

# DATA SETS AND DATA ACCESS ARRANGEMENTS

## GENERAL INSTALLATION AND CONNECTION INFORMATION

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### 2. PREINSTALLATION

2.01 To avoid interference during data transmission, the following restrictions generally apply:

- Use only on individual lines or private branch exchange (PBX) extensions equipped with direct inward dialing (DID).
- Do not connect extension telephones.

### 1. GENERAL

1.01 This section standardizes installation information for data sets (DSs) and data access arrangements (DAAs). This minimizes the amount of information required in DS installation sections. Since this information is not applicable to every situation, each DS installation and connection section should also be consulted.

*Note:* For each DAA (data coupler), a single BSP covers all description, installation, maintenance, and test information.

1.02 This section is reissued to add information on the new DSs 201C, 202S, 202T, 208A, 208B, and 209A. To support these arrangements, three new adapters for DS station interconnections have been designed. These units are covered by KS-21253. A standard method of checking for presence of transient voltages between grounds of the DS and the associated data terminal equipment has been added. Where installation information applies to both a DS and data coupler, the term data apparatus is used. Since this reissue constitutes a general revision, change arrows have been omitted.



*Only certain DSs can be used in key telephone systems having "A" lead control, such as 1A1 key telephone systems. Refer to the appropriate section covering the particular set being installed.*



*To minimize inductive interference to data signals on the telephone (data) line, the line should not be carried in the same run as the cable between the data set and the customer business machine, or lines connected to dc teletypewriter services. If this condition cannot be met, it will be necessary to run telephone (data) line in type-SK (shielded) station wire between the DS and cable distribution terminal or building entrance. Shield should be grounded at distribution terminal only. A 25-conductor shielded cable, such as the A-25K, can also be used.*

2.02 Data apparatus should not be used on ac outlets shared by electrical devices *other than the data apparatus* because of the possibility of noise interference. Impulse noise due to external electrical equipment served by the same power bus may cause errors (garbled data, loss of data, noise interference, etc).

2.03 To avoid the possibility of a potential difference between DS ground and business machine ground, the outlet for the DS power cord should



*The KS-21253 adapters do not provide switching between DSs and telephone lines.*

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be served from the same ac distribution panel as the business machine. If they are not served from the same panel, a test using the 6-type impulse counter should be used to detect the presence of noise potentials (see Part 5).

**2.04** Loop facilities must be tested and must meet transmission requirements specified for switched network operation in the section entitled Data Systems—DATA-PHONE® Service and Data Access Arrangements on Direct Distance Dialing Network—Test Requirements for Subscriber, Foreign Exchange, and Remote Exchange Lines (314-205-501). In the case of private line (PL) operation, the requirements are specified for nonswitched network operation in the section entitled Private Line Circuits—Voice Bandwidth Private Line Circuits Tests and Requirements (314-410-500).

### 3. INSTALLATION

**3.01** Careful planning of the installation with the customer is important. Future expansion of the customer data apparatus should be considered when planning an installation. Consider the proximity of the data apparatus to other office equipment for the best possible appearance and efficiency.



**Do not locate the data apparatus in an environment subject to excessive dust or foreign matter.**

**3.02** For optimum appearance and utility, locate the data apparatus apart from the business machine equipment on a nearby desk, table, shelf, wall, or in a Bell System cabinet.

**Note:** Backboards are available for wall-mounting data apparatus. Data apparatus is only wall-mounted at customer request or after consideration of other possibilities.



**Some data apparatus contain mercury relays or other components that require the apparatus to be mounted either horizontally or vertically. Refer to the BSP pertaining to the particular apparatus for restrictions of this type.**

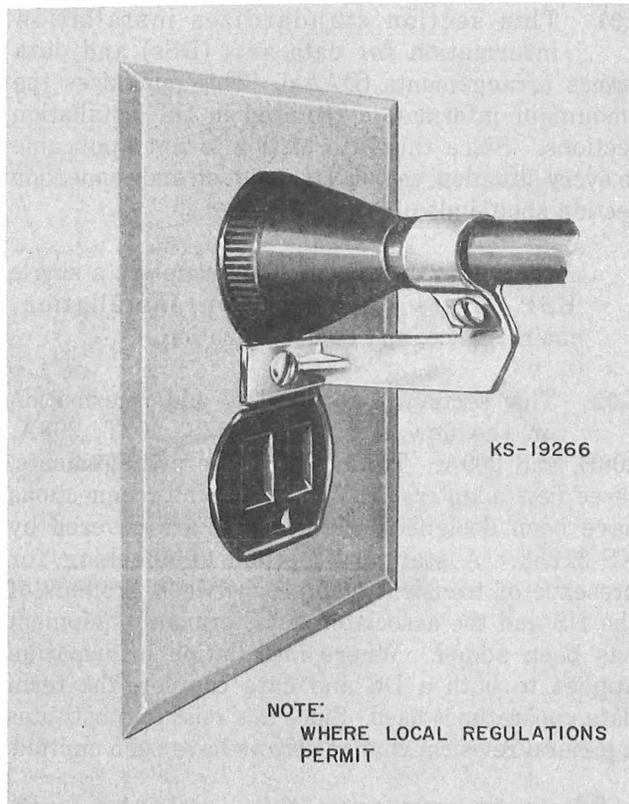
**3.03** The DS must be located within range of the interface connector cord supplied by the business machine company. The maximum length

of this cord is specified in the BSPs covering the DS to be used.

**3.04** The customer must furnish a 3-wire ac outlet (to accept a plug with two vertical parallel blades and a U-shaped grounding pin). The outlet must not be under control of a switch.

**Note:** The 117-volt wiring is installed by the customer and must conform to requirements of the *National Electrical Code*, governmental agencies, company standards, and applicable local codes and regulations.

**3.05** A power cord plug retainer assembly (Fig. 1) should be used (where local regulations permit) to prevent accidental removal of power from the DS. Refer to the section entitled Power Cord Plug Retainer Assemblies—Power Cord Plug Adapters for Use With Power Plants and Equipment Located on Customer Premises—Identification and Operation (167-400-210).



**Fig. 1—Power Cord Plug Retainer for Data Apparatus Installation**

**3.06** The customer must provide and maintain an ambient temperature range of 40° to 120°F at 20 to 95 percent humidity for proper operation of the DS. The temperature and humidity should be relatively stable.

**3.07** Where the installation requires three or more DSs, or DSs with auxiliary equipment (eg, 1A1 key telephone equipment), a Bell System cabinet should be used to improve the appearance of the DS installation. Figures 2 and 3 show examples of cabinet arrangements for data apparatus. Refer to the section entitled Data Sets—Multiple Installation Information (590-010-201) for choice of cabinet and cabinet arrangement options.

#### 4. CONNECTIONS

**4.01** The data apparatus must be connected in conformance with BSPs covering the type of installation being performed. A typical installation is shown in Fig. 4. All cords and connecting hardware required for data apparatus installations are standard telephone equipment and are supplied with the apparatus, or are available. An assembly of common mounting and connecting hardware for data apparatus installation is shown in Fig. 5 (Sheets 1-3).



*To prevent possible damage to electronic components in the data apparatus, do not make power connection until all other connections have been made. It may not be possible for the customer to connect the data terminal interface cord at the time the data apparatus is installed. However, installing or removing the interface cord with power applied to the data apparatus will not damage the DS components.*

**4.02** When quad JKT wire is used on 4-wire systems, use red (R1) and green (T1) conductors as the station transmitting pair, and the yellow (R) and black (T) conductors as the station receiving pair. For 2-wire systems, the red conductor (R) and the green conductor (T) are used.

##### A. Older Family of Data Sets

**4.03** A 6-conductor cord (telephone interface) is generally furnished with the older family of DSs. The smaller cord is adequate in 90 percent

of all installations. A 50-conductor cord (eg, a D50C-61) must be ordered separately if required for a more complicated installation. Refer to the appropriate section for the DS being installed.

**4.04** The 6-conductor cord is terminated in spade tips as are all DS mounting cords of ten or less conductors. Ten screw connections can be made quickly. Ten or less conductors may be terminated at a single 1044A connecting block making a simple, attractive, and inexpensive installation.

**4.05** As connections increase beyond ten, plug-ended cords are used since they save installation time.



*Where possible, unused conductors should be secured to spare terminals.*



*Never cut and/or leave exposed unrequired cord or cable conductors. Exposed conductors can cause short-circuiting.*



*Tape and store unrequired cord or cable connectors when spare terminals are not available.*

##### B. New Family of Data Sets

**4.06** The new family consists of DSs 201C, 202S, 202T, 208A, 208B, and 209A. With one exception for PL (see 4.07) and DDD (see 4.08), the line interfaces of the new family are the same. The standard channel interface for PL DSs is a 6-lead interface (Fig. 6).

**4.07** The exception to the standard PL interface is the addition of a pair of leads to indicate whether the connected channel is the PL channel or a backup channel. The leads are used in the new DAS 829 family of channel interface units (CIUs). When the connected channel is the backup channel, the normally open contact closes. This indication is expected to be required only for CIUs used with DS 209A (see Fig. 6). A wiring modification to the DAS 828C can provide this indication when required.

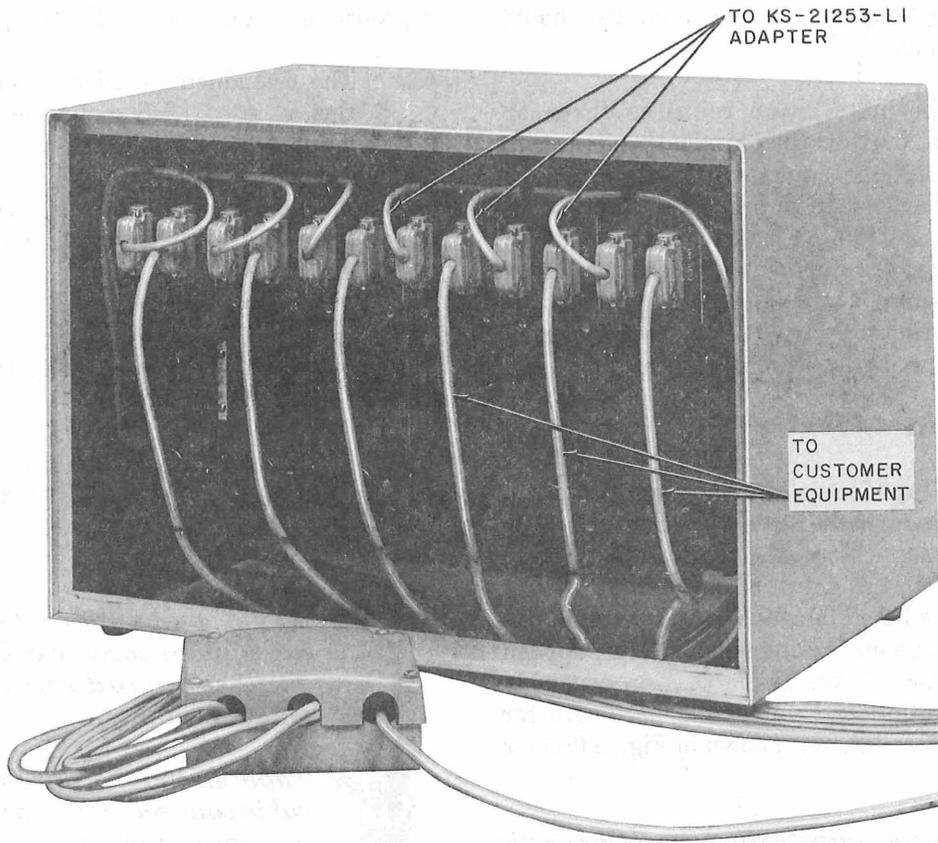
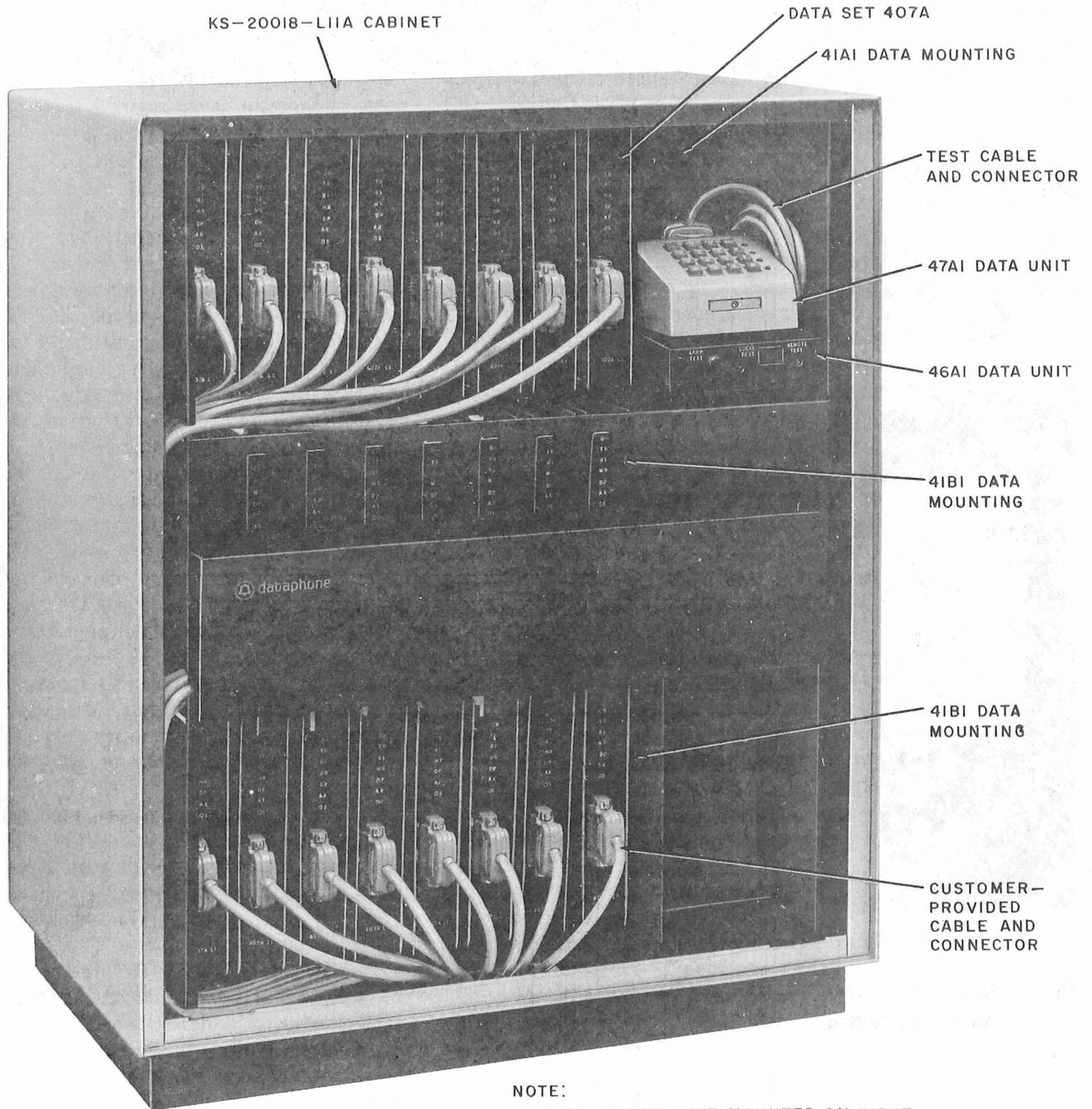
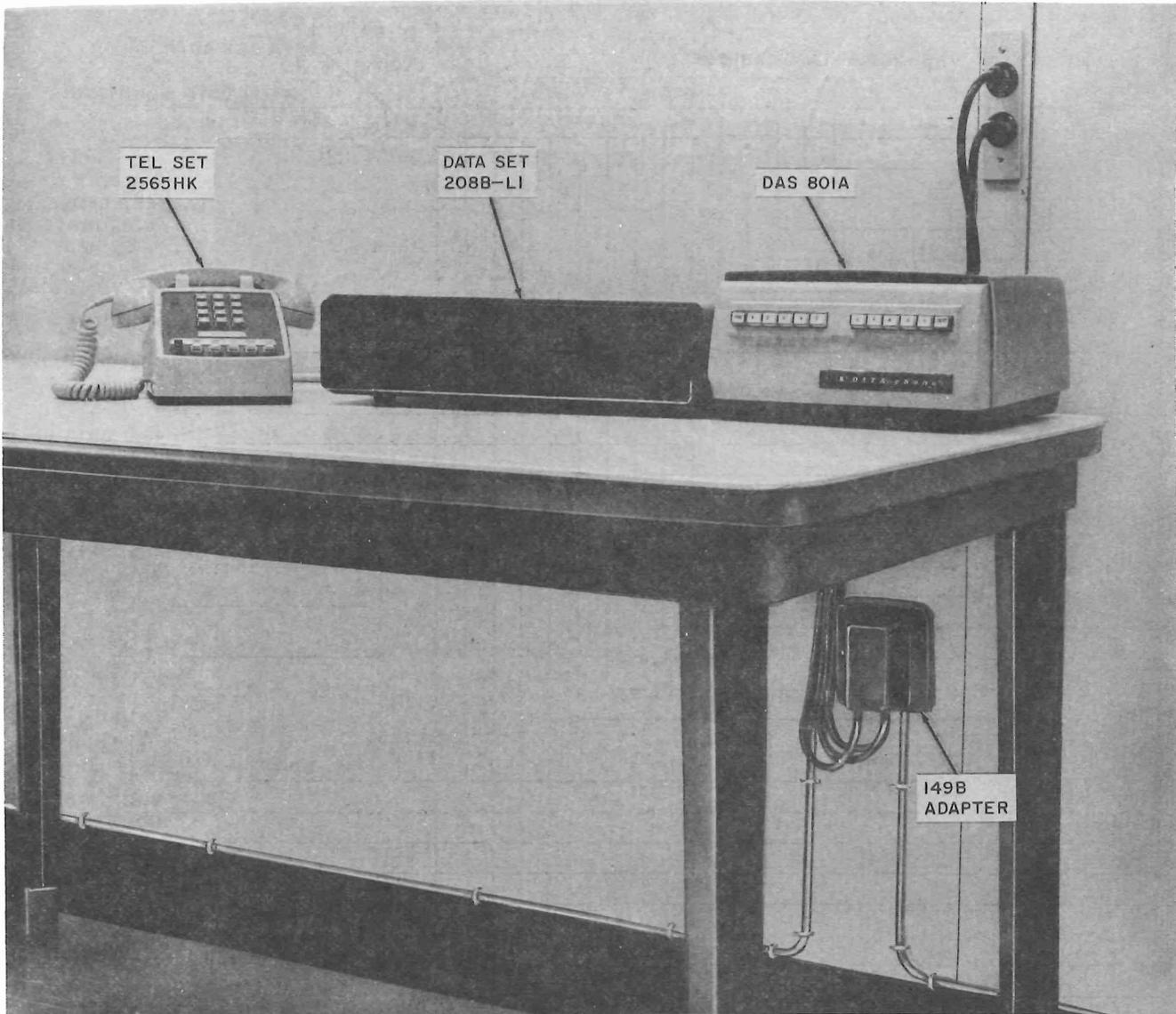


Fig. 2—KS-21253-L1 Adapter and Data Set 201C Installed in KS-20018-L12 Cabinet With Cover Removed

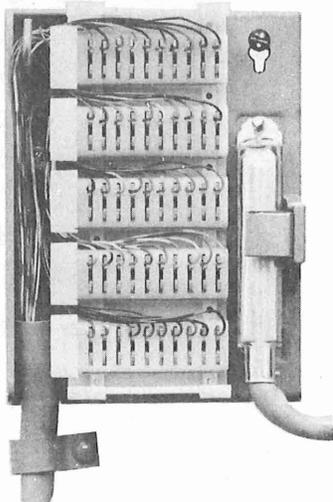


**Fig. 3—407A-Type Multiple Data Station Arrangement Mounted in a KS-20018-L11A Cabinet**

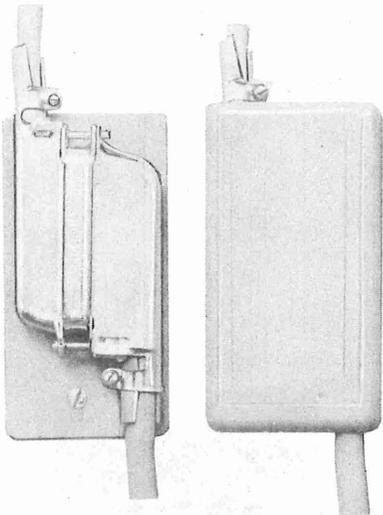


**Fig. 4—Main Components of Typical Installation of Data Set 208B-L1 Terminal With DAS 801A to Provide Automatic Calling**

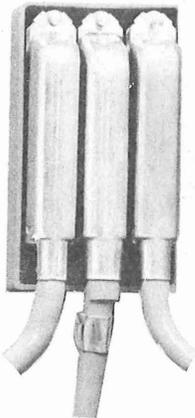
TPA 467442



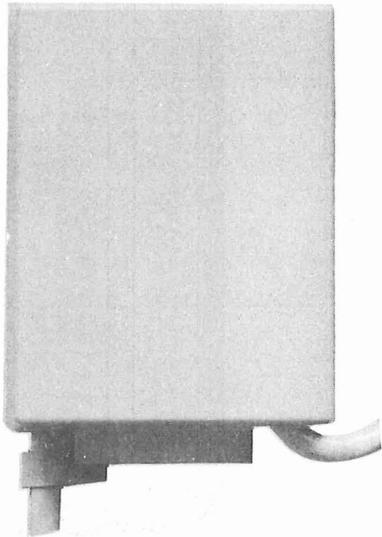
66E-TYPE  
CONNECTING BLOCK



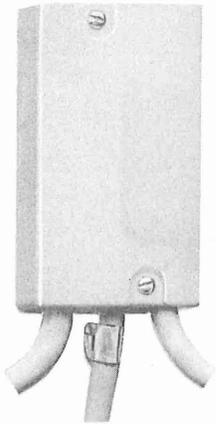
KS-20458  
COVER



KS-19252-TYPE  
THREE WAY  
BRIDGING ADAPTER



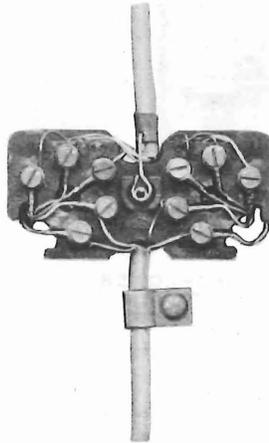
505A PLUG  
WITH 549A-TYPE JACK



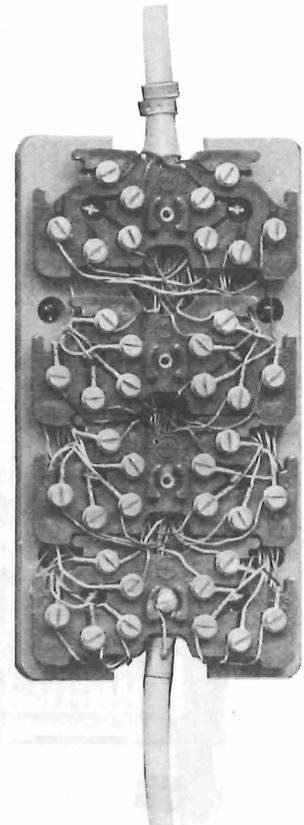
**Fig. 5—Standard Mounting and Connecting Hardware for Data Set Installation (Sheet 1 of 3)**



4 2A  
CONNECTING  
BLOCK



IO44A  
CONNECTING  
BLOCK



FOUR 44A CONNECTING  
BLOCKS 168F BACKBOARD  
IOID COVER

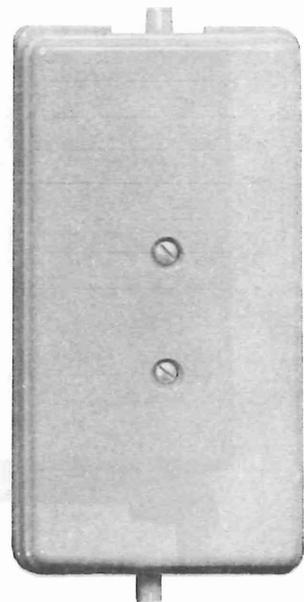
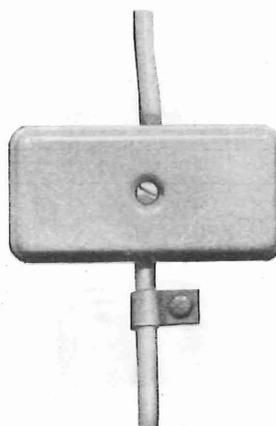


Fig. 5—Standard Mounting and Connecting Hardware for Data Set Installation (Sheet 2 of 3)

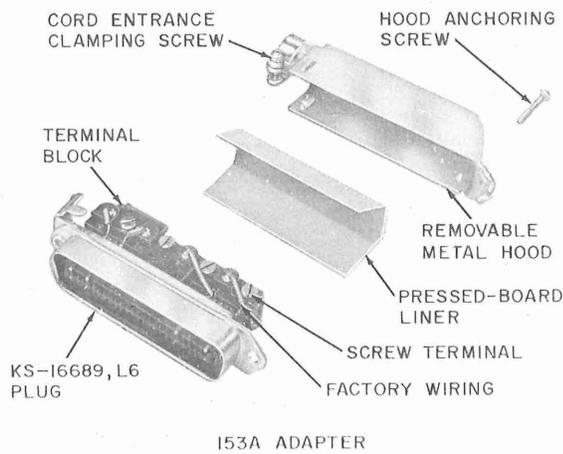
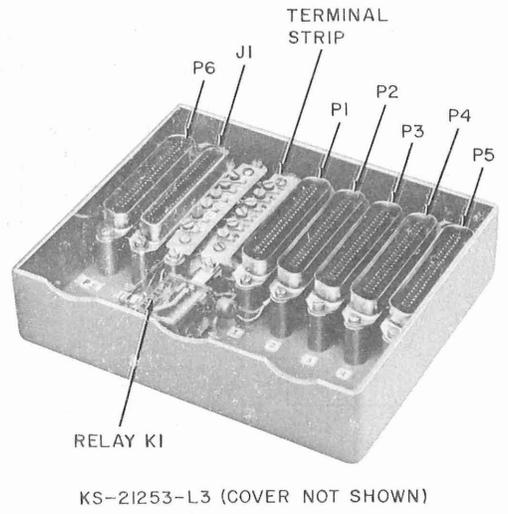
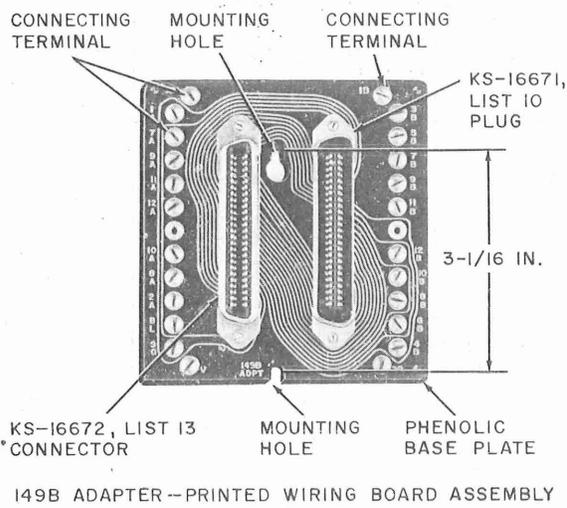
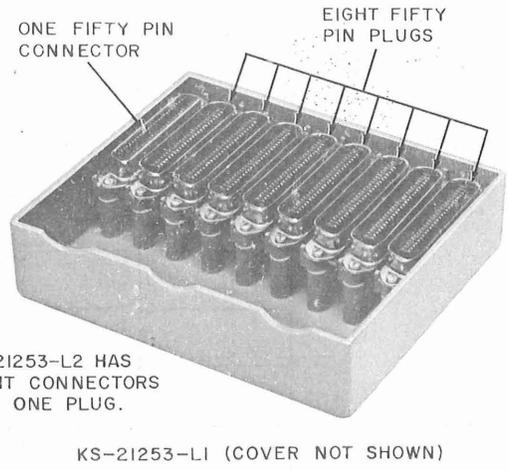
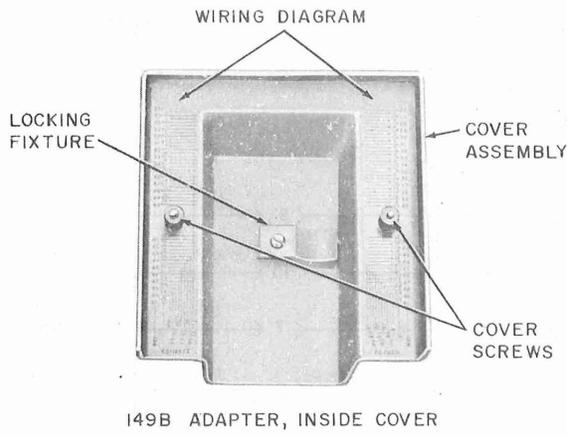


Fig. 5—Standard Mounting and Connecting Hardware for Data Set Installation (Sheet 3 of 3)

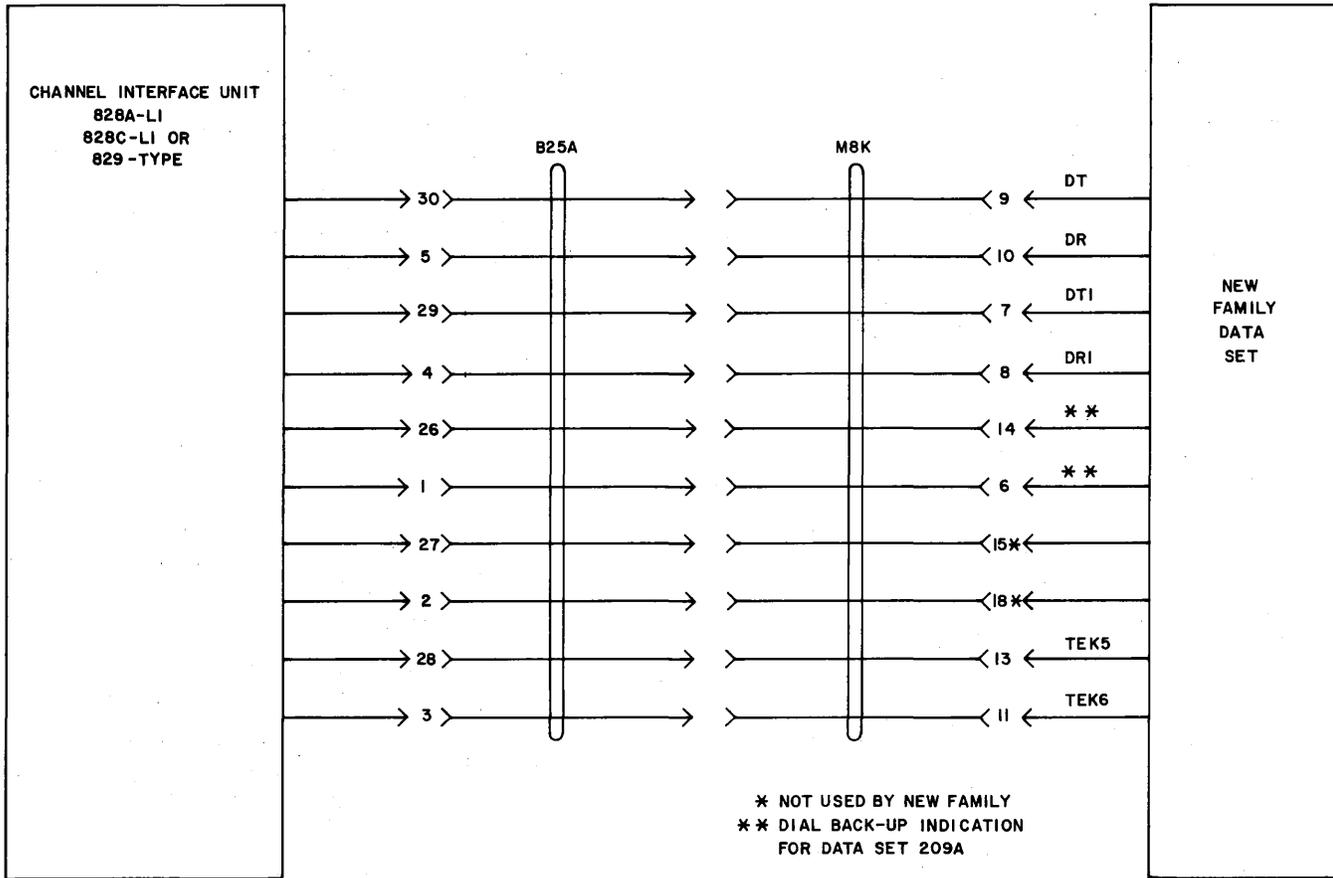


Fig. 6—Single Data Set Connections—Private Line

**4.08** Figure 7 shows the interface for DSs in DDD application. The one exception to the standard DDD interface is DS 201C, which provides a make contact to ground at the A lead (pin 23 of the 25-pin plug). Nothing is connected to the A1 lead (pin 24). The standard indication for the new family is a make contact between A and A1.

#### Single Data Set Arrangements for Private Line

**4.09** All PL DSs in the new family are shipped with the M8K cord. This cord connects to the DS telephone interface connector with a 25-pin plug and to the CIU with a 50-pin plug. The DAS 829-type replaces the 828A.



*Only six (eight with DS 209A) leads of the 25-conductor telephone interface cord are actually used (Fig. 6).*

#### Single Data Set Arrangements for DDD

**4.10** DSs intended for application on the switched telecommunications network are shipped with an M13F cord. This cord connects to the DS through a 25-pin connector and, for individual data set/telephone set arrangements, to a 6-button key telephone set through a 50-pin connector (Fig. 8).

#### Multiple Data Set Arrangements for Private Line

**4.11** In multiple arrangements of DSs and CIUs, the concentration or expansion of several channel interfaces is desirable. The KS-21253-L1 and -L2 adapters are used for these purposes.

**4.12** Some arrangements [eg, those using an automatic calling unit (ACU)] require access to leads going between the telephone set and DS. Figure 9 shows ACU connections for those arrangements.

#### Adapters for Private Line Data Sets

**4.13** When several PL DSs are located at a station, the 6-lead channel interfaces can be concentrated into a single 50-pin connector using KS-21253-L1 adapter. This is done in order to run only an A- or B-type cable the required distance to the CIUs. With a multiple arrangement of CIUs, direct connection on a plug-to-connector basis is possible using a B-type cable. The KS-21253-L1 adapter contains eight 50-pin plugs and one 50-pin

connector. Up to eight M8K cords from DSs can be connected to this adapter. The channel interfaces are then available in a single 50-pin connector (Fig. 10).

**4.14** When several CIUs are located at the same station, it may be desirable to concentrate the 6-lead channel interfaces into a single 50-pin plug. This is done in order to run only an A- or B-type cable the required distance to the modems. The KS-21253-L2 adapter contains eight 50-pin connectors and one 50-pin plug. Up to eight B25A cables from individual CIUs can be plugged into the adapter. The concentrated channel interface leads are then available in a single 50-pin plug (Fig. 11).

**4.15** Figure 12 shows three typical arrangements for the adapter in a multiple PL DS arrangement. In Fig. 12a, up to eight individual DSs are connected to a corresponding number of individual CIUs, with most of the distance between a DS and CIU being spanned with a single cable. A multiple mounting of DSs is connected to individual CIUs in Fig. 12B. Up to eight individual DSs are connected to a multiple CIU mounting in Fig. 12c.

#### Multiple Data Set Arrangements for DDD Data Sets

**4.16** The KS-21253-L3 adapter (Fig. 13) allows up to five DDD DSs to be placed under the control of one 6-button key telephone set. It includes five 50-pin plugs to accept the M13F cords from the five DSs, one 50-pin connector to accept the cord from the telephone set, one 50-pin plug for connection to the telephone lines and two strips with eight screw terminals each.

**4.17** Ringing is detected in the DSs and a call indication (make contact to ground) appears at pin 14 on 50-pin plugs P1-P5 of KS-21253-L3 adapter. Access to these indications is available at screw terminals 1-5, corresponding to DSs one through five, respectively. The terminals are shipped wired together to provide a common audible indication via the KS-20419-L1 buzzer in the key set (pins 18 and 43 of the telephone set connector). This common audible indication is provided by the factory-equipped wiring of 1-5 together and to COM, which provides a closure to ground to operate the relay contained within the adapter. Low-voltage ac from a wall-mounted transformer (the 2012A) can be brought into the adapter either through the telephone line plug or by connection to AC1



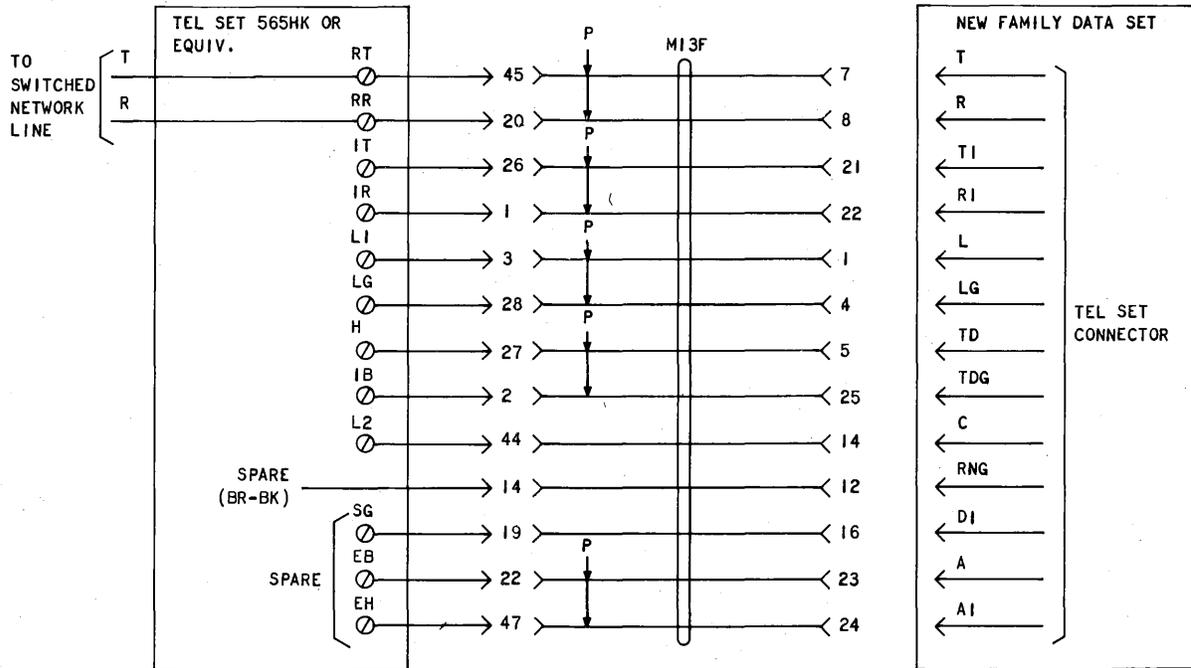


Fig. 8—Single Data Set Connections—DDD

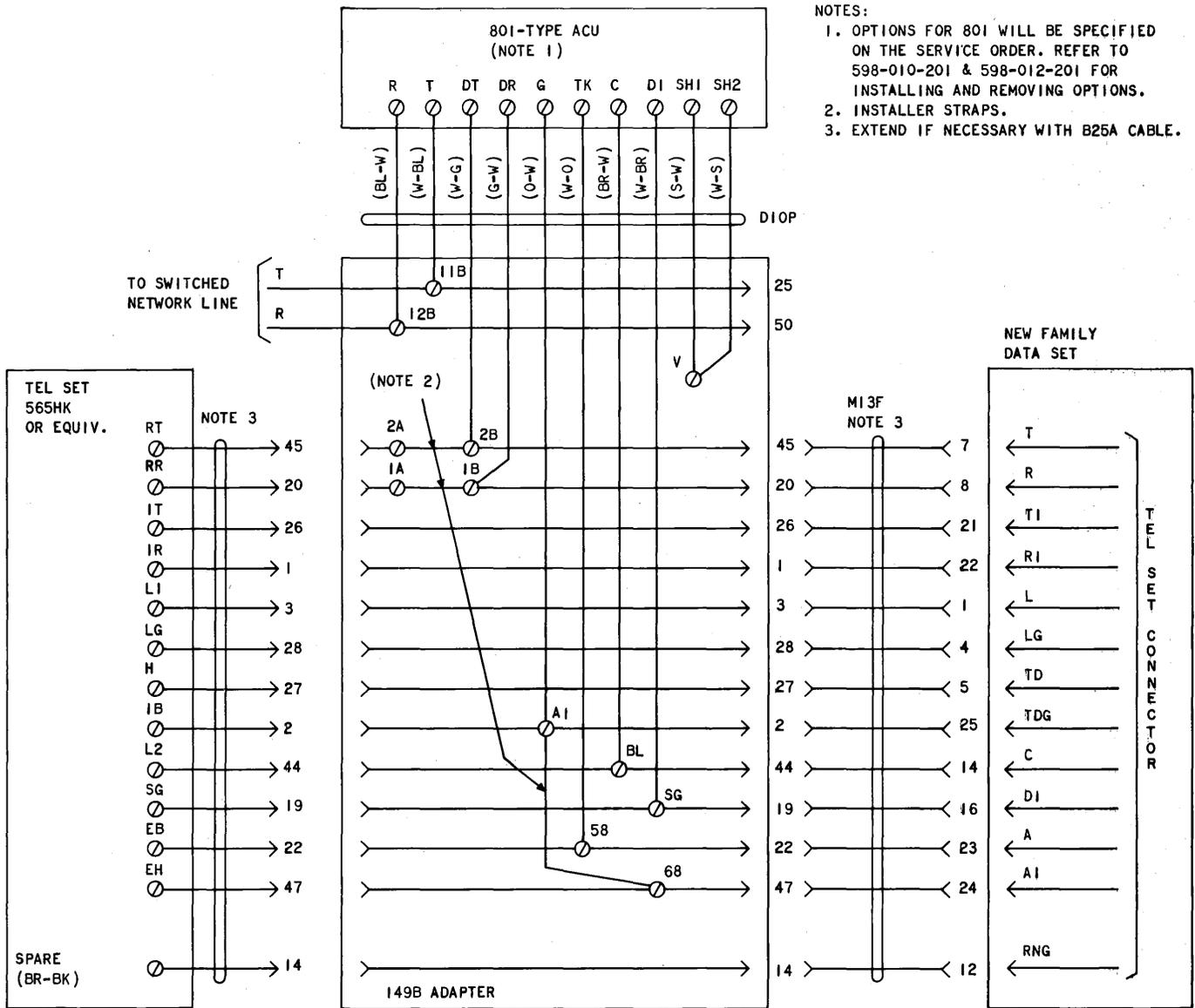


Fig. 9—Single Data Set Connections—2-Wire Switched Network With Automatic Calling Unit

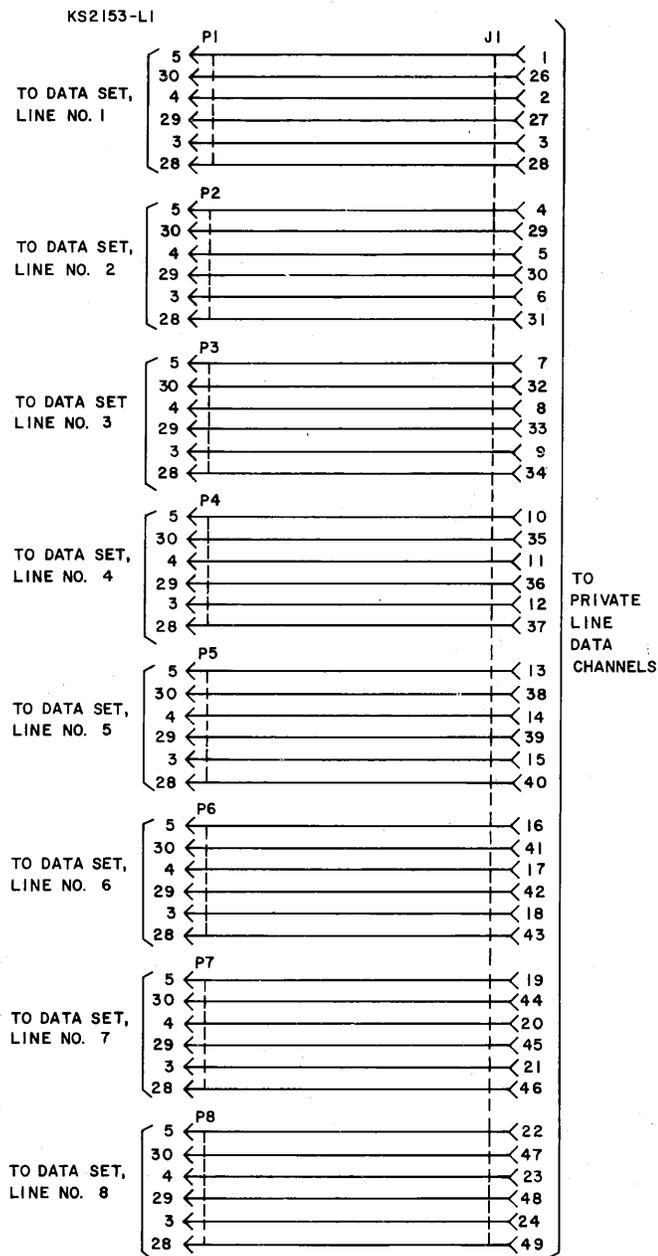


Fig. 10—Adapter for Concentrating the Channel Interface of Up to Eight Private Line Data Sets Into One

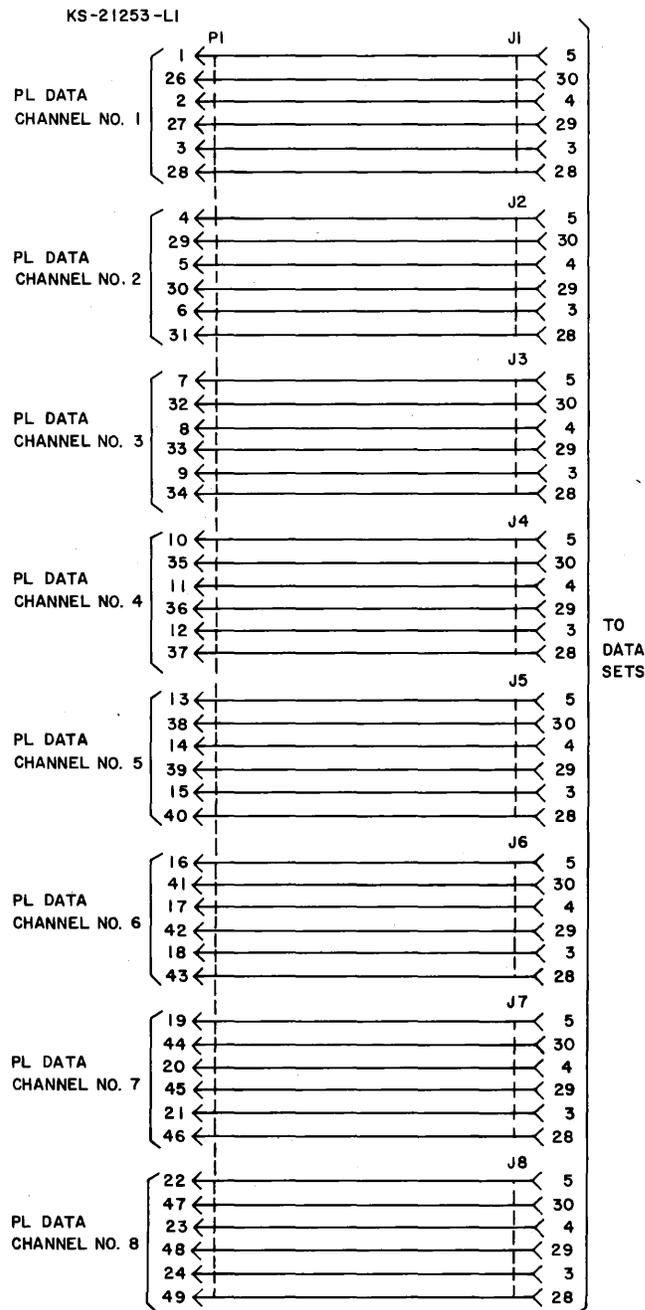


Fig. 11—Adapter for Fanout of Connected Channel Interfaces Into Eight 50-Pin Connectors

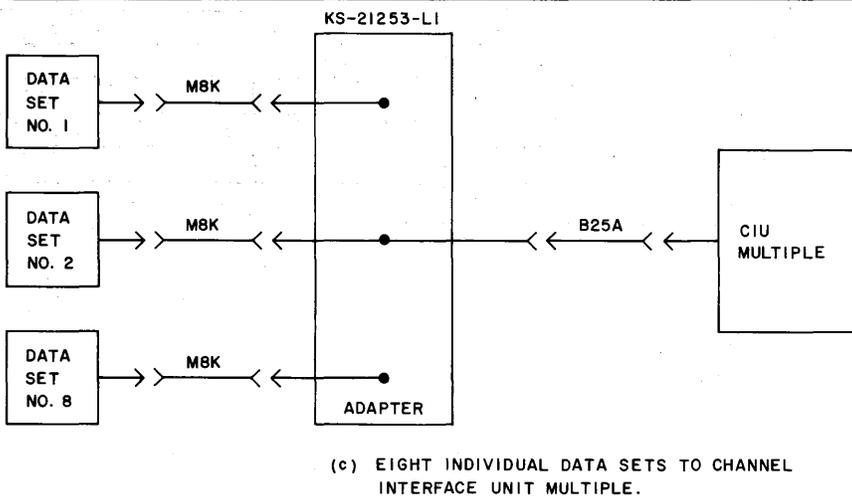
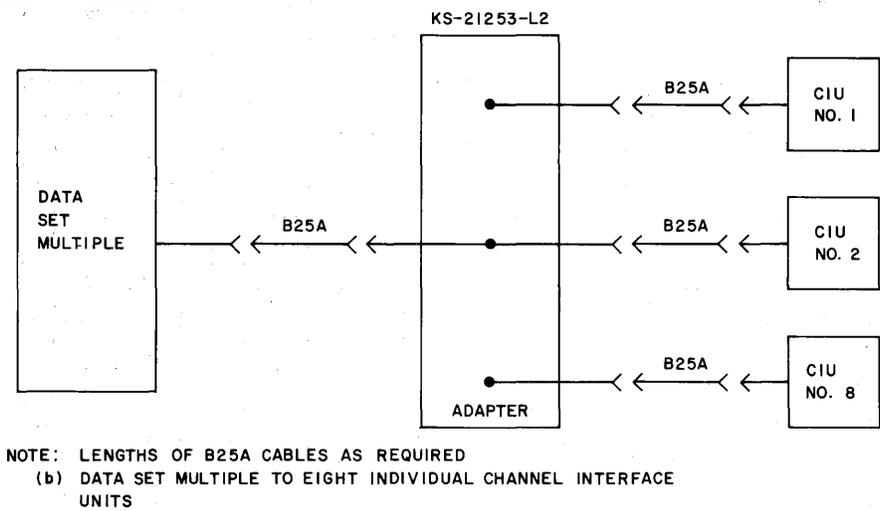
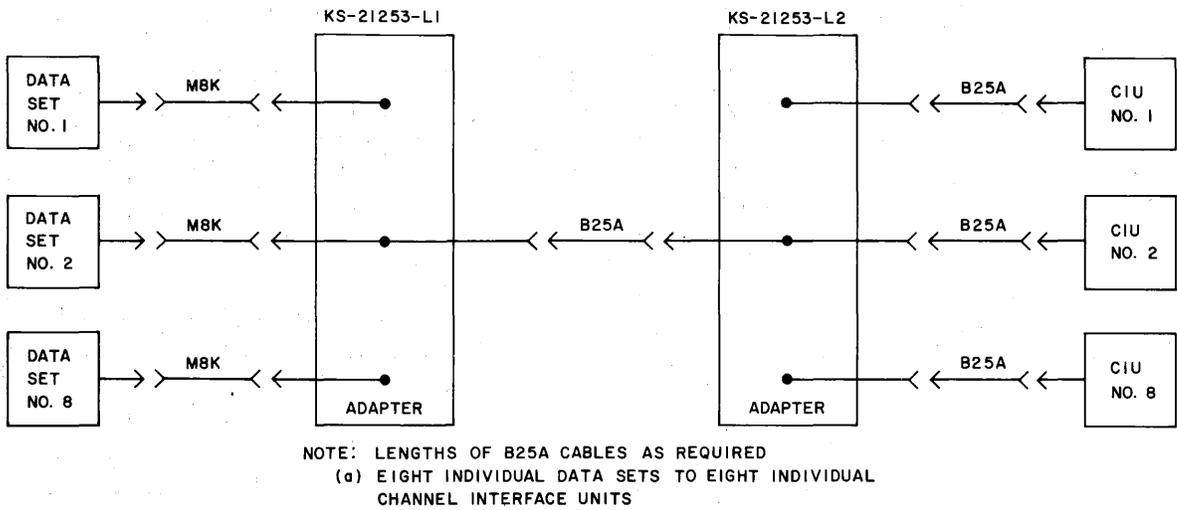


Fig. 12—Typical Applications for the Private Line Adapters, KS-21253-L1 and KS-21253-L2

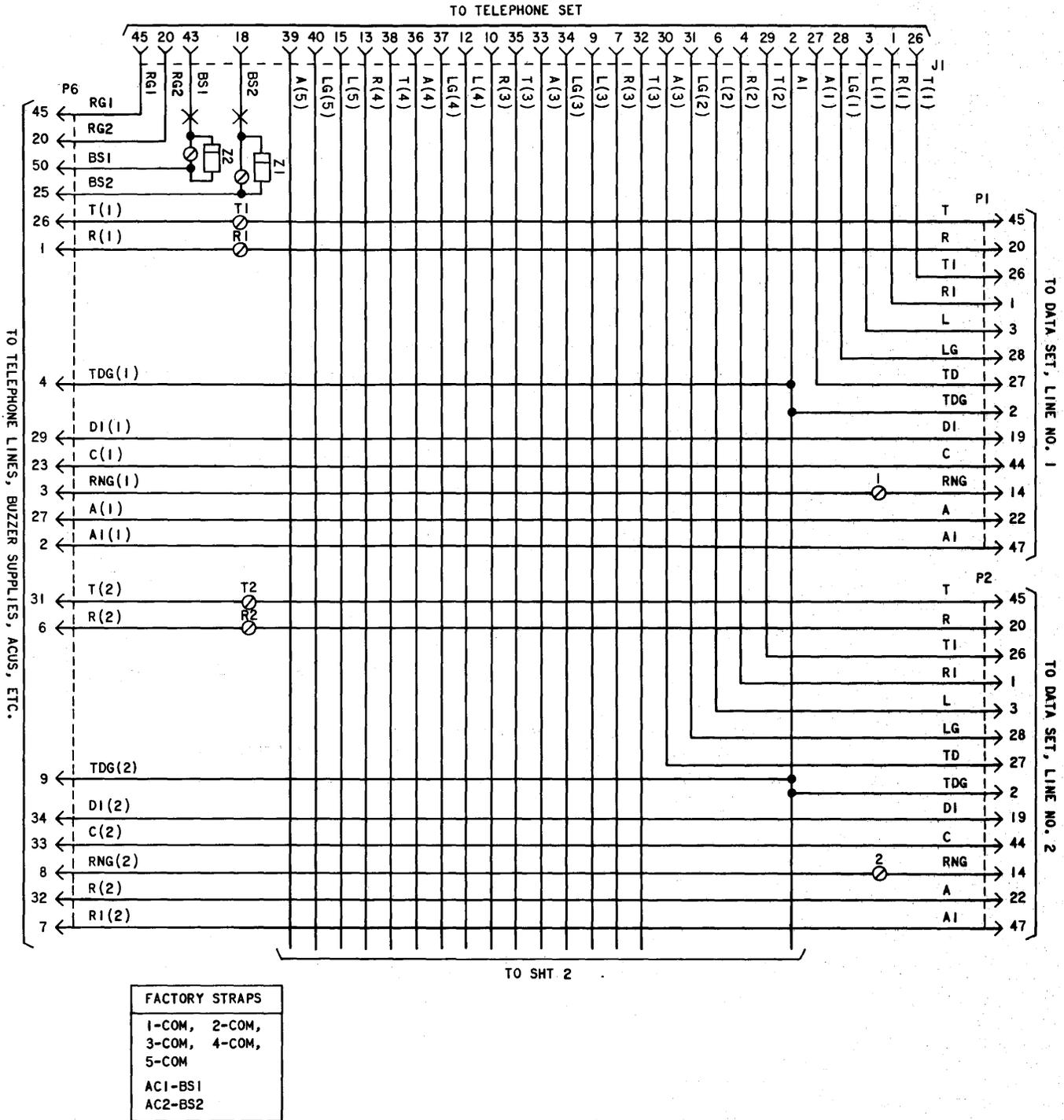


Fig. 13—Adapter for up to Five DDD Data Sets Into One Key Telephone Set (Sheet 1 of 2)

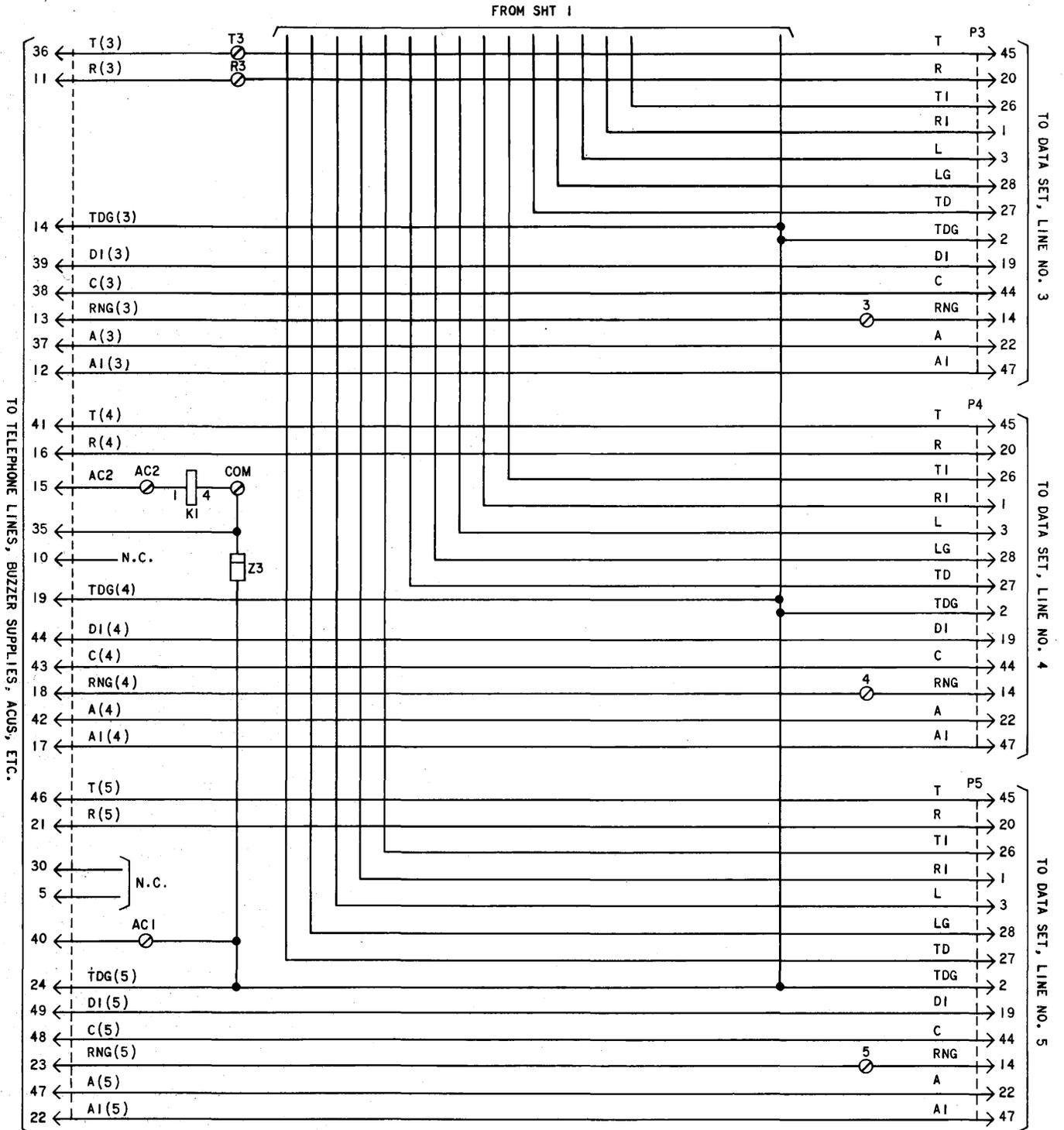


Fig. 13—Adapter for up to Five DDD Data Sets Into One Key Telephone Set (Sheet 2 of 2)

and AC2. To supply the voltage for the buzzer, the adapter is factory wired with AC2 connected to BS2 and AC1 connected to BS1. The make contacts shown connecting to pins 18 and 43 of the telephone set connector cause buzzing to occur whenever ringing is detected by a connected data set.

**4.18** The buzzer is the audible indication used in order to avoid the need for a local 20- or 30-Hz ringing generator. A buzzer, KS-20419-L1, will be shipped with the 565HK telephone set. If ringing is desired, however, the telephone set can be rewired to place the ringer across pins 18 and 43 of the telephone set connector and a 20- or 30-Hz ringing supply can be brought into BS1 and BS2 or through the telephone line connector on pins 25 and 50. In this case the connections between AC1 and BS1, and AC2 and BS2 must be broken. Low-voltage ac is still required for operation of the relay.

**4.19** The appearance of the call indications on screw terminals makes other arrangements possible. For example, in a multiple DS arrangement, it is likely that the DSs will be in an automatic answering mode. Under normal operation, the customer may prefer not to hear the buzzing or ringing. The connections for screws 1-5 can be broken and left disconnected if no audible indication is ever desired. (This assumes that the telephone set would be used very infrequently and only to originate calls.) The customer can select audible indication on one or more lines. An externally mounted key strip is used to pick which lines result in an audible indication (Fig. 14).

**4.20** Typically, only DDD local loops connect to the KS-21253-L3 adapter. Tip and ring for the first three DSs are available at screw terminals T1, R1, T2, R2, T3, and R3. This removes the need for entry of the loops via the connector for three or fewer DSs, assuming the low-voltage ac power is also brought in directly to screw terminals AC1 and AC2. Figure 15 shows wiring for three lines arranged for buzzer operation.

**4.21** When four or five DSs are connected to the KS-21253-L3 adapter, the DDD local loops must be brought in through the telephone line plug (Fig. 16). A 66E block is used to terminate the loops external to the adapter. Connections for an ACU can be made on the line side of the

adapter by using the leads which appear at the telephone line plug of the adapter (Fig. 17)

**4.22** The 149B adapter can also be used between the KS-21253-L3 adapter and a DS to connect an ACU (Fig. 18). Wiring for the 149B is the same as shown in Fig. 9.

## 5. POST-INSTALLATION TESTS

**5.01** At the completion of installation of the DS, refer to the appropriate installation section for information on necessary testing. A remote loop-back test can usually be performed with the assistance of the data test center (DTC). This test enables the installer to verify that the transmit and receive portions of the DS are working properly.

**5.02** After a DAA (data coupler) has been installed, tests should be performed as outlined in the BSP on the particular apparatus to ensure that the data coupler is connected properly. A test can be performed with a test desk or DTC, so the installer can verify that the data coupler is working properly.

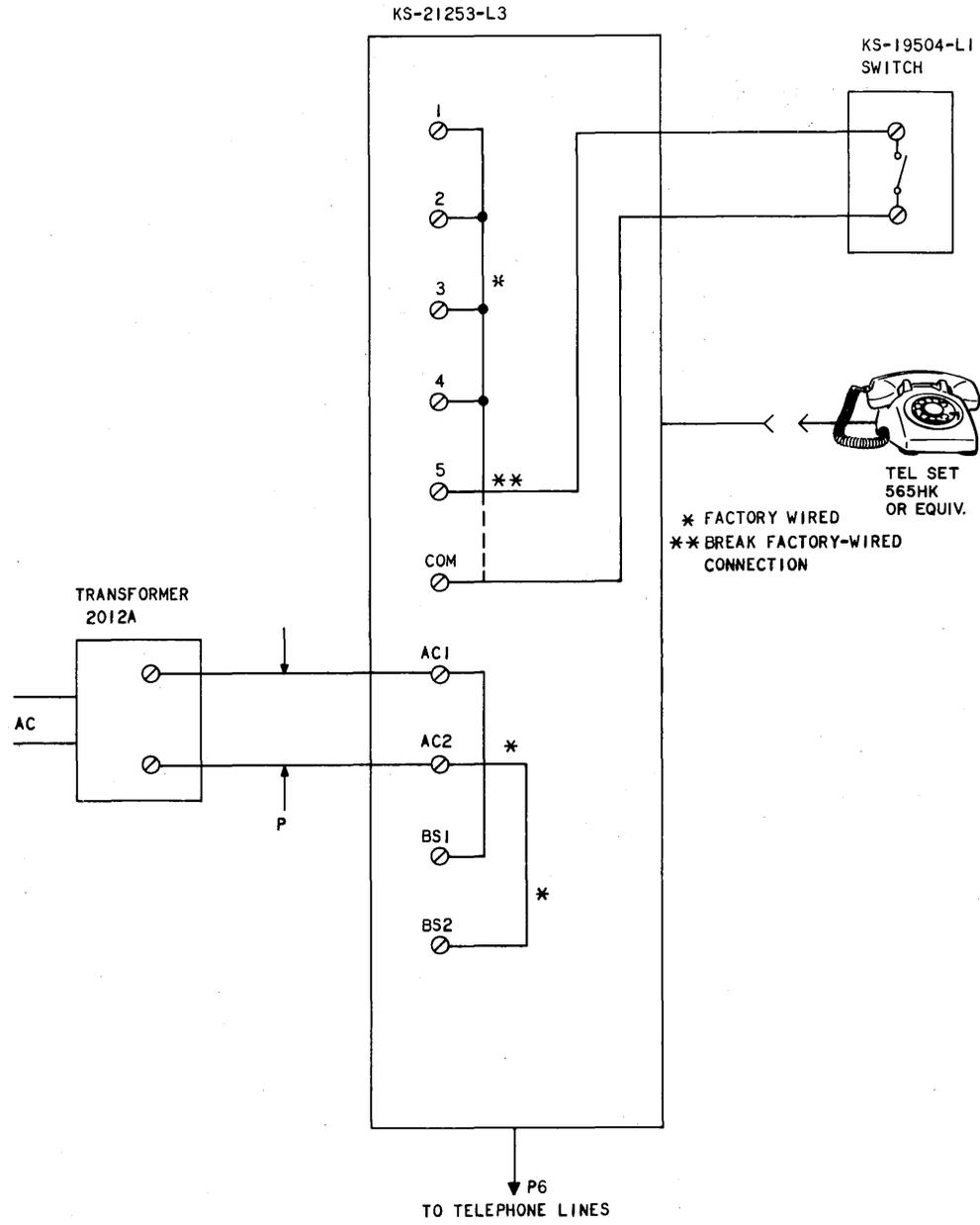
### Ground Noise Test

**5.03** Errors may occur if the DS and business machine are not at the same ground potential. To detect the presence of noise potentials and to provide a standardized test, the following test is recommended when required.

**Note:** For information pertaining to the 6H impulse counter, refer to the section entitled 6H and 6HR Impulse Counters (J94006H and J94006HR)—Description, Operation, and Maintenance (103-620-101). If the 6H impulse counter is not available, a 6A impulse counter may be used. For information pertaining to the 6A impulse counter, refer to the section entitled J94006A (6A) Impulse Counter—Description, Operation, and Maintenance (103-620-100).

**5.04** The 6H impulse counter is connected and the test is performed as follows:

- (1) Use a 2W6A test cord or equivalent (310 plug on one end, alligator clips connected to tip and ring on the other end). Connect the 914-type data test set (DTS) connector A to the customer connector on the DS. Connect the 914-type DTS connector B to the DS connector



**NOTE:**  
THIS ARRANGEMENT ENABLES OR DISABLES THE COMMON AUDIBLE INDICATION FOR ALL LINES. LINES CAN BE CONTROLLED SEPARATELY BY USING SEPARATE SWITCHES OR KEYS.

**Fig. 14—External Switch for Control of Common Audible Indication**

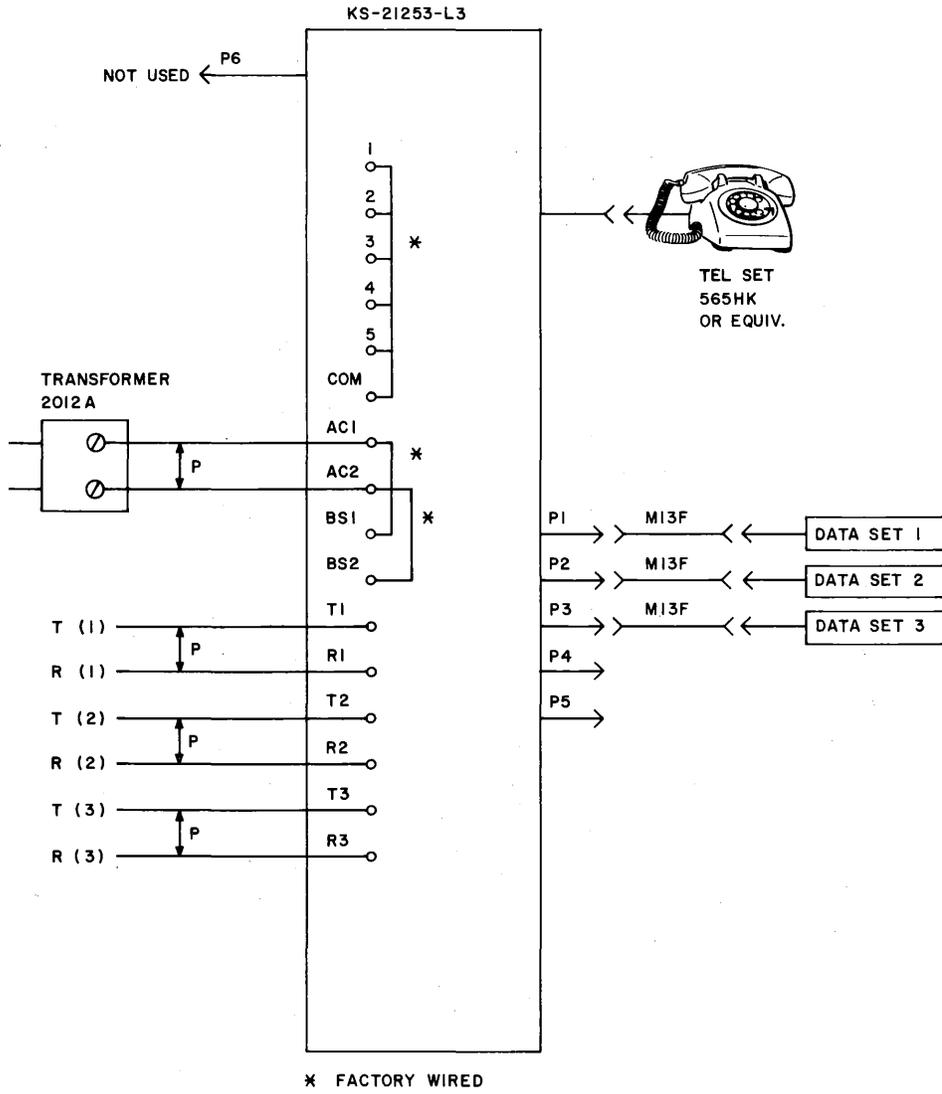


Fig. 15—Adapter Arrangement for Three Lines

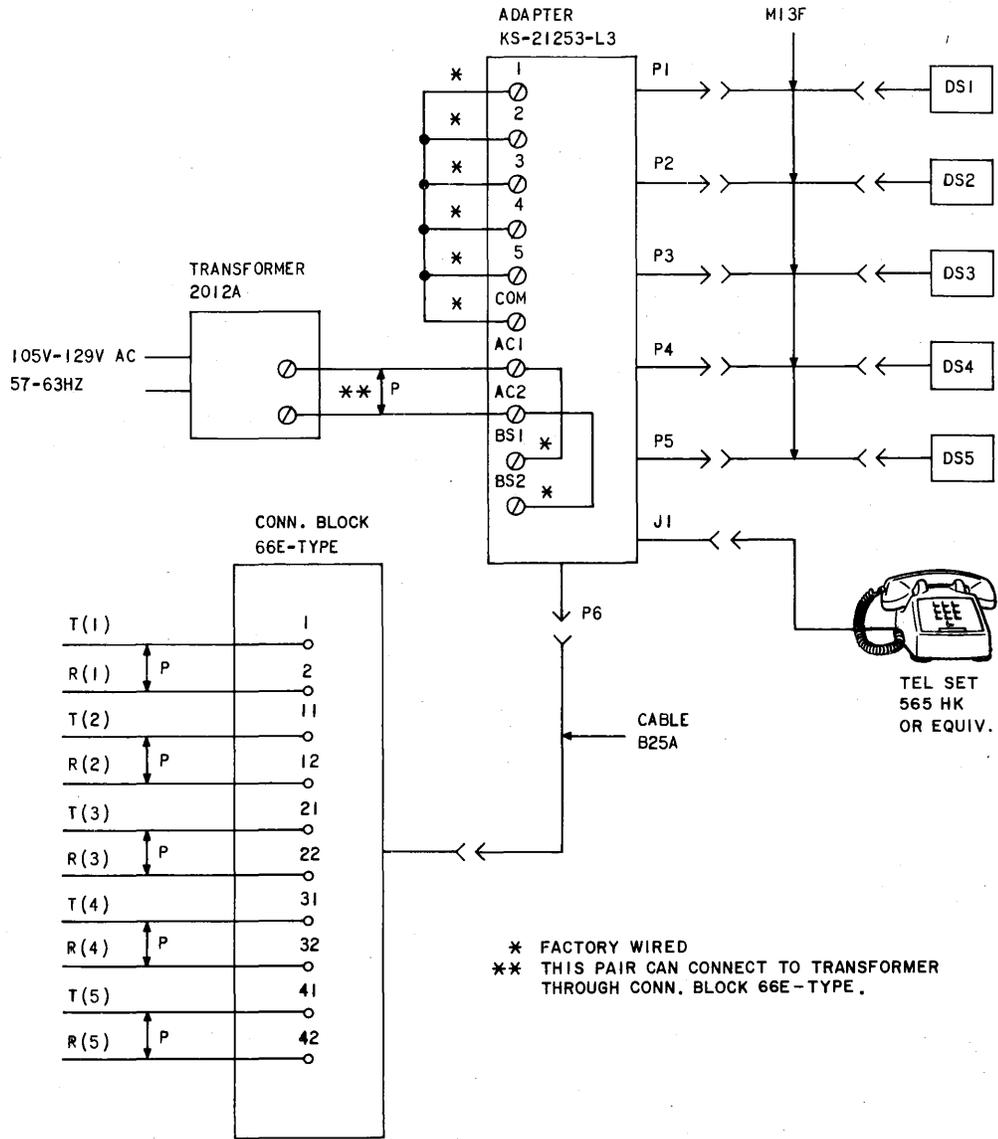


Fig. 16—Adapter Connections for Five Lines

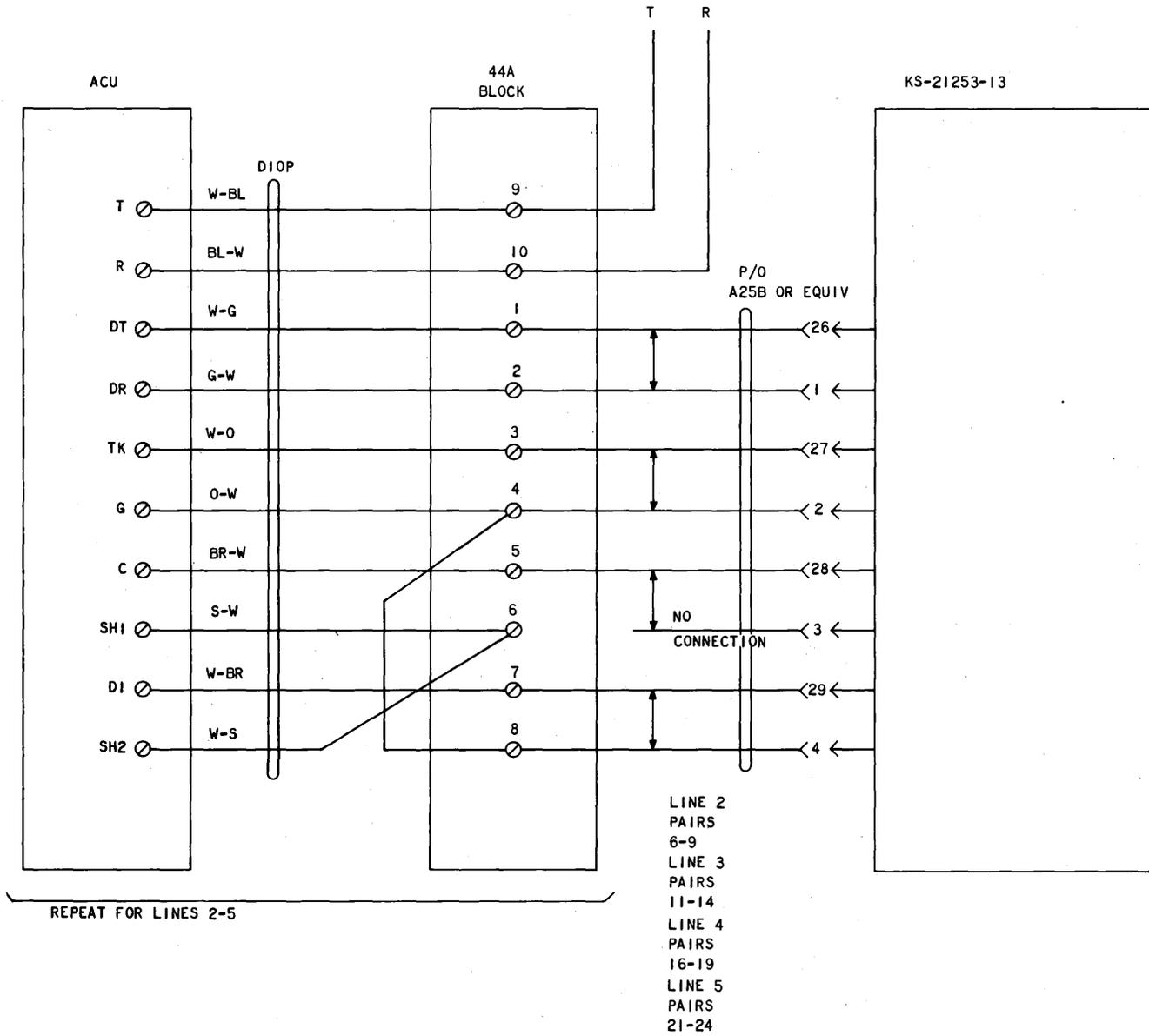


Fig. 17—ACU Wiring Using P6 for ACU Access Rather Than 149B Adapter

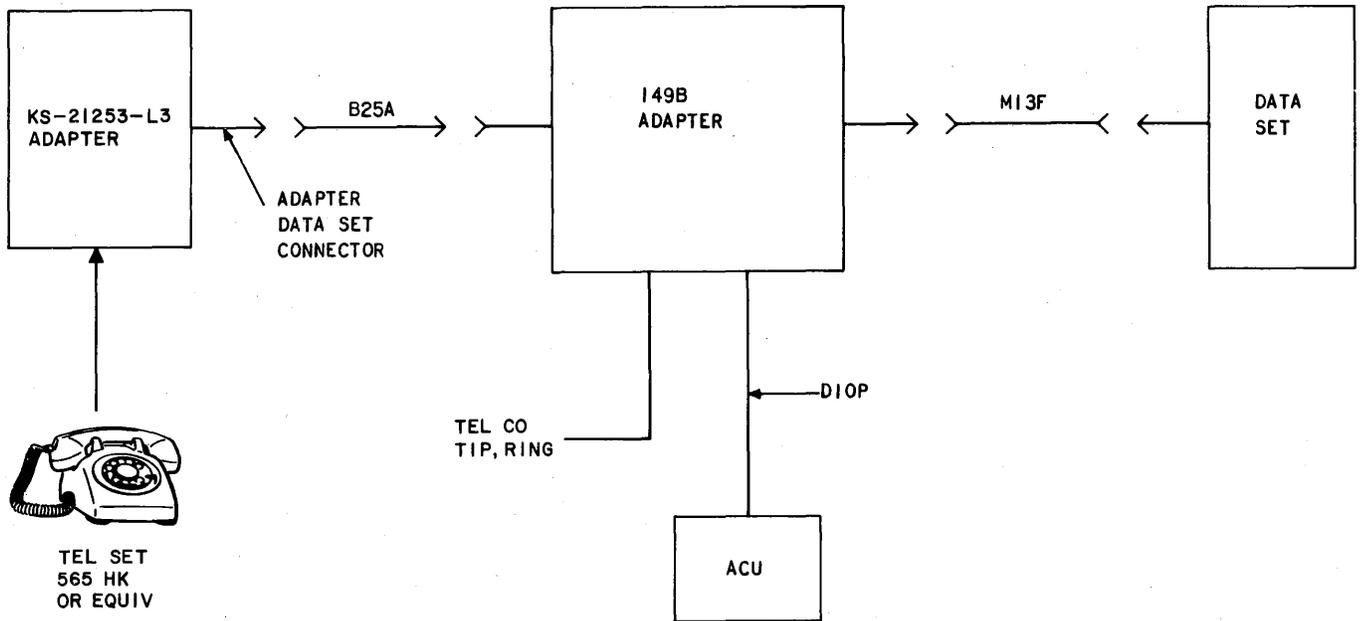


Fig. 18—Use of 149B Adapter for ACU Connection in a Multiple Data Set Arrangement With KS-21253-L3 Adapter

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on the business machine. This test assumes that protective ground from the business machine appears at the customer interface.

- (2) On the 914-type DTS, remove all programming pins from the matrix. Pull up all A and B interface selector switches.
- (3) Connect one clip of the 2W6A cord to switch 1A and connect the other clip to switch 1B. Verify that power is applied to DS and business machine.
- (4) Insert the 310 plug into the 310 MEAS jack on the 6H impulse counter.
- (5) On the 6H impulse counter, set the DIAL-MEAS switch to MEAS and set the DBRN dial to 90.
- (6) Reset the counter on the 6H impulse counter to 0.
- (7) Set the minutes control to 15. After the 15-minute test has elapsed, record the number of indications on the counter.

- (8) Remove clips of 2W6A cord from 1A and 1B and connect to 7A and 7B.
- (9) Reset the counter on the 6H impulse counter to 0.
- (10) Set the minutes control to 15. After the 15-minute test has elapsed, record the number of indications on the counter.

**5.05** At the end of both of the 15-minute periods, there should be no indications on the counter of the 6H impulse counter. If there is an indication on the counter, the grounds must be bonded together according to local instructions. At the end of the test, disconnect the test equipment and restore the DS to pretest condition.

**5.06** If trouble persists, begin sectionalization as described in the BSP 314-205 series. If the sectionalization tests are inconclusive, refer the problem to the Plant Staff and DATEC personnel through normal lines of organization.