminals of the bunching block to the group and terminal of the private line subscriber to be served by AML-3.

5.06 At this point, it is well to temporarily connect an AML-3 subscriber terminal to the physical pair terminals and check operation by dialing up the AML-3 subscriber number. A ringer can be used to verify ringing and a test set to verify talking. If the unit does not operate, check wiring, C. O. line assignment, etc. If trouble cannot be found, substitute another AML-3 subscriber terminal and/or COT. This step saves disturbing subscribers and facilitates rapid installation and check-out of AML-3 at the station.

NOTE: If the above check is made before the cable pair is connected to the AML-3 central

office terminal, a .1 microfarad condenser should temporarily be connected across the jumper used to connect the central office terminal with the subscriber terminal. This will furnish proper termination for the carrier frequency filters and assure proper check-out of the carrier units.

6. AML-3 SUBSCRIBER TERMINAL - DESCRIPTION

6.01 This unit consists of a molded plastic enclosure suitable for mounting on floor joists, backboards, walls or other convenient locations on the subscriber's premises. The physical dimensions of this assembly are 6" by 4½" by 1½".

6.02 The complete "AML-3 ST" or Added Main Line subscriber terminal circuit is contained on one printed wiring board which slides into grooves in the plastic base-mounting unit. Gas tube protectors and zener diodes are built in which coordinate with the station protection provided at the customer's premises.

6.03 Where second line service is to be provided on the same customer's premises, an isolation filter coded "AML-3 IF" is also used to separate the carrier circuit from the physical circuit. The isolation filter is always inserted between the station protector and any existing station wiring in order to provide for isolation of the two services.

6.04 Where primary service via an AML-3 channel is to be provided, isolation filters (AML-3 IF) must be installed on all physical

parties working on the same pair with the AML-3 channel. These units are usually mounted adjacent to the station protector on the physical subscriber's premises. They are, in effect, inserted between the station protector and the station wiring.

7. SUBSCRIBER TERMINAL - INSTALLATION INSTRUCTIONS

7.01 If the AML-3 ST unit has been in storage over 60 days, the nickel-cadmium battery may be at least partially discharged. In such cases, it can be charged by connecting the CXR line terminals of the AML-3 ST unit to any 48 volt resistance-type battery feed circuit in the central office. An overnight charge will be adequate to deliver full rated voltage to the subscriber terminal circuitry.

7.02 Remove the snap cover from the unit and slide out the printed circuit card.

CAUTION: Do not set the circuit board on any metal surface if battery is connected.

7.03 Mount the plastic base unit as near to the station protector and to existing connecting blocks as possible. Be sure to leave sufficient room to remove the circuit card at a later date, should this ever become necessary.

7.04 Replace the circuit card by sliding it into the plastic base mount and insert the 6 volt nickel-cadmium battery into its holder on the card using associated quick-connect terminals.

7.05 Mount the isolation filter, "AML-3 IF", near the station

protectors, using the screws provided.

7.06 Refer to application drawings on Figures 13, 14, and 15; and to Figure 5 of BSP 363-910-100 SB for schematic wiring information. Refer to Figures 2 and 6 for AML-3 connection details.

7.07 Disconnect the physical subscriber's station wiring leads from the protector and connect the blue and white pair from the isolation filter to the station protector using the same lugs as those connected to the incoming drop wire.

7.08 Connect the orange and white pair from the AML-3 IF unit to a connecting block.

7.09 Re-connect all physical circuit station wiring to the same lugs on the connecting block as the orange and white leads from the AML-3 IF unit.

7.10 At this point follow normal check-out procedure for the physical subscriber's circuit.

7.11 Connect the Added Main Line subscriber terminal AML-3 ST as shown in Figure 15 with CXR leads wired direct to the station protector lugs (already connected to the drop and to the isolation filter blue and white leads). The AML-3 ST unit is in effect bridged directly onto the incoming drop.

7.12 Connect the tip (green) and ring (red) wires to the AML-3 ST unit as shown in Figure 15. Also connect the "bell" or yellow wire as shown.

CAUTION: Do not multiple the yellow

lead from the telephone set to either the tip or the ring from the set. A separate wire must be used all the way to the AML-3 ST unit.

It may be desirable to connect the yellow lead to ground to minimize radio interference where this is a problem. The yellow lead also may use one of the leads between the lighting transformer used for PRINCESS and TRIM LINE telephones and the telephone instrument. See Figure 2.

7.13 Snap the plastic cover on the base mount for the AML-3 ST unit. This completes the installation and wiring.

7.14 Verify that a 500-type set has been used for the AML-3 subscriber. If AML is to be used for key systems, see Section 8 on installation restrictions and special instructions.

CAUTION: Verify that there has been no tip and ring turn-over between the terminals of the AML-3 subscriber terminal unit and the telephone instrument. If a turn-over exists, the telephone will ring continuously when called. Under this trouble condition, it will continue to ring until the battery is exhausted or until the telephone is answered. This problem may be avoided by careful verification of the station wiring.

7.15 Follow normal check-out procedure for the new installation and refer to the section on maintenance and trouble shooting if any difficulty is encountered.

CAUTION: Since the cable pair now

provides service not only on the physical but also via an AML-3 carrier channel, a lineman's telephone set should not be bridged directly across the cable pair, either at the station protector, or at one or more terminals along the cable route. It is suggested that the installer-repairman be equipped with a spare AML-3 IF isolation filter fitted with clips on the leads. The isolation filter should be inserted between the lineman's telephone set and the cable pair whenever test calls or connections are made on AML-3 equipped cable pairs. Failure to follow these instructions will cause the AML-3 subscriber's telephone during the interval of test to be out of service due to the shunting effect of the lineman's set at carrier frequencies.

7.16 In order to minimize the possibility that AML-3 circuits will be placed out of service during other installation or repair work along the cable route, SSP treatment per B.S.P. Section 680-520-010 SB should be applied.

8. SUBSCRIBER TERMINAL - INSTALLATION RESTRICTIONS AND SPECIAL INSTRUCTIONS

8.01 The earlier AML-2 carrier system had a number of restrictions involving two factors:

- (1) central office circuits which at times had a "dry-circuit" time of over 100 milliseconds.
- (2) subscriber charging current and transmitter current limitations in the talking condition.

These factors prevented the earlier

system from being used in any Number One Crossbar office and in certain step-by-step offices with mal-adjusted line relays. It also did not release from Number Five Crossbar offices where ANI two-party lines were cross connected and used in the central office as though they were private lines.

The earlier charging current and transmitter current characteristics of the AML-2 ST unit prevented its use for deriving additional central office facilities connected to key telephone systems and made marginal the operation of TOUCH-TONE calling subscriber sets. It also prohibited the use of all special-purpose instruments such as "hard-of-hearing" sets, etc.

8.02 The AML-3 system overcomes most of the earlier restrictions on AML-2 but does not eliminate them entirely. The following restrictions apply to AML-3 until revised by suitable addenda or other communications:

(1) Do not use AML-3 for any special-purpose telephone instrument including DATAPHONE and DTWX sets.

(2) Do not use AML-3 for "ground-start" PBX trunks or any other circuit using ground-start features (automatic call distributors, etc.).

(3) Do not install AML-3 "central office" terminals in a PBX. The reversed high-frequency line allocation with respect to central office mounted units can be expected to cause intolerable crosstalk.

(4) AML-3 has not been tested

for derived lines on 1A2 key systems. Until this is done, restrict usage of this nature to type 1A1 key systems.

(5) Do not use AML-3 for foreign exchange service without first consulting transmission engineering. Generally, interoffice trunk cables are too noisy and special methods or assignments may be required to keep crosstalk under control.

8.03 AML-3 may be used in providing service to "TOUCH-TONE calling" sets.

8.04 AML-3 may be used in providing attendant's PBX trunks since they are all loop signaling.

8.05 When installing AML-3 on a 1A1 key system, the central office end should be arranged to ring metallically - not to ground. The subscriber end should be wired for the "bell" or yellow lead connected to "local ground". This procedure will not electrically unbalance the "line" and should not cause any undue susceptibility to noise induction.

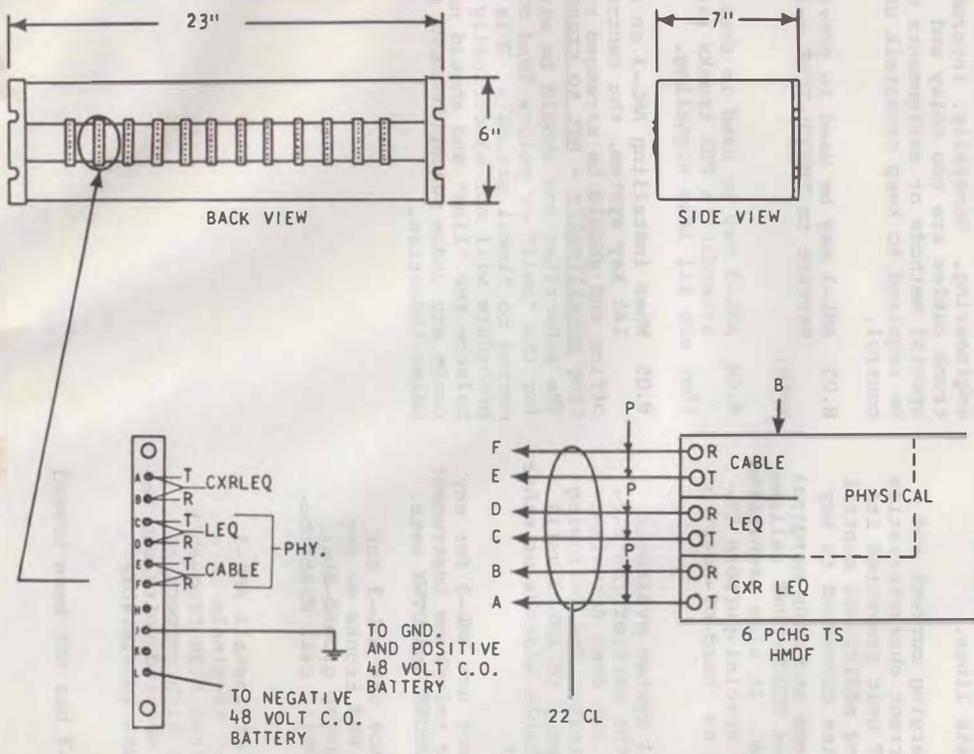


FIGURE 1 AML-3 CENTRAL OFFICE TERMINAL CABLING FROM RELAY RACK BAY TO MDF

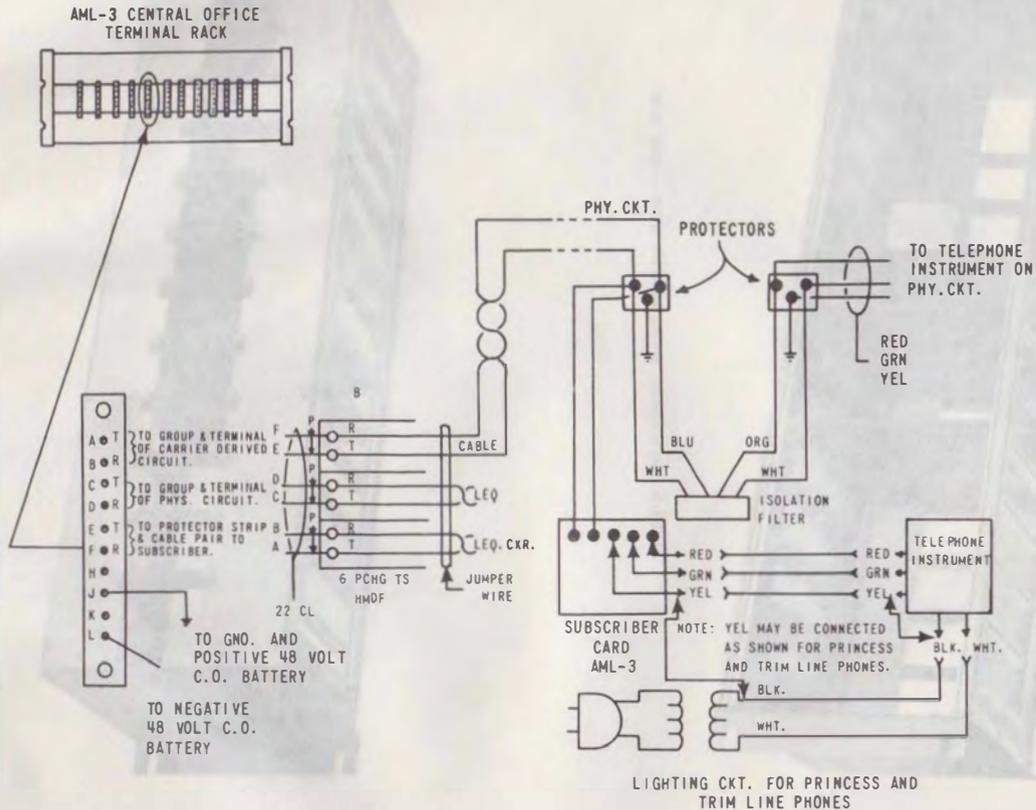


FIGURE 2 AML-3

SIMPLIFIED CONNECTION DIAGRAM

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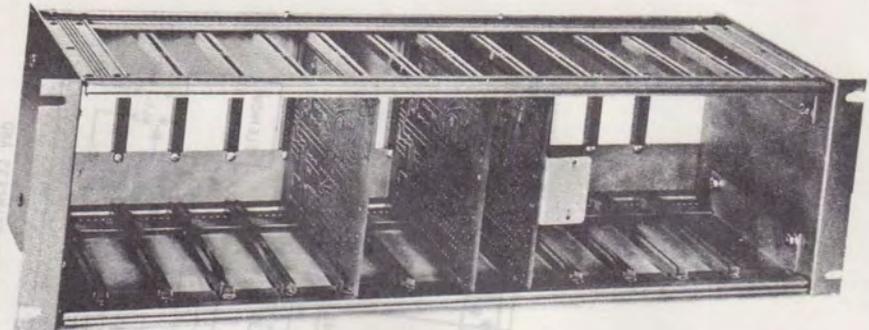


FIGURE 3 AML-3 CENTRAL OFFICE MOUNTING SHELF - FRONT VIEW

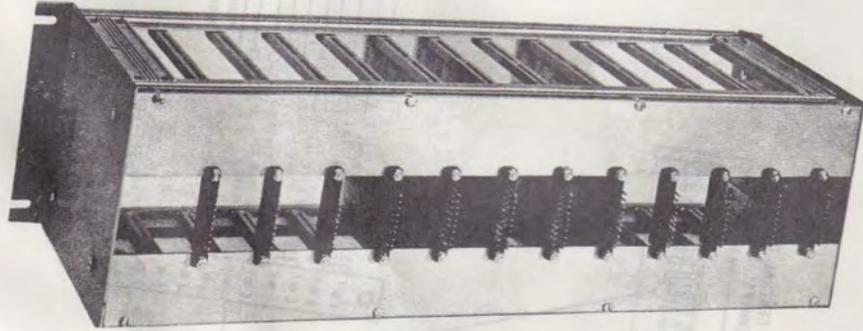


FIGURE 4 AML-3 CENTRAL OFFICE MOUNTING SHELF - REAR VIEW

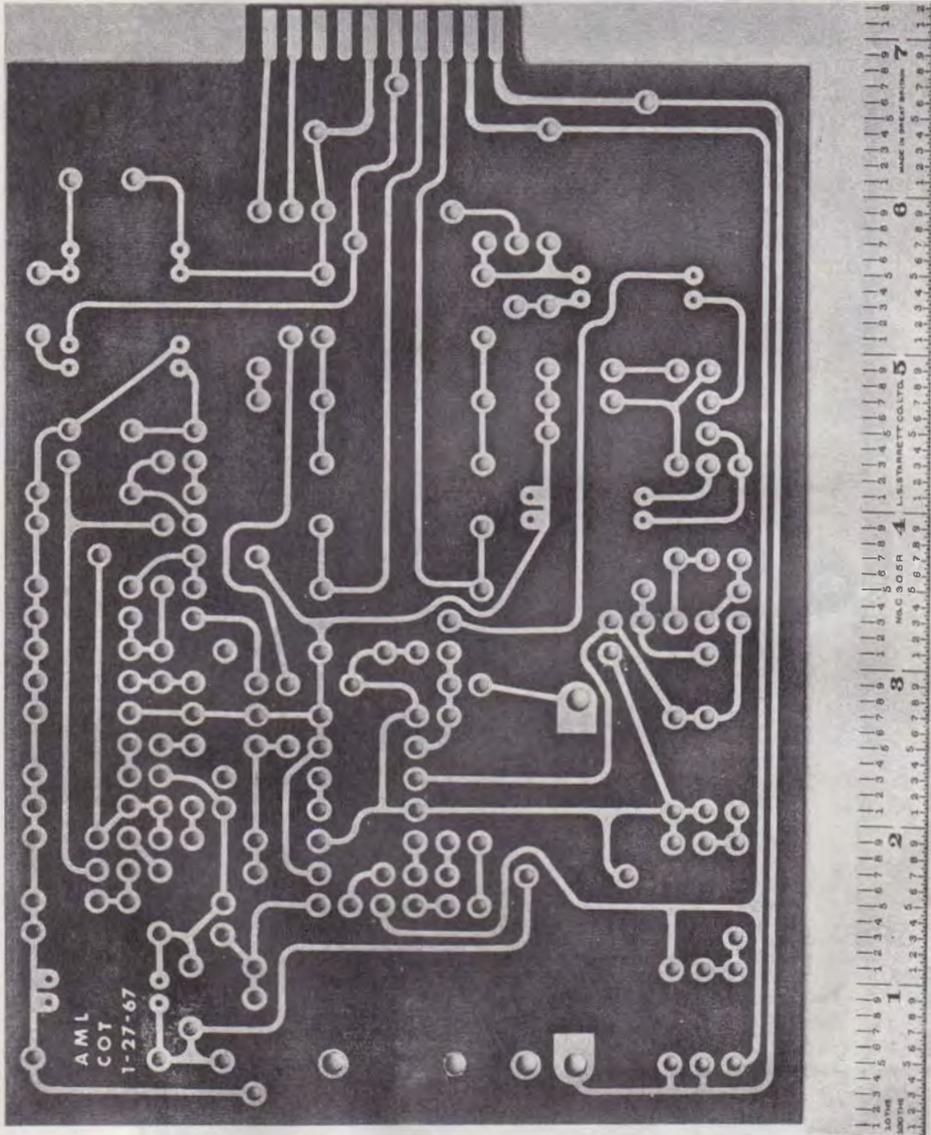


FIGURE 5 AML-3 CENTRAL OFFICE TERMINAL-CIRCUIT CARD

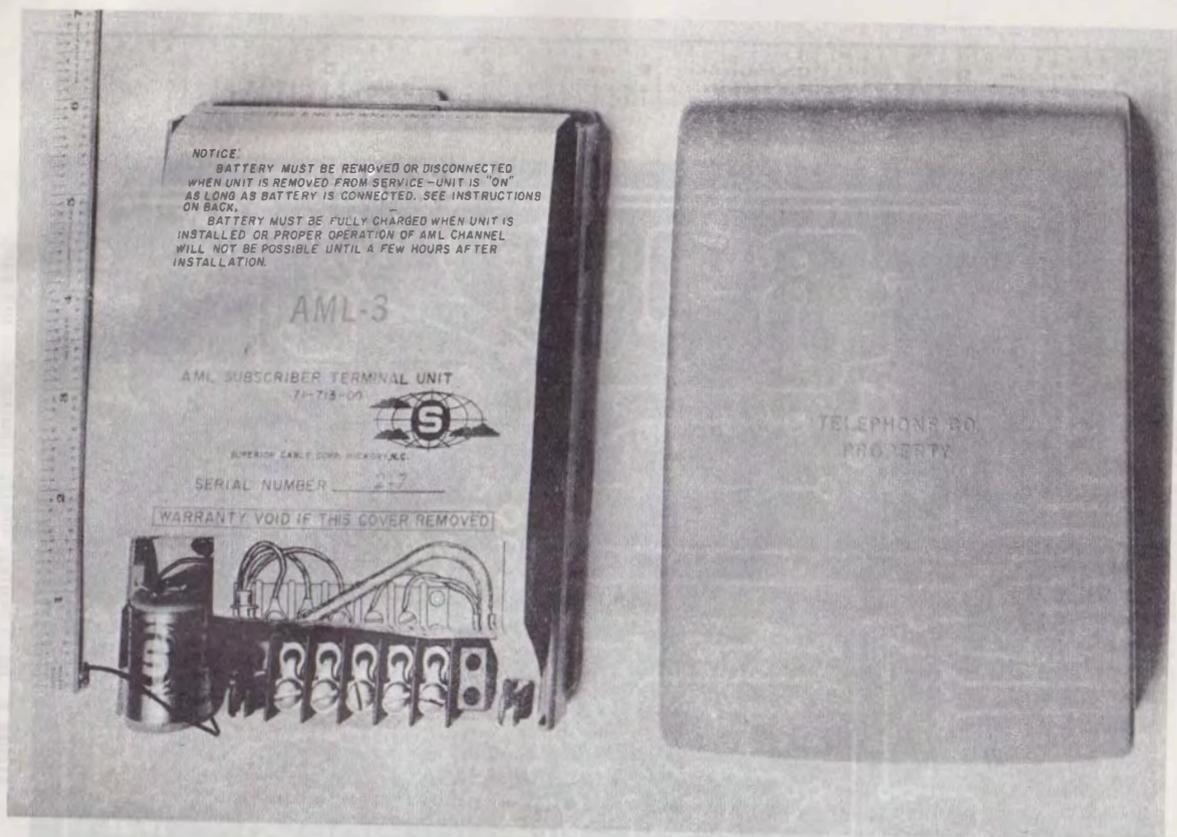


FIGURE 6 AML-3 SUBSCRIBER TERMINAL UNIT

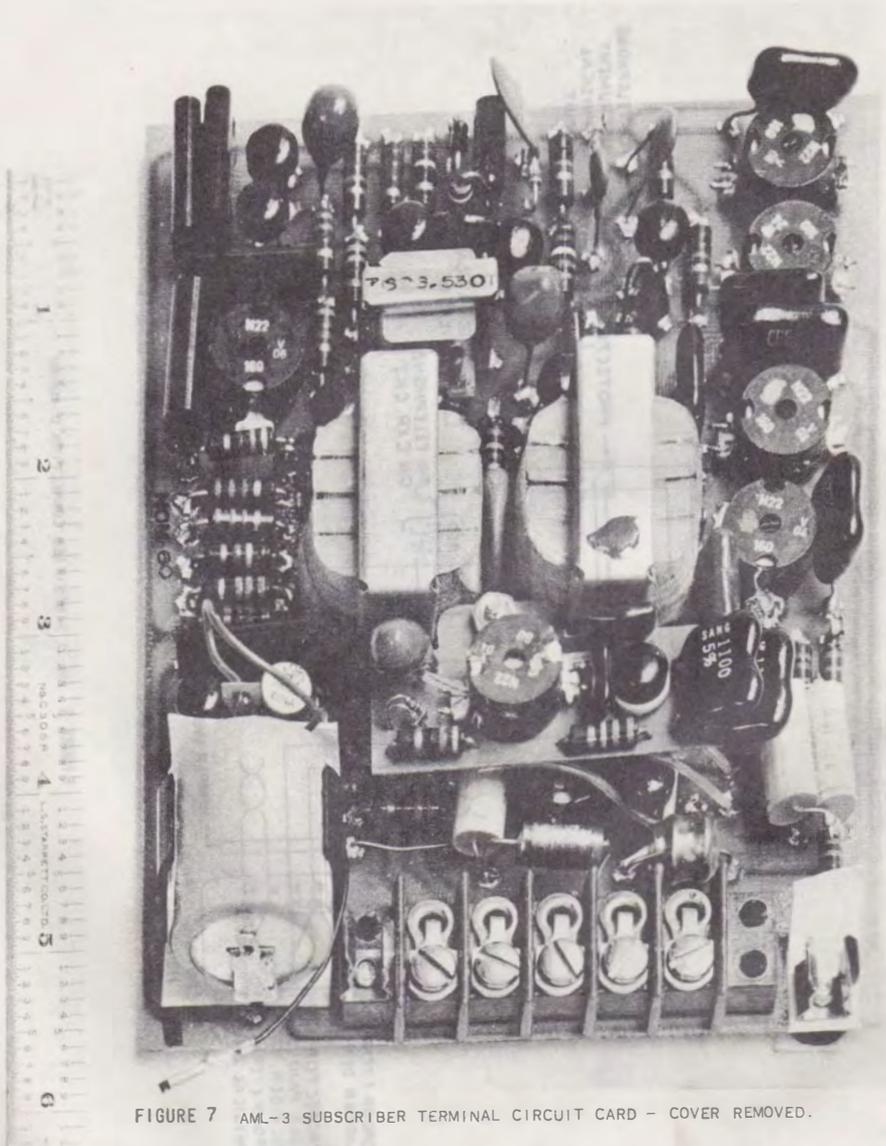


FIGURE 7 AML-3 SUBSCRIBER TERMINAL CIRCUIT CARD - COVER REMOVED.

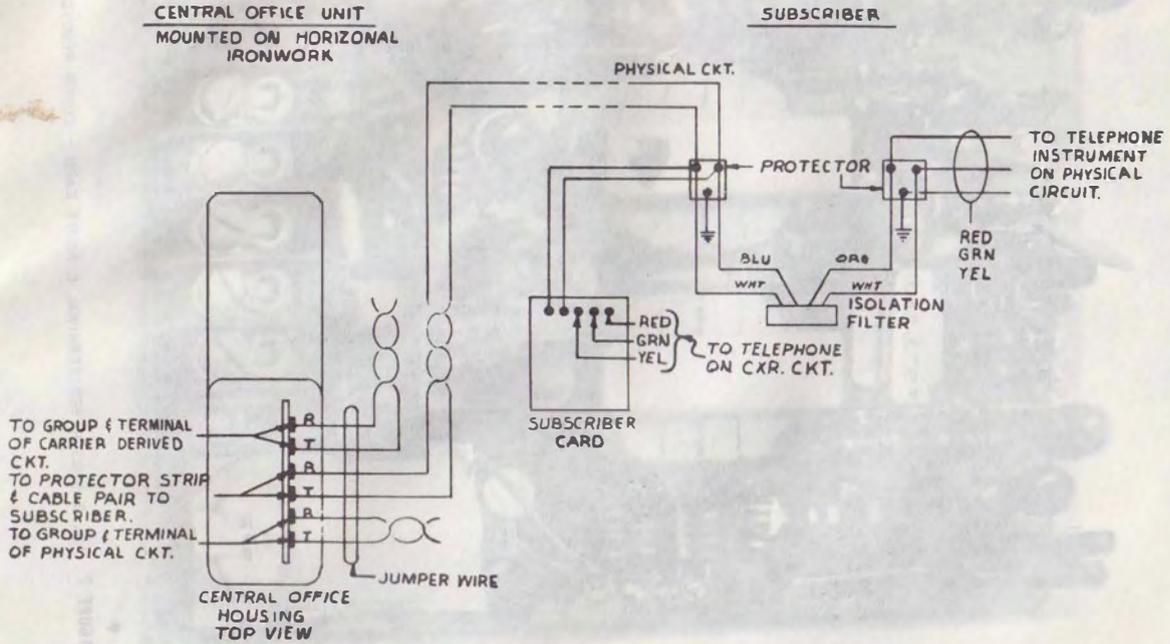


FIGURE 8 AML-2 SIMPLIFIED CONNECTION DIAGRAM

HORIZONTAL IRONWORK ON
BUNCHING BLOCK SIDE OF
MAIN FRAME

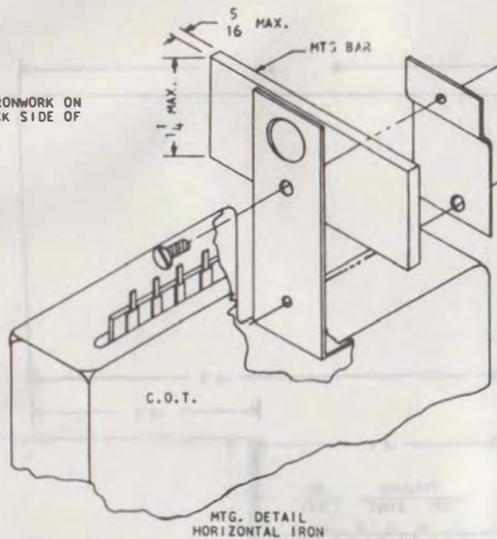


FIGURE 9 MOUNTING DETAIL FOR AML 2
CENTRAL OFFICE TERMINAL

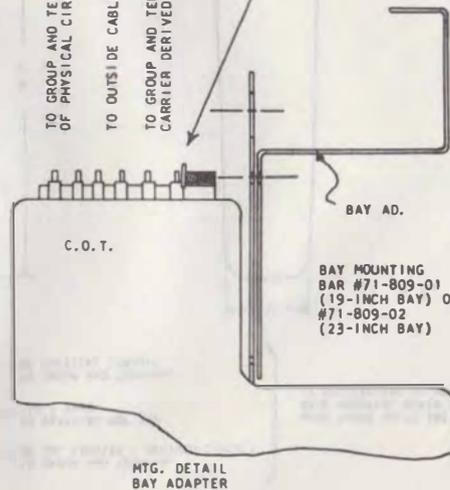
NOTE: ADJUST SCREW TO ACCOMMODATE
MATERIAL THICKNESS OF MOUNT-
ING BAR BEFORE INSTALLING
AML COT UNIT.

SEE FIG. 10 FOR CABLING
INFORMATION TO MDF.

TO GROUP AND TERMINAL
OF PHYSICAL CIRCUIT

TO OUTSIDE CABLE PAIR

TO GROUP AND TERMINAL OF
CARRIER DERIVED "AME" CCT.



363-910-200 SB

ISS B, SECTION 363-910-200 SB

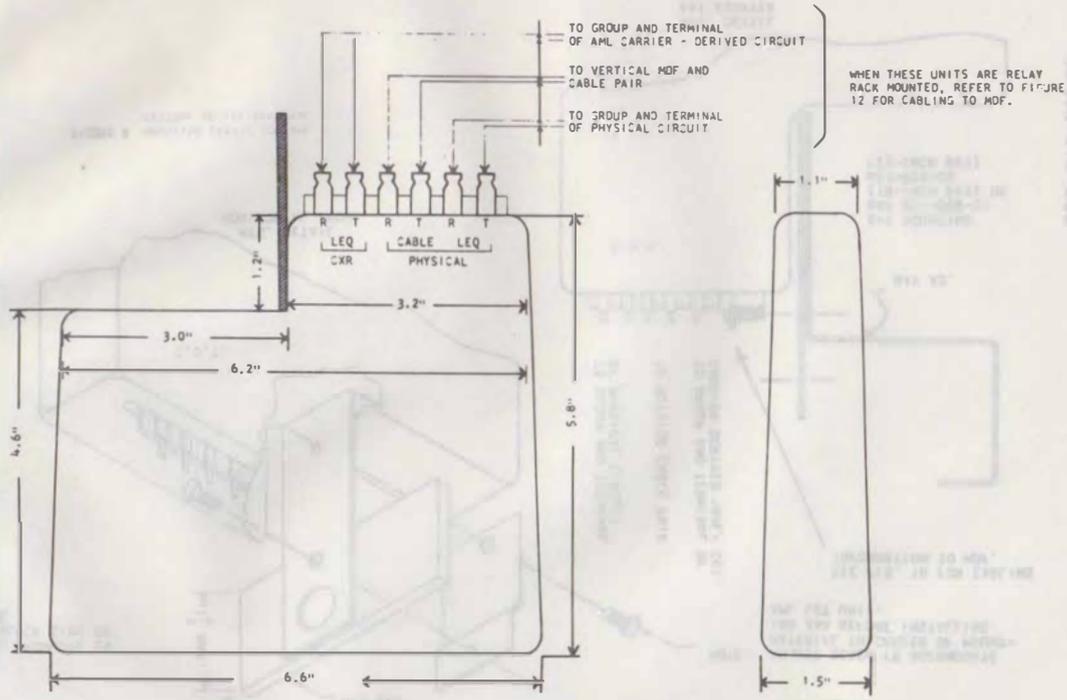


FIGURE 10 AML 2 CENTRAL OFFICE TERMINAL PHYSICAL DIMENSIONS OF CASE INDICATED

NOTE: 19 INCH BAR IS CODED #71-809-01 AND PROVIDES SPACE FOR 11 AML CENTRAL OFFICE TERMINALS IN FIVE 1-3/4" VERTICAL MOUNTING SPACES.

23 INCH BAR IS CODED #71-809-02 AND PROVIDES SPACE FOR 14 AML CENTRAL OFFICE TERMINALS IN FIVE 1-3/4" VERTICAL MOUNTING SPACES.

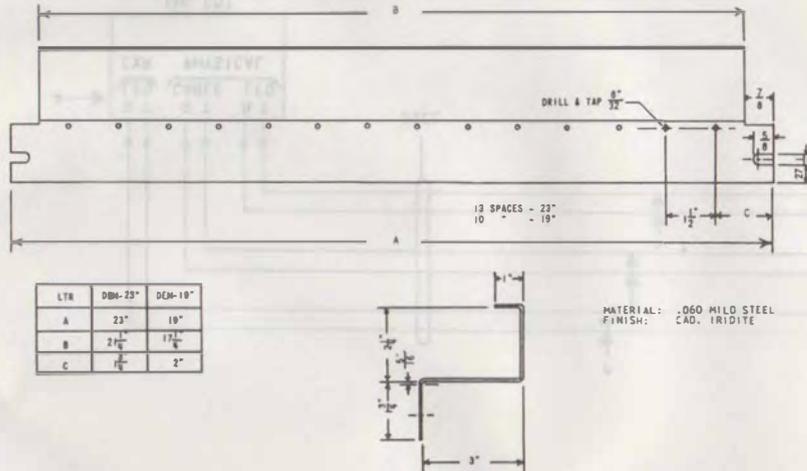


FIGURE 11 AML 2 RELAY RACK MOUNTING BAR FOR CENTRAL OFFICE TERMINALS

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ISS B, SECTION 363-910-200 SB

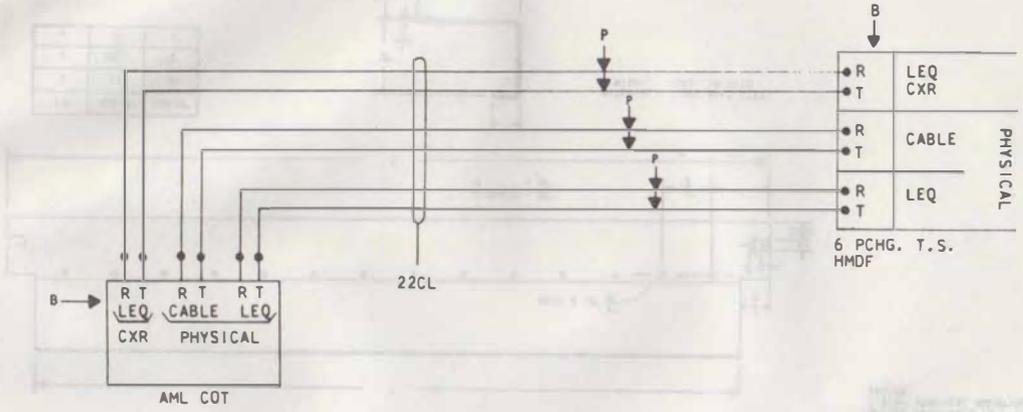


FIGURE 12 AML-2 CENTRAL OFFICE TERMINAL CABLING FROM RELAY RACK BAY TO VDF

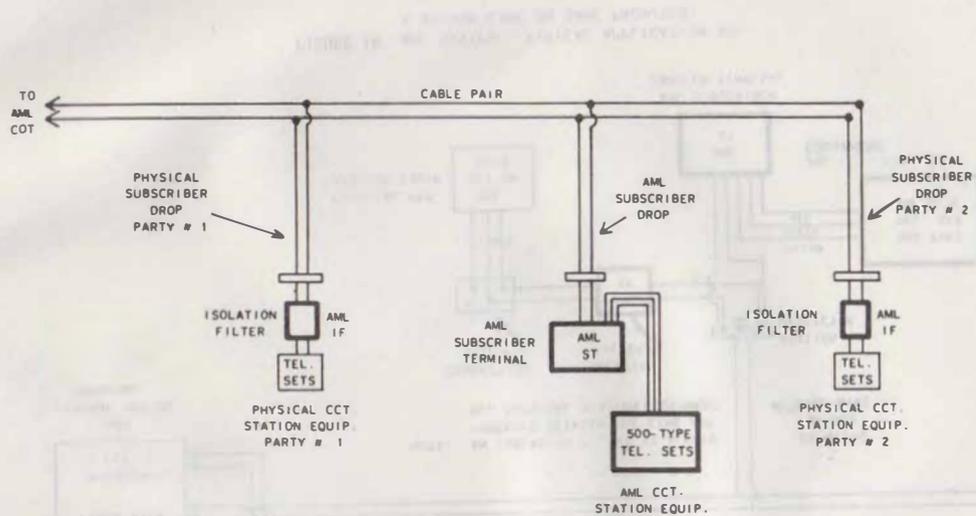


FIGURE 13 AML SYSTEM - TYPICAL APPLICATION:
 ADDED PRIMARY SERVICE ON AN EXISTING
 TWO-PARTY LINE.

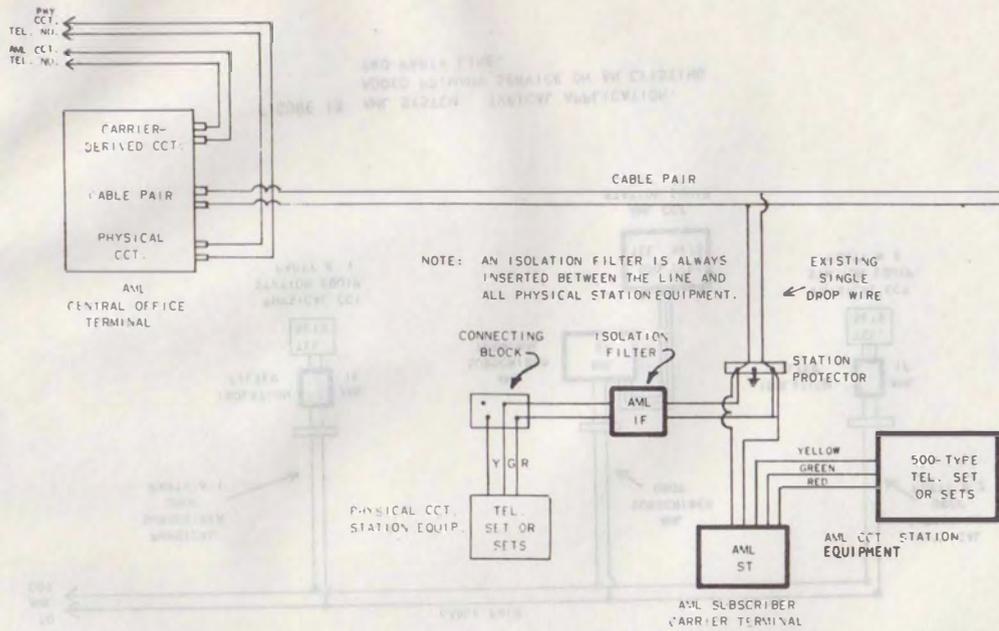


FIGURE 14 AML SYSTEM TYPICAL APPLICATION AS A SECOND LINE ON SAME PREMISES.

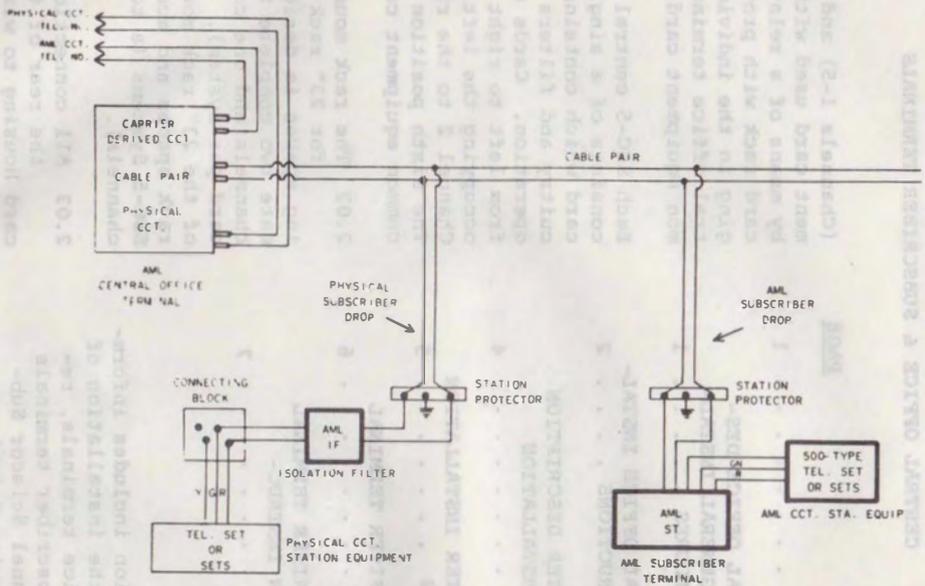


FIGURE 15 AML SYSTEM - TYPICAL APPLICATION FOR PROVIDING PRIMARY SERVICE ON SEPARATE PREMISES FROM PHYSICAL-CIRCUIT STATION EQUIPMENT.

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