

## 407-TYPE MULTIPLE DATA STATION INSTALLATION AND CONNECTIONS

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### 1. GENERAL

**1.01** This section provides installation and connection procedures to be followed when installing the 407A- and 407B-type multiple data stations. Installation information is also provided on the Call Director®, 565HK-type telephone set, and 2B automatic call distributor (ACD) associated with the data station. Information concerning the associated business machine, data terminal equipment, or related services is *not* included.

**1.02** This section is reissued to add information on data set (DS) 407B. Since this is a general revision, arrows ordinarily used to indicate changes have been omitted.

**1.03** The DS 407-type multiple data station consists of data sets 407-type, 41-type data mounting(s) (eight data sets per data mounting), and an appropriate cabinet. The 41A1, 41A2, 41B1, and 41B2 data mountings contain a 101A power unit, but only the 41A1 and 41A2 contain test units. One 101A power unit may supply power to one data mounting or a maximum of eight data sets. The test unit consists of the 46A1 and 47A1 data units. The DS 407-type multiple data station sets

are receivers of Touch-Tone® signals used primarily in Digital Inquiry Voice Answer-Back (DIVA) systems.

**1.04** The 407-type multiple data station may be housed in a KS-20018-L11A or -L12A cabinet, or equivalent, or any mounting rack arrangement that will accept the 23-inch, 41-type data mounting. Each KS-20018-type cabinet listed above may house the following number of 41-type data mountings and data sets.

- KS-20018-L11A cabinet can house one 41A1 or 41A2 and up to two 41B1 or 41B2 data mountings with a maximum of twenty-four data sets 407A or sixteen 407B. (Heat dissipation reduces the number of DS 407Bs that can be mounted in a given cabinet).
- KS-20018-L12A cabinet can house one 41A1 or 41A2 data mounting with a maximum of eight DS 407A or DS 407B.

Larger installations require multiple KS-20018-L11A cabinets.

**1.05** Plugs and cables for connecting the customer-provided terminals (CPTs) to the data sets are provided by the customer and should not exceed 50 feet in length. The cables for connecting the multiple data station to the transmission facilities must be terminated at the data mounting end in a 50-pin connector, such as the one on the A25D-type connector cable.



*Some installations may require that a 5-foot M25A-61 cord, or equivalent, be supplied with the 407-type multiple data station. These cords can serve as extension cords for connections to customer interface cords external to the cabinet. The M25A-61 cord, or equivalent, is required when the customer interface cords have a bending radius greater than 4 inches. Refer to Section 594-800-150 for customer interface connector and cable requirements.*

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## SECTION 594-800-200

**1.06** The multiple data station may be installed in any location that is convenient for the customer within 50 feet of the CPT. It is desirable to mount the station adjacent to or within view of the customer's audio response unit (ARU). This will allow visual monitoring of the status lamps on the DS 407s while operating or testing the ARU. Verify that the location selected by the customer for the installation is adequate for maintenance and that the customer-provided ac power outlet is **not** controlled by a switch. The ac power outlet must be within 10 feet of the equipment cabinet or mounting rack arrangement.

**1.07** Reference directions (left, right, front, or rear) on the data mounting are in respect to facing the apparatus.

**1.08** When test or demonstration calls are made, refer to the section entitled Crediting Charges on Test Calls (010-250-001) for the proper procedure for crediting charges.

**1.09** Ensure that the data loops have been tested and meet requirements outlined in the section entitled Data System—Dataphone® Service on Direct Distance Dialing Network—Test Requirements for Subscriber, Foreign Exchange, and Remote Exchange Lines (314-205-501) or Voice Bandwidth Private Line Data Circuits—Tests and Requirements (314-410-500).

**1.10** Data sets and data units found to be defective should be returned to a Western Electric Company distributing house for repair. Sets should be tagged to indicate the nature of the trouble.

## 2. SPECIAL TOOLS

**2.01** In addition to the standard installation tools, installation of the data mountings and data sets will require the following special tools:

- KS-19053-L1 screwdriver, or equivalent
- Screw starter, Kedman Co. No. 1736, or equivalent.

## 3. OPTIONS

### DS 407A and DS 407B

**3.01** Options for DS 407-type multiple data station vary with application. Options are installed

on the JU1 or JU1B circuit packs by means of small 2-pronged plugs which fit into numbered jacks on both DS 407A and DS 407B. Additional options on DS 407B are made by means of small rectangular jacks which fit over lettered prongs on the option block of the circuit module (daughter board). Installation of options should be made in accordance with the service order or the circuit layout record card. There are no options associated with the data units. **Install options in DS 407A or DS 407B as applicable before installing the data sets in the data mounting.** Options which apply to DS 407-type are illustrated in Fig. 1 and 2, and are listed in Table A.

### Station Options

**3.02** Nine options are made external to the data set (AA through JJ, Table A). Seven of these options are made on the connector block or intermediate distribution frame; two are made on the power supply.

### Option Descriptions

**3.03** The following describes both the data set and the data station options:

- (a) **Option A**—This option (factory-furnished) provides switched telecommunications network operation with a line impedance of 900 ohms.
- (b) **Option B**—This option provides private line (PL) operation with a line impedance of 600 ohms. When this option is installed, the line control circuit of the data set is bypassed and the data set is placed on line via the data terminal ready (DTR) customer interface lead.
- (c) **Option C**—This option (factory-furnished) is provided when there is **not** an automatic call distributor (ACD) associated with the data system.
- (d) **Option D**—This option is provided when an ACD **is** associated with the data system.
- (e) **Option E**—This option provides 0-dB attenuation of the data set answer-back signal and allows a maximum signal level of  $-3$  dBm out of the data set.
- (f) **Option F**—This option provides 4-dB attenuation of the data set answer-back signal and allows

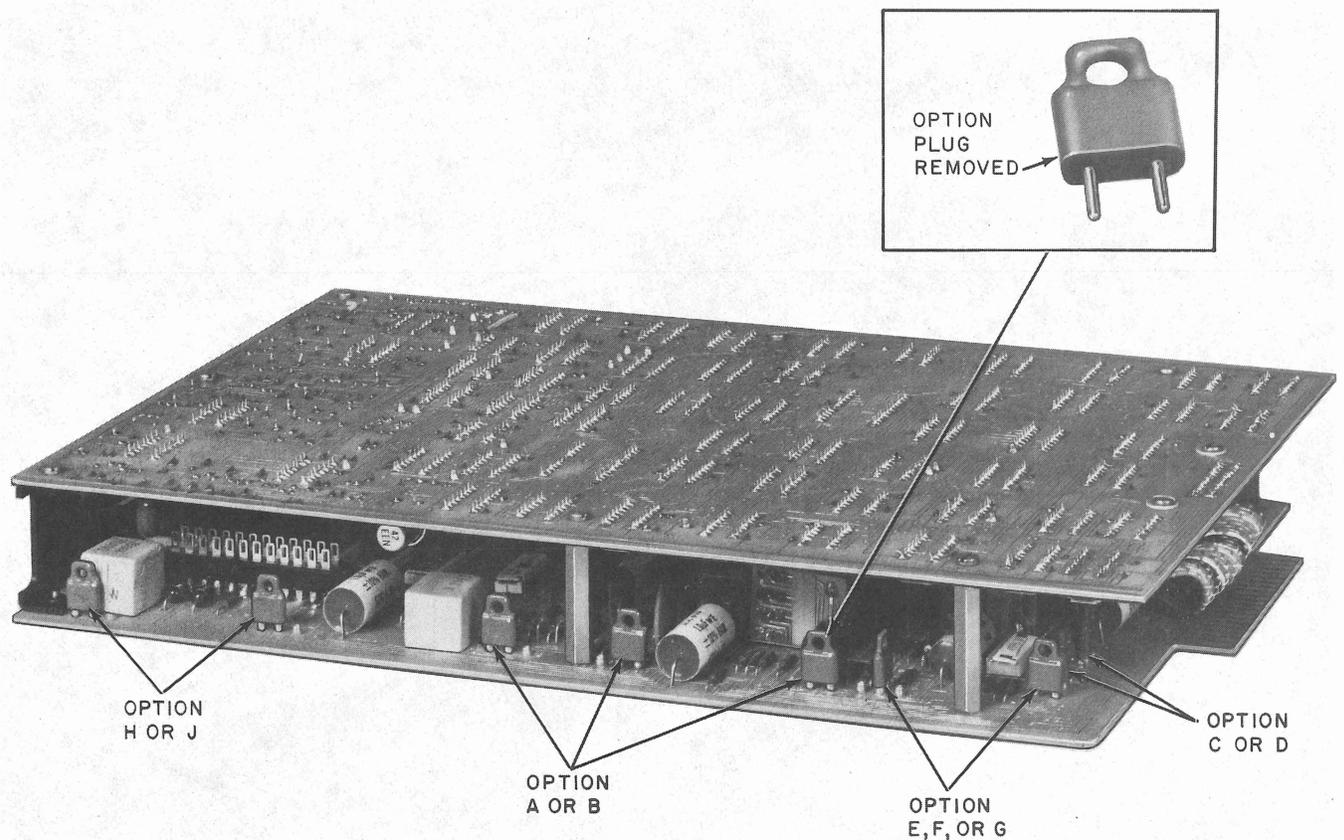


Fig. 1—Data Sets 407A and 407B—Option Plug Locations

a maximum answer-back signal level of  $-7$  dBm out of the data set.

(g) **Option G**—This option (factory-furnished) provides 9-dB attenuation of the data set answer-back signal and allows a maximum signal level of  $-12$  dBm out of the data set.

(h) **Option H**—This option (factory-furnished) provides an Electronic Industries Association (EIA) voltage interface (RS-232-C).

(i) **Option J**—This option provides a contact equivalent interface.

(j) **Option K**—(DS 407B only) With this option, the calling terminal is always able to initiate referral to an attendant by sending the Touch-Tone sequence \*\*.

(k) **Option L**—(DS 407B only) With this option, the terminal can initiate referral to an attendant only during "computer down" mode.

(l) **Option M**—(DS 407B only) This option provides out of service controlled by the OS interface lead.

(m) **Option N**—(DS 407B only) This option provides out of service controlled by DTR lead.

(n) **Option AA**—(DS 407B only) This option provides for "computer-down" detection by means of a customer-actuated switch.

(o) **Option BB**—(DS 407B only) This option provides for "computer down" detection by means of all DTR leads being in the OFF condition simultaneously.

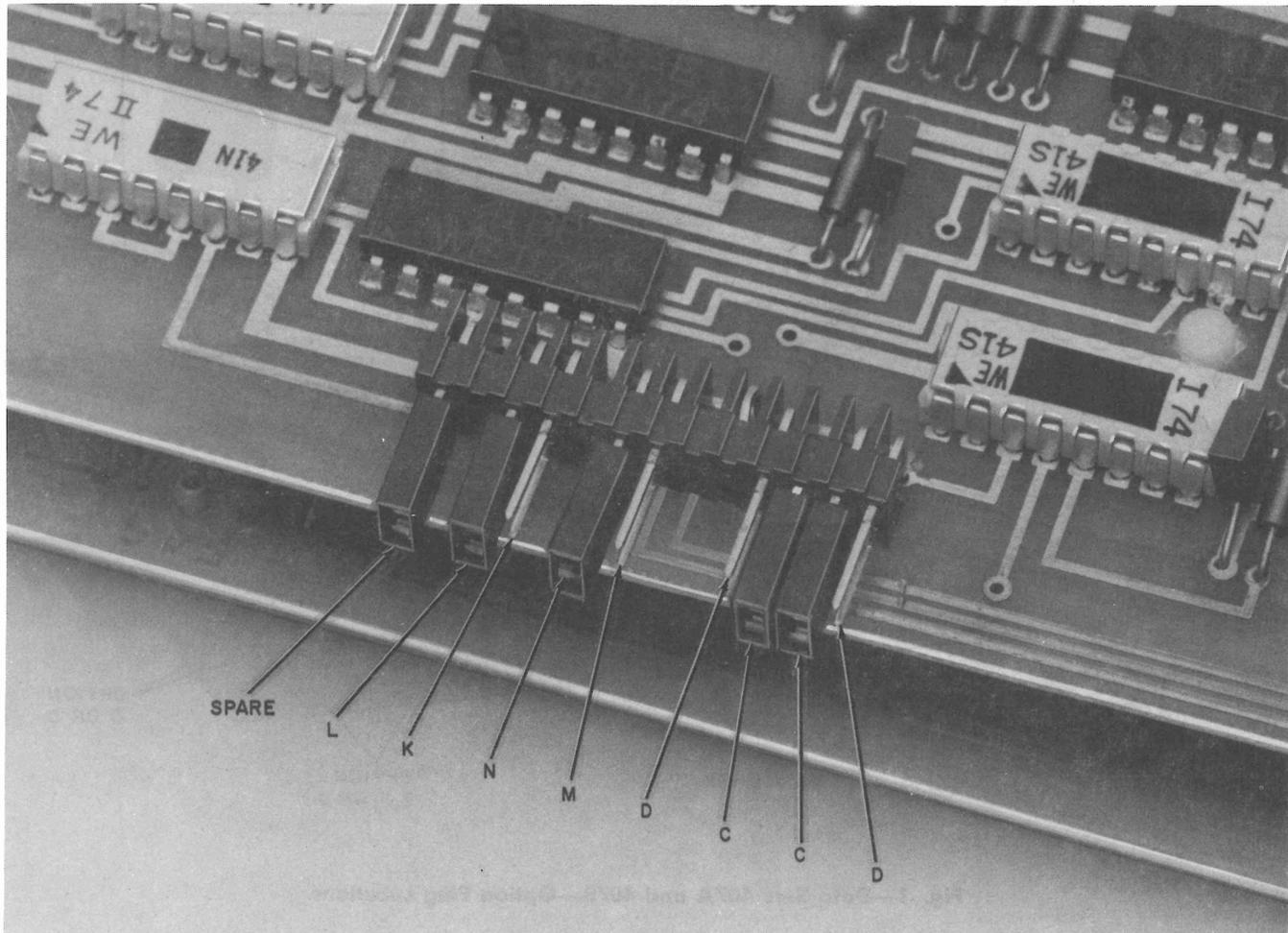


Fig. 2—Data Set 407B—Additional Option Jack Locations on CM1 (Daughter Board)

- (p) **Option CC**—(DS 407B only) This option provides for “computer down” detection either by customer-actuated switch or by all DTR leads being OFF.
- (q) **Option DD**—(DS 407B only) “Computer down” option not used.
- (r) **Option EE**—Out of service provided by tip-to-ring short.
- (s) **Option FF**—Out of service provided by third wire ground.
- (t) **Option GG**—Out of service provided by short on separate pair. Some electronic switching system (ESS) offices require this arrangement for out-of-service option.
- (u) **Option HH**—This option provides frame ground to signal ground connection. This is the option usually specified.
- (v) **Option JJ**—This option eliminates frame ground to signal ground connection.

#### 4. CUSTOMER INTERFACE INFORMATION

4.01 Customer interface lead functions, abbreviations, and lead designations are given in Table B.

#### 5. INSTALLATION AND CONNECTION PROCEDURE

5.01 The front cover of the 41-type data mounting is removable (by opening to a horizontal position and pulling forward). A decal is attached to the inside cover of each of the 41-type data

TABLE A  
DATA SET 407-TYPE OPTIONS

OPTION	SELECTION	DESIG	STRAPPING				AVAILABLE IN
			ON LINE CONTROL AND INTERFACE BOARD	ON CM1	ON 101A POWER UNIT	ON CONNECTOR BLOCK	
Type of Operation	Switched Network (DDD)	A <sup>1</sup>	E34-E32, E37-E38 E42-E41	—	—	—	Both 407A and 407B
	Private Line	B	E34-E33, E37-E36 E42-E43	—	—	—	
Used With ACD	No	C <sup>1</sup>	E28-E26, E30-E29 <sup>2</sup>	C (Two Straps) <sup>3</sup>	—	—	Both 407A and 407B
	Yes	D	E28-E27, E30-E31 <sup>2</sup>	D (Two Straps) <sup>3</sup>	—	—	
Answer Back Level	- 3 dBm	E	E54-E56, E60-E58	—	—	—	Both 407A and 407B
	- 7 dBm	F	E54-E53, E60-E59	—	—	—	
	-12 dBm	G <sup>1</sup>	E54-E55, E60-E61	—	—	—	
Customer Interface	EIA	H <sup>1</sup>	E49-E48, E51-E52	—	—	—	Both 407A and 407B
	Contact Equivalent	J	E49-E47, E51-E50	—	—	—	
Terminal Initiated Referral	Always	K	—	K	—	—	407B Only
	During Computer Down Only	L <sup>1</sup>	—	L	—	—	
OS Controlled by DTR	No	M <sup>1</sup>	—	M	—	—	407B Only
	Yes	N	—	N	—	—	
Computer Down Detection	Switch Only	AA	—	—	—	Per Fig. 7	407B Only
	All DTR Off Only	BB	—	—	—	Per Fig. 8	
	Switch or All DTR Off	CC	—	—	—	Per Fig. 9	
	Not Used	DD	—	—	—	Per Fig. 10	
Out-of-Service Wiring	Tip-Ring Short	EE	—	—	—	Per Fig. 6	Both 407A and 407B
	Third Wire Ground	FF	—	—	—		
	Separate Pair Short	GG	—	—	—		
Grounding	Frame Ground Connected to Signal Ground	HH <sup>1</sup>	—	—	E16-E17	—	Both 407A and 407B
	Frame Ground and Signal Ground Not Connected	JJ	—	—	E16-E17 Open	Per Fig. 4	

## Notes:

1. Factory Furnished Option.
2. Applies to DS 407A and DS 407B.
3. Applies to DS 407B only.

TABLE B

## CUSTOMER INTERFACE LEAD FUNCTIONS

PIN NO.	LEAD DESIGNATION	ABBREVIATION	FUNCTION
1	Frame Ground	FG	Common to ac power service ground.
2	Voice Receive A	VRA	Provides one-half of a 600Ω balanced pair for line signals being passed to the customer.
3 4 5 6	A1 Data A2 Data A3 Data A4 Data	A1 A2 A3 A4	Low group outputs from data set when a valid Touch-Tone character is present.
7	Spare	—	Not used.
8	Voice Receive B	VRB	Provides one-half of a 600Ω balanced pair for line signals being passed to the customer.
9 10 11 12	B1 Data B2 Data B3 Data B4 Data	B1 B2 B3 B4	High group outputs from data set when a valid Touch-Tone character is present.
13	Spare	—	Not used.
14	Ring Indicator	RI	An ON condition on this lead indicates that ringing signal is being received.
15	Attendant Request	AR	An ON condition on this lead (data set in data mode) indicates that an attendant is requested on the line.
16	Data Present	DP	An ON condition on this lead indicates that the data set is receiving a valid Touch-Tone signal. This lead is considered a data lead and therefore an ON condition is a negative voltage.
17 18	Voice Answer-Back A Voice Answer-Back B	VAA VAB	Provides a 600Ω balanced pair for answer-back signal from customer to data set.
19	Data Mode	DM	An ON condition on this lead and the DSR lead (pin 23) indicates the data set is in the data mode. An OFF condition on the DM lead and an ON condition on the DSR lead indicates the data set is in the talk mode.

TABLE B (Cont)

## CUSTOMER INTERFACE LEAD FUNCTIONS

PIN NO.	LEAD DESIGNATION	ABBREVIATION	FUNCTION
20	Tone Answer-Back	TAB	An ON condition on this lead causes the data set to disable the voice answer-back port and generate an answer-back tone (2025 Hz).
21	Data Receive	DR	An ON condition <i>must</i> be placed on this lead (by the customer) to connect the Touch-Tone receiver to the telco line. This enables the data set to receive data.
22	Data Terminal Ready	DTR	An ON condition on this lead prepares the data set to be connected to the telco line. In DS 407B, the out-of-service function can be optionally controlled by the DTR lead. When that option (N) is selected, the OS lead has no effect and the set is out of service when DTR is off.
23	Data Set Ready	DSR	An ON condition on this lead indicates the data set is <i>either</i> in the data mode and ready to receive data, transmit answer-back signals, or both, depending on the condition of the DR lead (Pin 21), or is in the talk mode (DM lead Pin 19 is OFF).
24	Signal Ground	SG	This conductor establishes the common ground for signals referenced to it and is optionally connected to frame ground via a strap located on the power unit.
25	Out of Service	OS	An ON condition on this lead makes the data set appear busy to incoming calls. When an ACD is employed, this lead is placed in the OFF condition at all times. In DS 407B, the out-of-service function can be optionally controlled by the DTR lead. When that option (N) is selected, the OS lead has no effect and the set is out of service when DTR is off.

mountings, which provides the data set number location and computer port assignment for each data set in the data mounting. Another decal is attached to the inside cover of the 41A1 data mounting, which provides local test information. This decal, plus a third decal, is attached to the

inside cover of the 41A2 data mounting to provide additional local test information.

**5.02 Lettered Steps:** A letter a, b, c, etc, added to a step number of this section indicates an action which may or may not be

required, depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the PROCEDURE column, and all steps governed by the same condition are designated by the same letter within the procedure. Where a condition

does not apply, all steps designated by that letter should be omitted.

**5.03** The installation and connection procedure for the 407-type multiple data station is as follows:

## STEP

## PROCEDURE



***Do not apply power to the cabinet or any of the related components of the data station until the complete station has been installed.***

- 1 Position the KS-20018-L11A or -L12A cabinet, or equivalent, near the customer-provided 60-Hz power outlet and the business machine interface cords as described in 1.06.

**Note:** For ease of installation of the 41-type data mounting(s), the KS-20018-L11A and -L12A cabinets may be placed **face up** during installation.

- 2 Gain access to front of cabinet.

**Note:** A bag of number 12 mounting screws and star washers are supplied with each 41-type data mounting. Frame ground is connected to the cabinet from the 41-type data mounting by the use of the star washers. Either 41A1 or 41A2 and 41B1 or 41B2 data mountings may be used with DS 407A; 41A2 and 41B2 data mountings must be used with DS 407B.

- 3 Verify that terminals E16 and E17 on 101A power unit are connected together (option HH) per Fig. 3. If the service order or circuit layout record card requires that signal ground **not** be connected to frame ground (optional JJ), remove the strap between E16 and E17 on 101A power unit per Fig. 3. Strap terminal 31 of 41-type data mounting(s) as shown in Fig. 4.

- 4 Remove the 101A power unit from the 41-type data mounting(s). (Power unit may be shipped loose.)

- 5 Remove front cover of each 41-type data mounting to be installed as required.

**Note:** Removal of the power unit and front cover from the data mounting ensures easy installation of the data mounting within the cabinet.

- 6a When installing a DS 407A data station in a KS-20018-L11A cabinet, install the mounting brackets (furnished with the 41-type data mounting) in the cabinet. The top of the bracket has the hole closest to the end. Mount the 41A1 or 41A2 data mounting in the top or center position as required.

- 6b When installing a DS 407B data station in a KS-20018-L11A cabinet, do not use the mounting brackets. Mount the 41A2 data mounting in either the third, sixth, and ninth holes from the top or the third, sixth, and ninth holes from the bottom of the cabinet.

- 7a Mount the 41B1 or 41B2 data mountings above and below the 41A1 or 41A2 data mounting as required for a DS 407A data station.

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**STEP****PROCEDURE**

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- 7b Mount the 41B2 data mounting above or below the 41A2 data mounting as required for a DS 407B data station.
- 8a Connect the five wires from the 41B1 or 41B2 data mounting(s) to the 46A1 data unit (after removing 47A1 data unit) per Table C by removing two screws under the 46A1 data unit and sliding it forward. (The top of the 46A1 data unit hinges upward to provide access to the terminals.)
- Note:** In private line systems (option B), remove BL-W wire from screw terminal 35 on the 46A1 data unit and reconnect to screw terminal 25.
- 9b If a KS-20018-L12A cabinet is required—  
Mount the 41A1 or 41A2 data mounting in the cabinet. (Only the 41A2 may be used in installing a DS 407B data station.)
- 10 Reinstall the 101A power unit(s) removed in Step 4 in their original location in the 41-type data mounting(s).
- 11a If a KS-20018-L11A cabinet is used—  
Connect the KS-14532-L16 power cable (furnished with 41A-type data mounting) to the ac inlet located on the side of the 101A power unit mounted in the **bottom** 41B1 or 41B2 data mounting.
- 12a Interconnect all other 101A power units together using P3BJ power cables (furnished with the 41B-type data mountings).
- 13b If a KS-20018-L12A cabinet is used—  
Connect the KS-14532-L16 power cable (furnished with 41A-type data mounting) to the ac inlet located on the side of the 101A power unit.
- 14 Verify that all pertinent data set options are properly installed per Table A and Fig. 1 and 2.
- 15 Insert each data set into the 41-type data mounting(s).

**Note:** Ensure that a good connection is made between the data set and the data mounting by using sufficient force when pushing the data set into position.

STEP	PROCEDURE
16	Insert the two telephone connector plugs (A25D connector cable equipped with KS-16689-L3 plug) into J3 and J4 located on the rear of each 41-type data mounting.
17	Route the A25D connector cables, as required, through the cabinet to the connecting block or intermediate distribution frame (IDF) and terminate per Table D.
18	Connect service line to connecting block or IDF.
19	Connect service line to pins 25 and 50 of the A25D connector cable going to J4 of the 41A1 or 41A2 data mounting as shown in Fig. 5.
	<b>Note:</b> For private line systems (option B), connect tip and ring pairs <i>only</i> per Table D. The remainder of the arrangement is connected per customer requirement.
20e	If a 2B ACD is specified on the service order or circuit layout record card— Proceed to Section 594-800-501.
21	Connect the central office telephone lines to the tip and ring pairs of the data sets at the connecting block or IDF per Table D.
22	Wire the out-of-service option (EE, FF, or GG) per service order or circuit layout record card in <i>one of the three ways</i> (shown in Fig. 6) for each data set in the 41-type data mounting.
	<b>Note:</b> The out-of-service option is only used in non-ACD switched network systems (data set options C and A, respectively).
23	Wire option AA, BB, CC, or DD as specified on the service order or circuit layout record card, in accordance with Fig. 7, 8, 9, or 10, as applicable.
24f	If a 565HK telephone set, or equivalent, or a Call Director is specified on the service order or circuit layout record card— Make connections per Table E from connecting block or IDF to Call Director or key telephone set. Refer to Fig. 11 for a functional wiring arrangement from data set number 1 to the Call Director or key telephone set.
	<b>Note:</b> Table E shows the connecting arrangement for the first four data sets to the Call Director or 565HK telephone set via the connecting block or IDF. Refer to the KEY SYSTEMS SERVICE MANUAL, volume one, or pertinent BSPs, for complete Call Director or 565HK telephone set, or equivalent, pin assignment.
25	Connect the power cord to a 117-volt 60-Hz ac outlet.
	<b>Requirement:</b> ON lamp of every data set should light, indicating proper power wiring.
26	Install front covers on 41-type data mounting(s) and perform the verification test per Section 594-800-500.

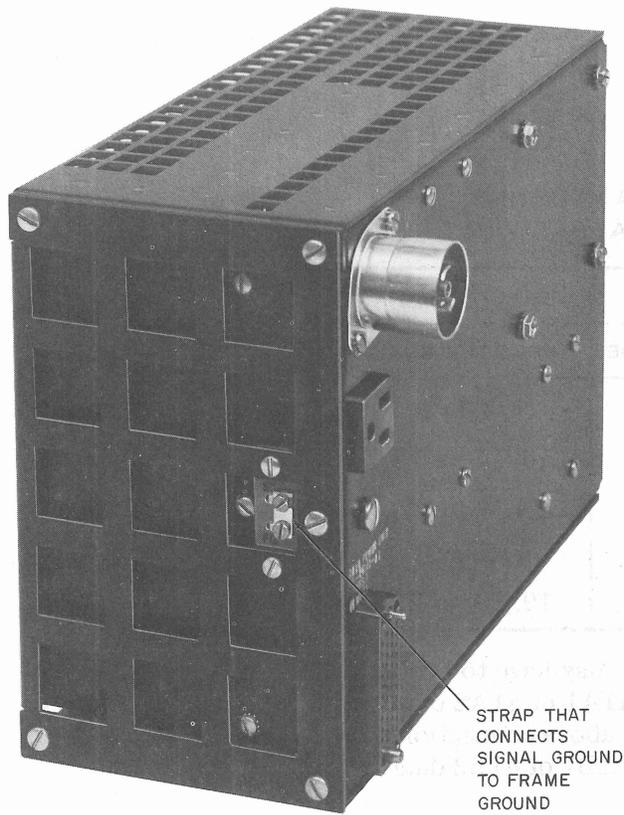


Fig. 3—Rear View of 101A Power Unit

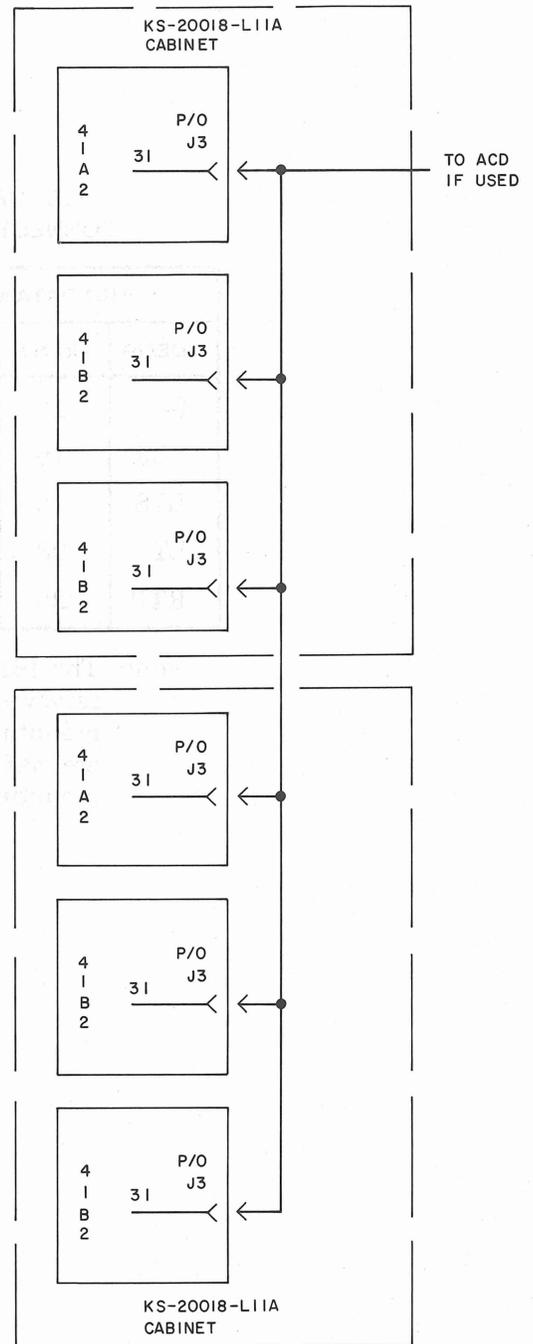


Fig. 4—Station Wiring When Frame Ground and Signal Ground Are Disconnected (Multiple Cabinets) (Option JJ)

**TABLE C**  
**41B1 OR 41B2 DATA MOUNTING**  
**CONNECTIONS TO 46A1 DATA UNIT**

41B1 DATA MOUNTING			46A1 DATA UNIT
DESIG	PIN NO.	COLOR CODE	SCREW TERMINAL
SLT	16	S	7, 8, or 9
SLR	19	G	10, 11, or 12
LTS	15	G-R	4, 5, or 6
LT	23	BR	1, 2, or 3
RTR	20	W	19, 20, or 21

*Note:* The 46A1 data unit may have to be removed from the 41A1 or 41A2 data mounting when the above connections are made from the 41B1 or 41B2 data mounting(s).

TABLE D

TELEPHONE INTERFACE FOR DATA SETS 407-TYPE MOUNTED IN THE 41-TYPE DATA MOUNTING

J3 CABLE PAIR ASSIGNMENT FOR DATA SETS (NOTE 1)				J4 CABLE PAIR ASSIGNMENT FOR DATA SETS (NOTE 2)				DESIGNATION	LEAD FUNCTION
1	2	3	4	5	6	7	8		
1 26	7 32	13 38	19 44	1 26	7 32	13 38	19 44	T R	Tip and ring pair
2 27	8 33	14 39	20 45	2 27	8 33	14 39	20 45	TT TR	Tip and ring pair to telephone set network
3 28	9 34	15 40	21 46	3 28	9 34	15 40	21 46	LAMP	Telephone set lamp control from data set
								OSG	Ground for "third wire ground" out-of-service connection
4 29	10 35	16 41	22 47	4 29	10 35	16 41	22 47	A	"A" lead control from telephone set for Talk/Data control
								DTRA	Data-terminal-ready control to ACD
5 30	11 36	17 42	23 48	5 30	11 36	17 42	23 48	ARA/OS1	Attendant request control to ACD/one lead of out-of-service pair (Note 3)
								+12A/OS2	+12 volts to ACD/other lead of out-of-service pair (Note 3)
6 31	12 37	18 43	24 49	6 31	12 37	18 43	24 49	ST1 ST2	"Start" pair from ACD

Notes:

1. Data set 1 is mounted in the far left slot of the 41-type data mounting.
2. The service line pair, pins 25 and 50 (ring and tip, respectively), also appear on J4 of the 41A1 or 41A2 data mounting..
3. Lead function is determined by installer option. The out-of-service leads are *not* required for operation with an ACD. In this case the out-of-service function is accomplished by turning DTRA OFF.



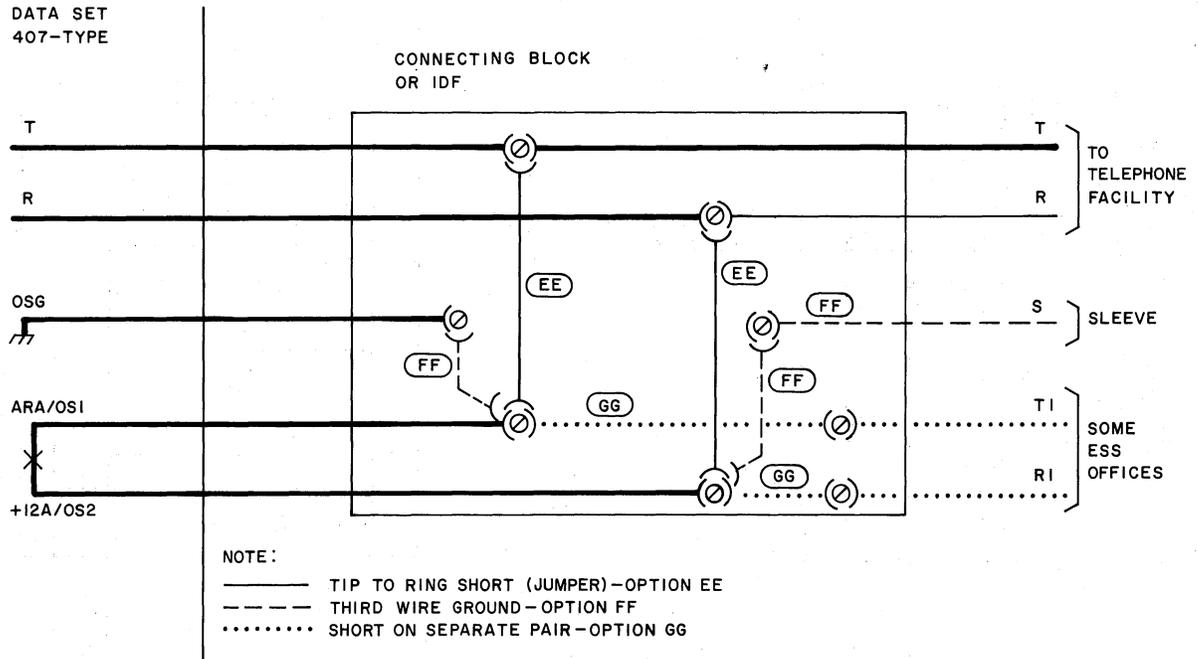


Fig. 6—Out-of-Service Wiring Connections for One Data Set 407A or 407B

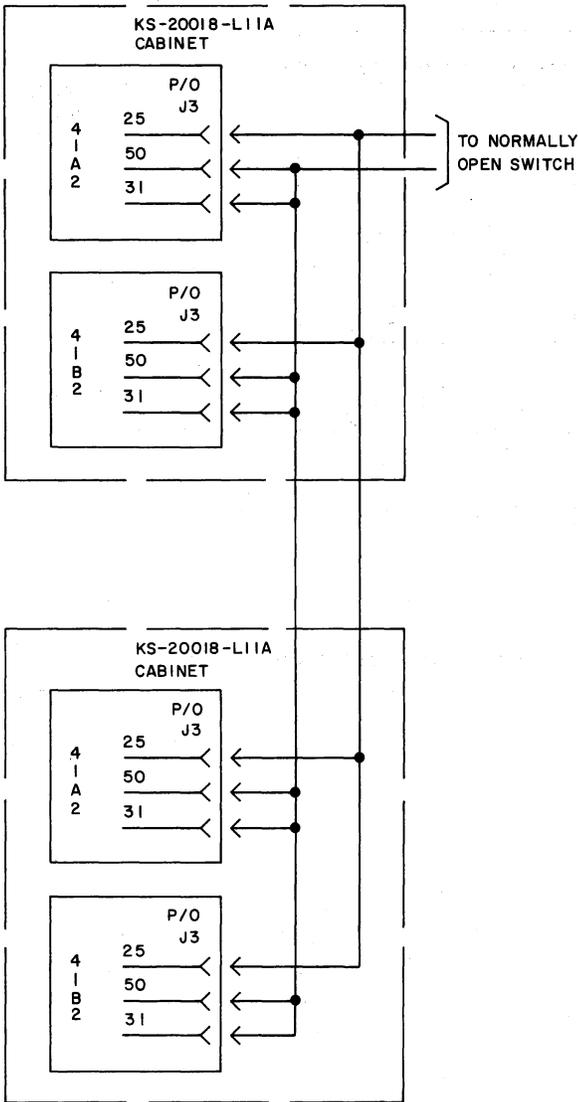


Fig. 7—Computer Down Detection by Switch Only (Option AA)

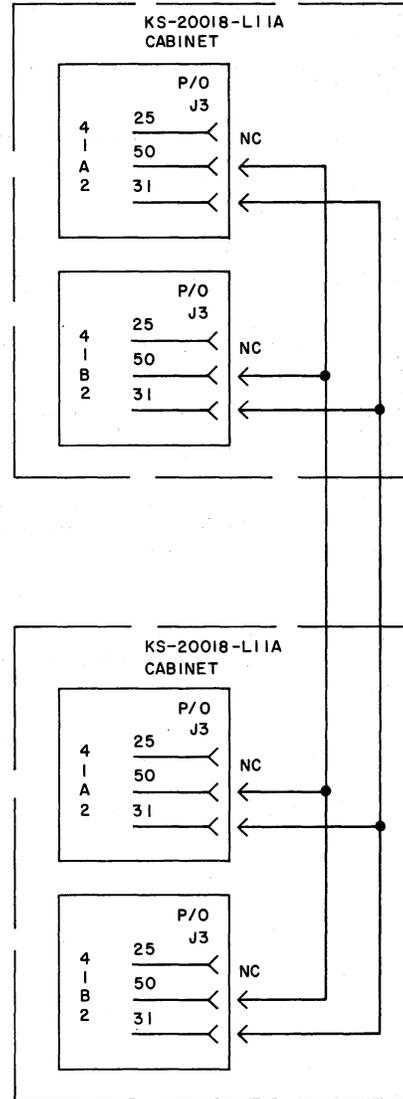


Fig. 8—Computer Down Detection by All DTR OFF Only (Option BB)

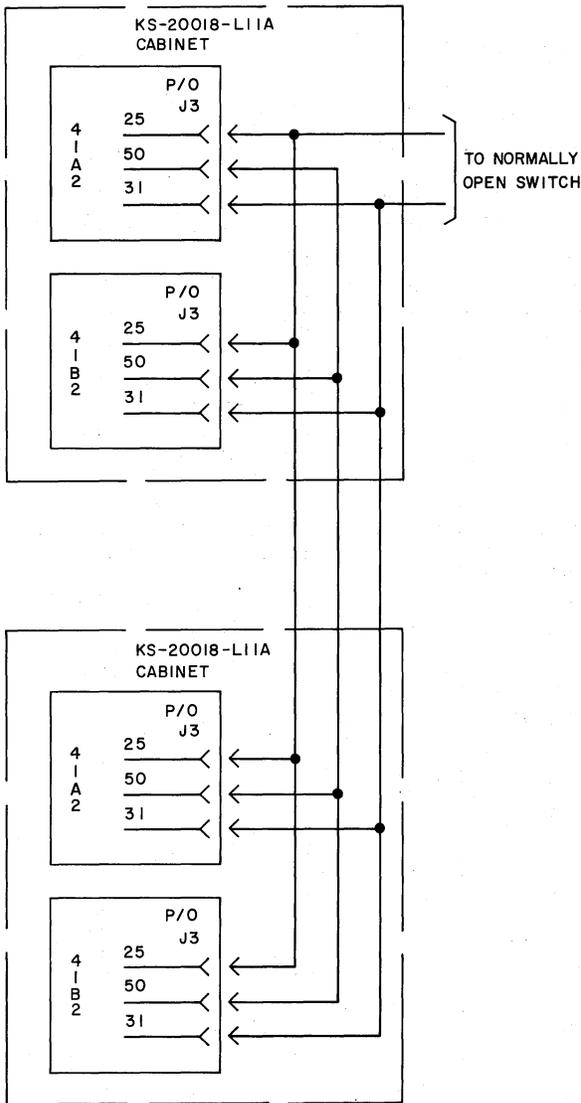


Fig. 9—Computer Down Detection by Switch or All DTR OFF (Option CC)

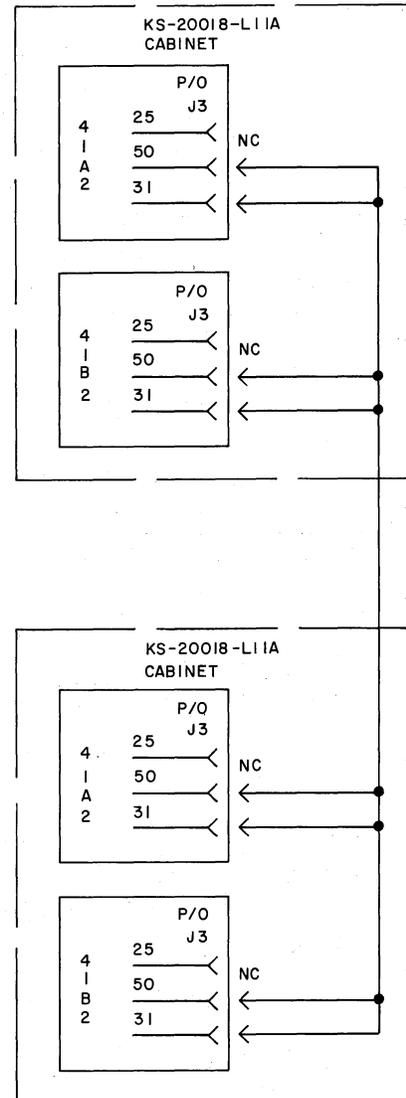


Fig. 10—Computer Down Detection Not Used (Option DD)

TABLE E

**CONNECTION ARRANGEMENT FOR DATA  
SET 407-TYPE TO A 565HK TELEPHONE  
SET OR CALL DIRECTOR**

565HK KEY TEL SET CALL DIRECTOR		CONNECTING BLOCK OR IDFC		KS-16672-L3 50-PIN CONNECTOR
DESIG	PIN NO.	DESIG	PIN NO.	J3
R1 T1 A1 AH L1 LG1	1 26 2 (to GRD) 27 3 (to 10V RMS — Note 1) 28	TR TT — A — LAMP	27 2 — 4 — 3	DATA SET 1 (Note 2)
R2 T2 A A-H-S2 L2 LG2	4 29 Common to DATA SET 1 30 6 (to 10V RMS — Note 1) 31	TR TT — A — LAMP	33 8 — 10 — 9	DATA SET 2 (Note 2)
R3 T3 A A-H-S3 L3 LG3	7 32 Common to DATA SET 1 33 9 (to 10V RMS — Note 1) 34	TR TT — A — LAMP	39 14 — 16 — 15	DATA SET 3 (Note 2)
R4 T4 A A-H-S4 L4 LG4	10 35 Common to DATA SET 1 36 12 (to 10V RMS — Note 1) 37	TR TT — A — LAMP	45 20 — 22 — 21	DATA SET 4 (Note 2)

*Notes:*

1. The 10V RMS must be locally supplied. If more than one lamp is required per data set, a 412A, or equivalent, KTU should be used.
2. Data set 1 is mounted in the far left slot of the 41-type data mounting. The J4 connector provides the same pin assignment as the J3 connector for data sets 5 through 8.

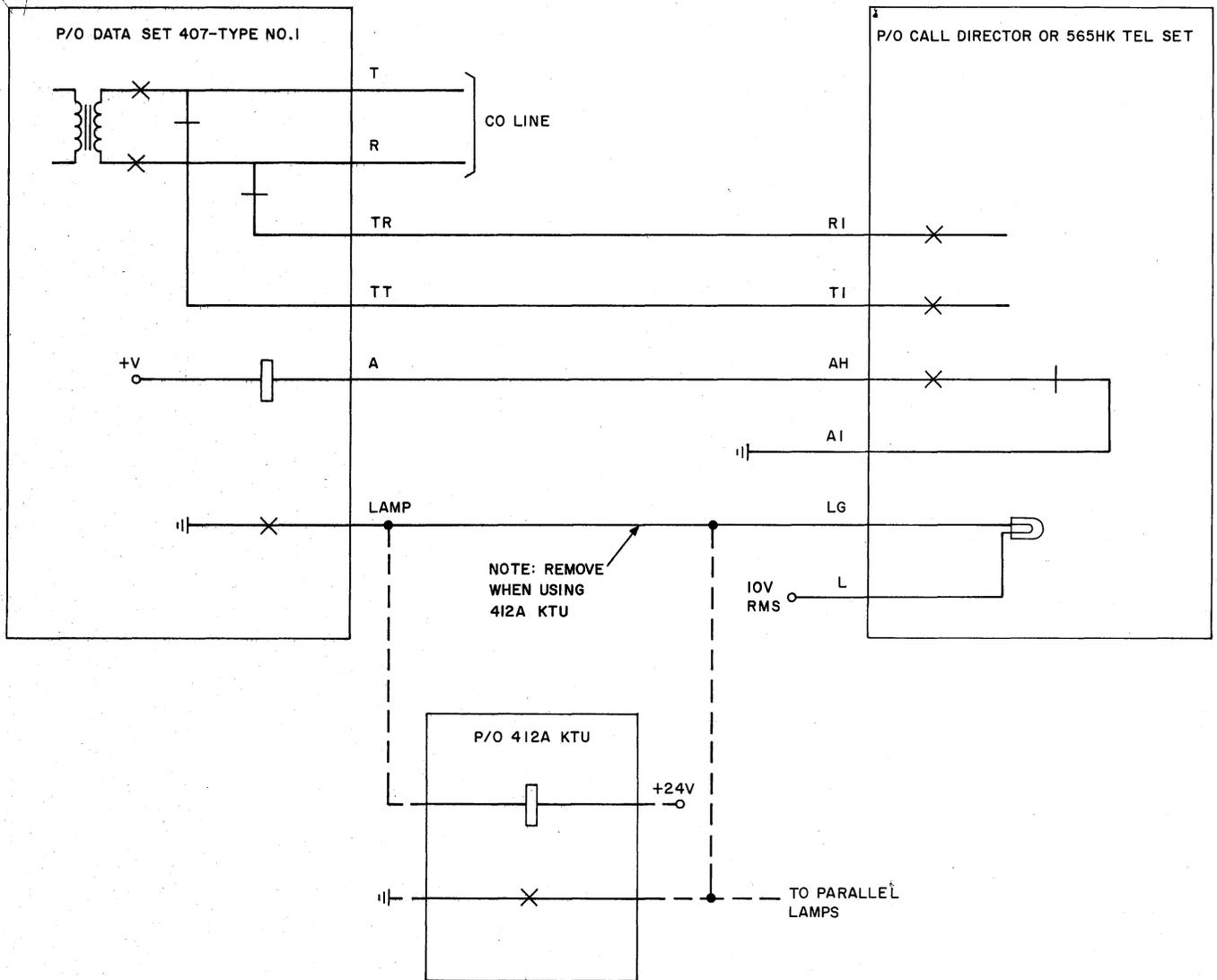


Fig. 11—Functional Wiring Arrangement From Data Set 407-Type to Call Director or 565HK Telephone Set