

## VOICE CONNECTING ARRANGEMENT SU7QW

### KS-20721 STATION COUPLER

#### 1. GENERAL

**1.01** This section provides identification, installation, operation, maintenance and connection information for the KS-20721, List 1 general purpose station coupler when used in Voice Connecting Arrangement (VCA) SU7QW.

**1.02** This section is reissued to:

- Change conditions for use of KS-20721, List 11 pulse corrector
- Clarify 3.02 and 3.03
- Revise Fig. 3 and 6
- Add information on noise pickup (6.06).

**1.03** The customer should be informed by the manufacturer or supplier of the equipment of the proper VCA to be used with his equipment.

**1.04** If the customer wants a copy of the Technical Reference which covers the above VCA, the customer should contact the local Telephone Company Business Office or the Marketing Representative.

**1.05** *Lettered Steps:* A letter a, b, c, etc, added to a step number in Part 5 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 ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

**1.06** The KS-20721 station coupler is a general purpose station coupler used with several voice connecting arrangements. All features and options are not shown; only those applying to SU7QW are shown.

**1.07** Information on dialer connections to switchboards and miscellaneous key equipment will be found in Section 512-125-430.

#### **1.08** *Voice Connecting Arrangement SU7QW:*

This connecting arrangement is intended to replace the existing VCA SU7 which uses a modified KS-20445 control unit (repertory dialer) to connect customer-provided (CP) dial pulse dialers that require no transmission paths.

**1.09** An associated telephone set may make a normal outgoing call with this connecting arrangement.

**1.10** The KS-20721, List 15 test set may be used to test the station coupler.

**1.11** This issue of the section is based on the following drawing:

SD-69903-01, Issue 5B—KS-20721 Station Coupler

If this section is to be used with equipment or apparatus reflecting later issue(s) of the drawing(s), reference should be made to the SDs and CDs to determine the extent of the changes and the manner in which the section may be affected.

#### 2. IDENTIFICATION

##### PURPOSE

- To provide facilities for connecting CP dial pulse repertory dialers to the telephone line
- To provide protection for personnel and facilities against hazardous voltages.

##### APPLICATION

- Provides for the connection of CP dial pulse dialers that do not require a transmission path.

**ORDERING GUIDE**

- Coupler, Station, KS-20721, L1 (Fig. 1 and 2)
- Assembly, Hinge, KS-20721, L10 (Fig. 3)
- Corrector, Pulse, KS-20721, L11 (Fig. 4)
- Set, Test, KS-20721, L15 (Fig. 5)
- Tool, KS-19192, L1 (not required on later model units which have slotted screws)
- Transformer, 2012B (one per coupler)  
or
- Unit, Power, 19-Type (or equivalent, when required for multiple coupler installations, see 6.05).

**DESIGN FEATURES**

**2.01** Voice Connecting Arrangement SU7 provides the following features:

- DC isolation and high-voltage surge protection
- Network control signaling (off-hook, dial pulse, and disconnect)
- AC or DC powered.

**2.02** The KS-20721, List 1 station coupler (Fig. 2) is the basic unit, designed to be field equipped with a KS-20721, List 10 hinge assembly for mounting the optional circuit pack (Fig. 3). The circuit pack is equipped with quick connect connectors for easy installation.

**2.03** The KS-20721, List 11 pulse corrector (Fig. 4) is not required for initial installations. It shall be used only after it has been determined that the dial pulses received from the customer-provided equipment (CPE) meet all requirements specified in the Technical Reference and pulsing problems still exist. It should not be used to correct poor customer pulses. When adding the List 11 pulse corrector to the List 1 coupler, remove wiring option Q and provide option V as shown in Table B.

**2.04** The KS-20721, List 15 test set plugs into the connector on the station coupler and is used with a 1013A hand test set (or equivalent) to check the operation of the coupler with the CPE disconnected (Fig. 5 and 6).

**3. INSTALLATION—KS-20721, LIST 1 STATION COUPLER (Refer to Table A and Table B.)**

**3.01** The location and method of installing the station coupler shall be consistent with standard practices. The installer should provide the necessary internal wiring options that are called for on the customer service order by uniform service order code (USOC) using Tables A and B. The features provided by the various options are explained in Table C. The KS-20721 station coupler is designed for wall or shelf mounting, weighs 4 lbs, measures approximately 9 inches square by 3 inches deep, and has a metal base with plastic cover. (Cover screws require KS-19192, List 1 tool for early models, screwdriver for later models, and may be changed by the installer.)

**3.02** A 15-pin connector (J1, Fig. 1) is located on the base of the unit to connect the pulsing and muting leads to the CPE. The mating ITT-Cannon Electric or Cinch Mfg. Co. plug No. DA-19603-403 with hood No. DA-51225-1 is customer provided. Screw terminals on the left side of the printed circuit board provide connections to dial and receiver of the telephone set, and 2012B power transformer (or power supply). Flexible jumper leads with connectors provide for installation options.

**3.03** When using an associated Telephone Company telephone set, locate station coupler within 5 feet of the telephone set, if practical, and connect telephone set to station coupler using a D4BN mounting cord or D station wire. (See Fig. 8.) Secure D4BN mounting cord or D station wire to clamp at lower left corner of station coupler.

**3.04** The station coupler should be located in a place mutually agreeable to the customer and Telephone Company and readily accessible for maintenance and convenient for customer connection. When mounting coupler with screws do not overtighten and bend base. Mount the unit close to a 115V ac convenience outlet not under control of a wall switch when power is provided by a 2012B transformer or 19-type power unit.

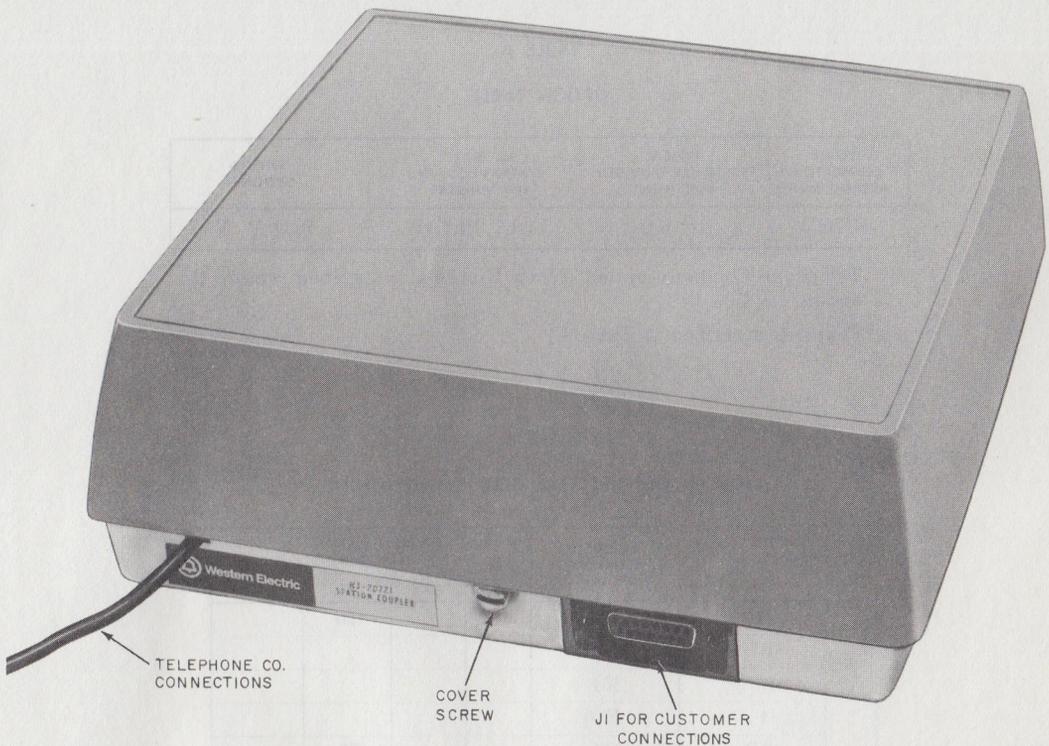


Fig. 1—KS-20721, List 1, Station Coupler



**Complete all installation work before connecting the 2012B transformer, 19-type power unit or the CPE.**

### CIRCUIT PACK INSTALLATION

**3.05** The KS-20721, List 11 circuit pack may be easily installed in the field. The installer may add the optional circuit pack initially or to an existing installation by providing the wiring options called for in Table A and shown in Table B.

**3.06** To install optional circuit pack, perform the following steps:

(1) Remove the cover from the station coupler using the KS-19192, List 1 tool or screwdriver.

(2) Attach KS-20721, List 10 hinge assembly to the four corner screws mounting the List 1 board. Refer to Fig. 3.

(3) The installer can mount any combination of circuit packs on the internal mounting frame formed by the hinge assembly. Place board in correct position on frame (refer to Fig. 3 or cover label) and secure with four corner mounting screws furnished with circuit pack.

(4) Connect the flexible jumper leads on List 1 board to provide the options called for in Table A by using the connecting information given in Table B.

(5) Plug connecting leads from boards into corresponding terminals on List 1 board per Table B and Fig. 3 and 4. Dress leads to avoid

**TABLE A**  
**OPTION TABLE**

VOICE CONNECTING ARRANGEMENT	TYPICAL CUSTOMER-PROVIDED EQUIPMENT	KS-20721 STATION COUPLER LIST NUMBERS	WIRING OPTIONS †
SU7QW	Dialers	List 1, 10,* 11*	P, Q, W, V*

\* Telephone Company option. When V option is specified remove Q option.

† Features described in Table C.

**TABLE B**  
**WIRING OPTIONS FOR FIELD INSTALLATION**

LOC	OPTION LEAD COLOR	FROM TERMINAL ON L1 †	TO TERMINAL ON L1 OPTIONS			
			P	Q ‡	W	V
L1 BOARD	G	N			RD	
	BL	K1				
	S	K4				
	O	F10				
	BR	F6			F8	
	V	F4			F7	
	BK	F5			F5	
	Y	P2		P2		P3
	S*	F8			F2	
	BL*	F7			VF1	
W	M	G5				
L11 BOARD	R					VS2
	BK					G2
	Y					P1
	BL					P2

\* These leads originate from J1 connector.

† Store on these terminals when not in use.

‡ Remove Q option when installing V option.

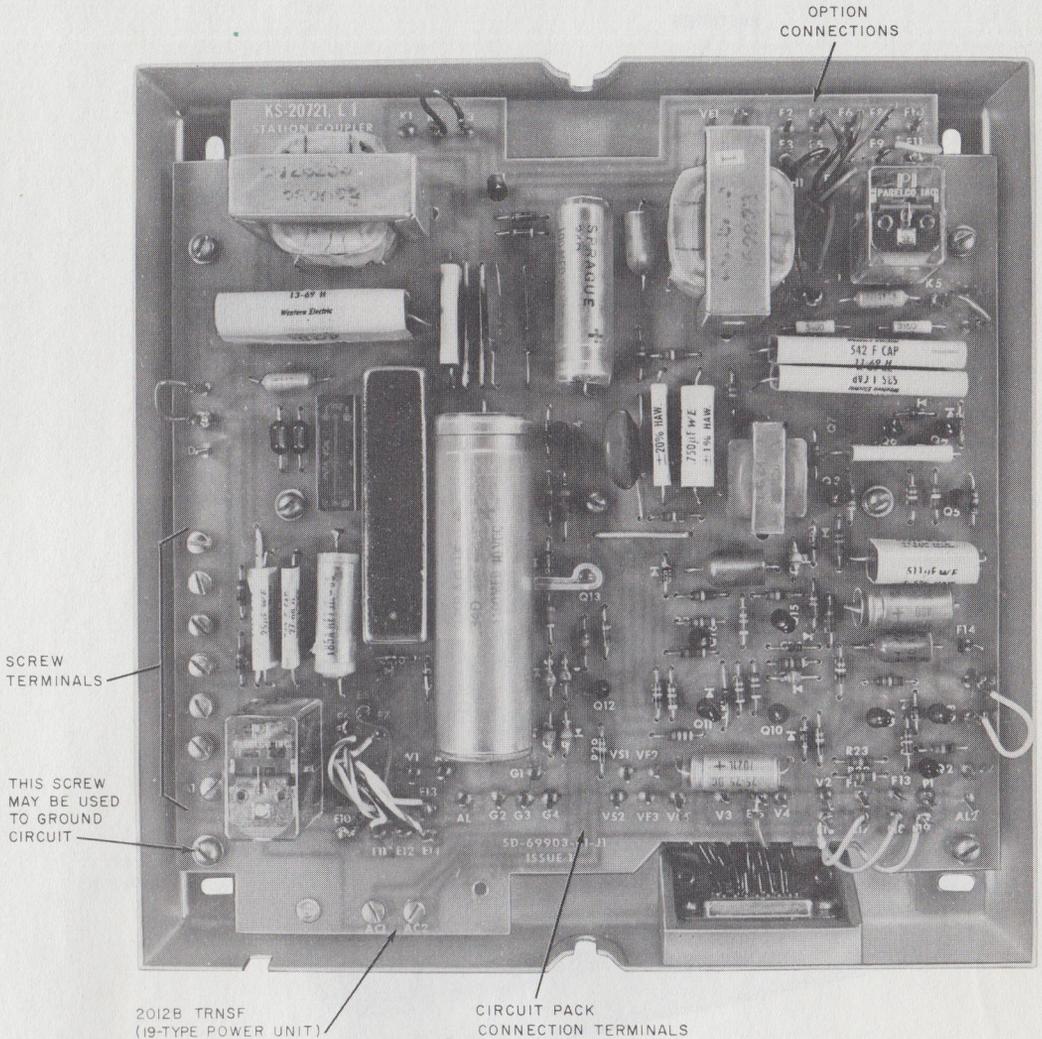


Fig. 2—KS-20721, List 1, Station Coupler, Cover Removed

interference with boards and cover and secure leads with cable clamp provided.

- (6) Close hinge assembly and fasten the two top corner fasteners.



*Early models had special quarter turn fasteners; current models have conventional captive screws which fasten clockwise and release when turned counterclockwise. On early models, turn fasteners clockwise only*

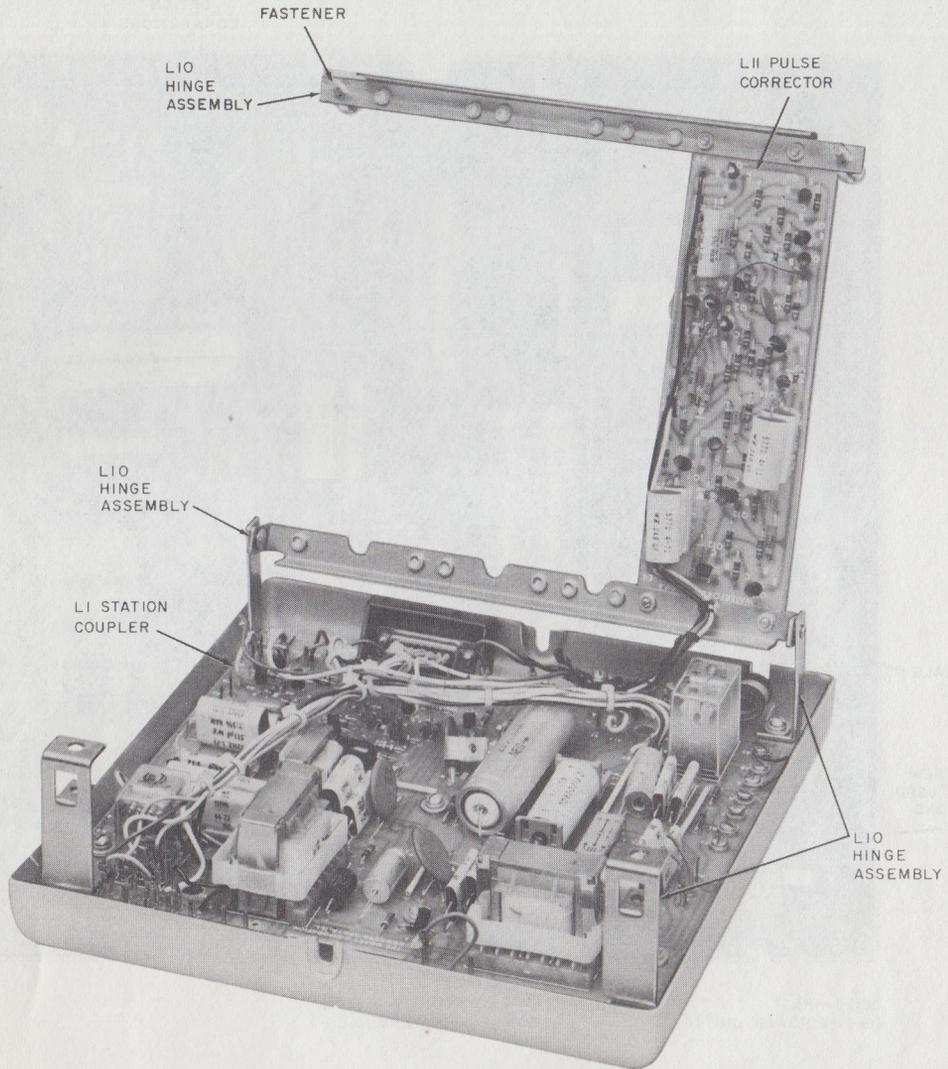


Fig. 3—KS-20721 Station Coupler Showing Optional Circuit Pack

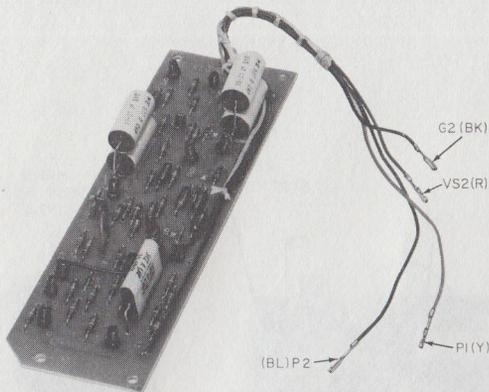


Fig. 4—KS-20721, List 11 Pulse Corrector

*to open or close. (Fastener may break if turned counterclockwise.)*

(7) Replace cover and fasten cover screws.

3.07 After installation is completed, perform operational tests given in Part 5 to check for proper operation before CPE is connected.

#### 4. OPERATION

##### DIAL PULSE REPERTORY DIALER (VCA SU7QW with no transmission path)

4.01 With VCA SU7QW (Fig. 7), the customer goes off-hook with the associated Telephone Company telephone set and after receiving dial tone operates his dialer to outpulse the desired station code. The dial pulsing contacts open and close leads OH1 and OH2 causing PR relay to repeat the pulses over leads R and R1 to the telephone line. The muting (off-normal) contacts from the CP dialer, if provided, open and close the muting leads MU1 and MU2 causing RU relay to repeat closures on leads A and A2 to mute the telephone set receiver during outpulsing. To prevent a false dial pulse, power must be applied to the coupler, and leads OH1 and OH2 must be closed before the associated telephone handset goes

off-hook. If a power failure occurs, the coupler automatically connects the telephone set across the line so the customer can dial manually.

#### LIST 15 TEST SET

4.02 The List 15 test set (Fig. 5 and 6) used with the 1013A hand test set (or equivalent) and a connecting cable terminated in a plug for connection to the station coupler permits checkout of the coupler independent of the CPE.

4.03 When detailed circuit description and operation information is required, refer to CD- and SD-69903-01.

#### 5. MAINTENANCE

5.01 When trouble is reported verify that:

- Customer connector plug is secure in coupler.
- Power is supplied to station coupler with correct polarity.
- Leads to CO line and telephone set are secure.
- CO pair and telephone set are good.
- Wiring options and coupler connections are correct. (Refer to Table B and Fig. 8.)

5.02 After performing steps in 5.01, if trouble still exists, perform the following test.

##### 5.03 Apparatus Required:

- List 15 test set
- 1013A (or equivalent) hand test set
- KS-6571 (or equivalent) battery (if coupler is powered by CPE).

##### 5.04 Preparation:



**Make all tests with CPE disconnected.**

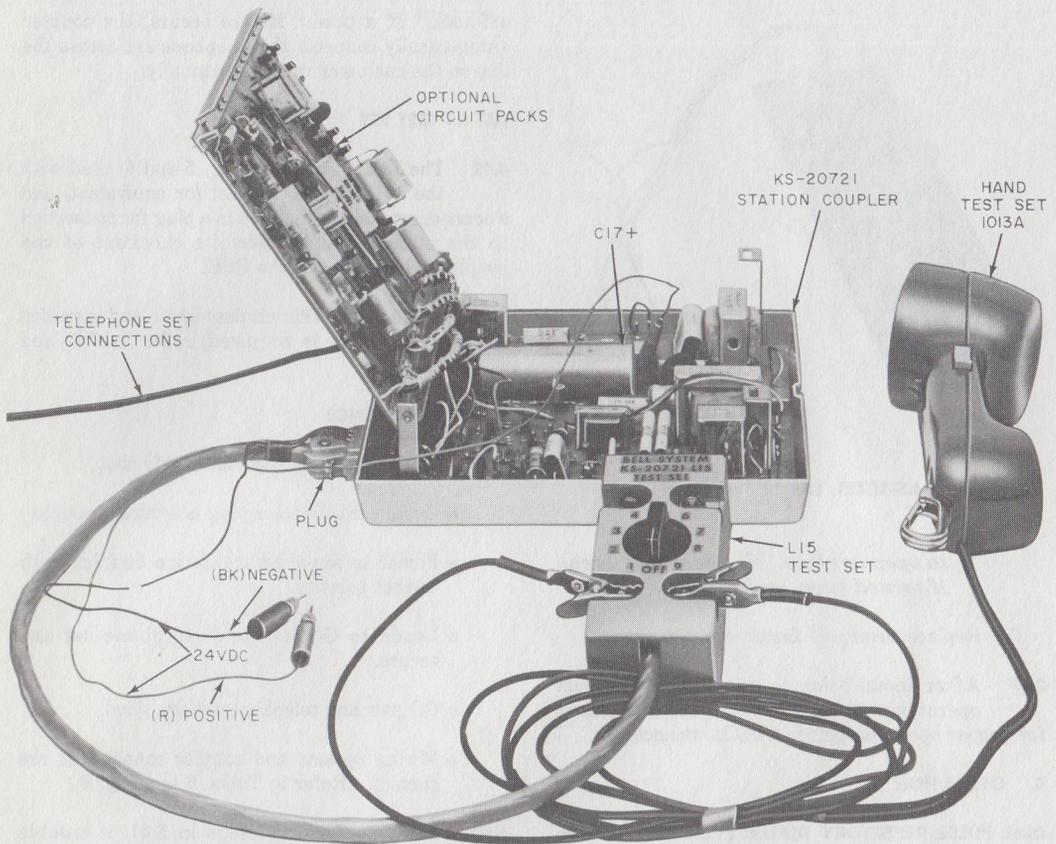


Fig. 5—KS-20721 Station Coupler With KS-20721, List 15 Test Set and 1013A Hand Test Set

STEP	ACTION	VERIFICATION
1	Rotate selector switch on List 15 test set to OFF.	
2	Remove cover of station coupler using KS-19192, List 1 tool or screwdriver.	
3	Connect a 1013A (or equivalent) hand test set to terminals provided on test set (Fig. 5).	
4a	If coupler is normally powered by CPE— Use a 24V (KS-6571 or equivalent) battery and connect the pin-tipped red lead from the test set to +24V and black lead to -24V.	

STEP	ACTION	VERIFICATION
5	Connect test set plug to receptacle on station coupler.	White lamp extinguished. Red lamp extinguished.
6	Connect alligator clip on wire coming from the test set plug to the positive (+) terminal of capacitor C17 in the station coupler (Fig. 5).	
<b>5.05 Tests:</b>		
STEP	ACTION	VERIFICATION
7	Operate switch on hand test set to MON.	
8	Rotate selector switch of test set to position 1.	White lamp remains extinguished. Red lamp remains extinguished.
9	Rotate selector switch of test set to position 3.	White lamp lighted.
10	Rotate selector switch of test set to position 6.	White lamp extinguished.
11	Operate switch on hand test set to TALK.	White lamp lighted. Very weak dial tone heard at associated telephone set.
12	Dial a test number using the hand test set while listening at the associated telephone.	Dial pulses should be muted to a low level.
13	Rotate selector switch of test set back to position 4.	White lamp extinguished. Ringback signal heard.
14	Rotate selector switch of test set to OFF.	White lamp remains extinguished.
15	Disconnect test set from station coupler and reconnect CPE.	
<b>5.06</b>	If coupler does not meet the above tests, replace coupler and/or circuit packs.	
<b>5.07</b>	If the tests are satisfactory, remove all test connections to restore circuit to normal and follow local reporting procedures for CP trouble.	
<b>5.08</b>	When in the repairman's judgment the trouble is located in the CPE, the Repair	



***Do not attempt any test or repair to the CPE.***

TABLE C  
WIRING OPTION FEATURES

OPTION	FEATURE
Q	Provides for direct control of line relay PR for DC pulse repeating without pulse correction.
P*	Removes line seizure delay feature.
W	Used for repertory dialer connections only.
V	Adds List 11 circuit to provide DC pulse correction

\* This option is a function of the KS-20721 coupler and should be furnished only on local instructions. It is not required for VCA SU7QW. May be used with any option.

Service Bureau should be notified so that proper Maintenance of Service Charge billing can be initiated as outlined in Section 660-101-312 entitled Maintenance of Service Charge on Services with Customer-Provided Equipment (CPE).

## 6. CONNECTIONS

**6.01** Connections to the CPE are made through the 15-pin KS-19087, List 1 female connector on the coupler. The customer must furnish a suitable connecting cable equipped with a Cinch Manufacturing Co. or IIT-Cannon Electric Co. plug No. DA-19603-403 with a No. DA-51225-1 hood (or equivalent).

**6.02** For connections to a repertory dialer, provide wiring option W from Table B and connections to telephone set as shown in Fig. 8. The coupler pulsing contacts are connected in series with the telephone set dial by using screw terminals R and R1. Leads from screw terminals A and A2 connect across the telephone set receiver to provide muting during outpulsing. Connect the 2012B power transformer (or 19-type power unit) leads to screw terminals AC1 and AC2. Lightly tighten all unused terminal screws.

**6.03** Typical connections to a 608-type PBX are shown in Fig. 9 and Table D. Mount the 10-141 terminal strip under the key shelf adjacent to the wire entrance hole for the dial. Rewire the 6044B dial mounting as shown in Fig. 9 or Table D. Lift wires and dial and use D-161488 connectors to extend wiring from the KS-16323 connector to the 10-141 terminal strip. Use strap wire to connect the 10-141 terminals to the 6044B dial mounting. If station coupler is disconnected, leave 10-141 terminal strip in place and strap terminals 3 and 5.

**6.04** For dialer connection to other switchboards and key equipment, refer to Section 512-125-430.

**6.05** The 2012B transformer must not be used to supply more than one coupler. A suitable dc power supply (19-type or equivalent) must be used to supply multiple couplers (a maximum of ten couplers per 19-type power unit connected to the dc signal terminals). The dc power supply should be of the current limiting type, or it should be connected through a 20-ohm, 1-watt resistor to each coupler to provide current limiting. The power supply may be connected with either polarity to the AC1 and AC2 terminals. Do not ground either terminal of the power supply. Power supply current drain is 0.140 ampere maximum with all circuit packs in use. Initial surge current is 1 ampere and standby current is 0.012 ampere.

**6.06** Line noise pickup, cross-talk, etc, may occur between units connected to a common power supply. When this occurs, it may be cleared by grounding the housing of each station coupler. The circuit board mounting screw below terminal A1 may be used for grounding the circuit.

**6.07** When power is supplied by a 2012B transformer (or 19-type power unit), an optional current limited, positive dc voltage source is provided to the customer on lead B1 (ground return on lead B2) furnishing a charging current of 2.5 milliamperes which may be used to keep a CP rechargeable battery (18V, 150 to 500 ma) charged during normal operation to provide power when commercial power fails. If the customer furnishes power, 21  $\pm$  5 volts dc is connected to leads B1 and B2 through plug (P1).

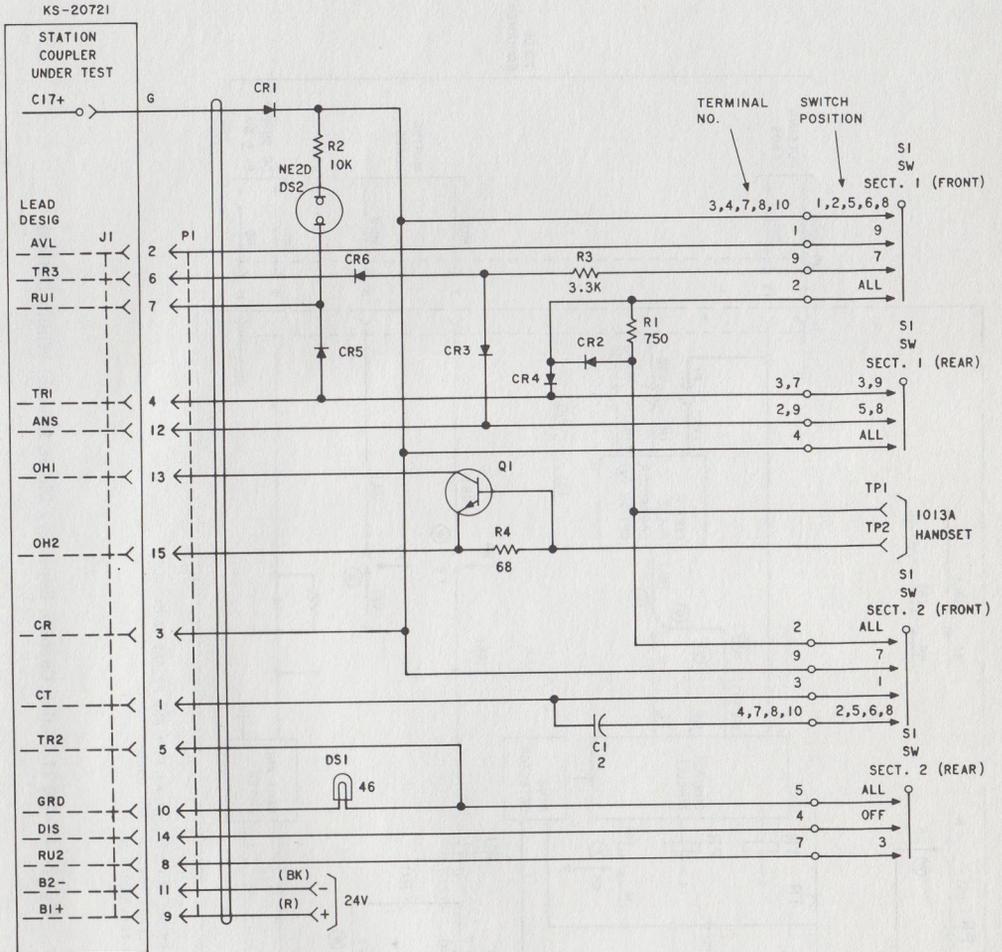


Fig. 6—KS-20721, List 15 Test Set, Schematic

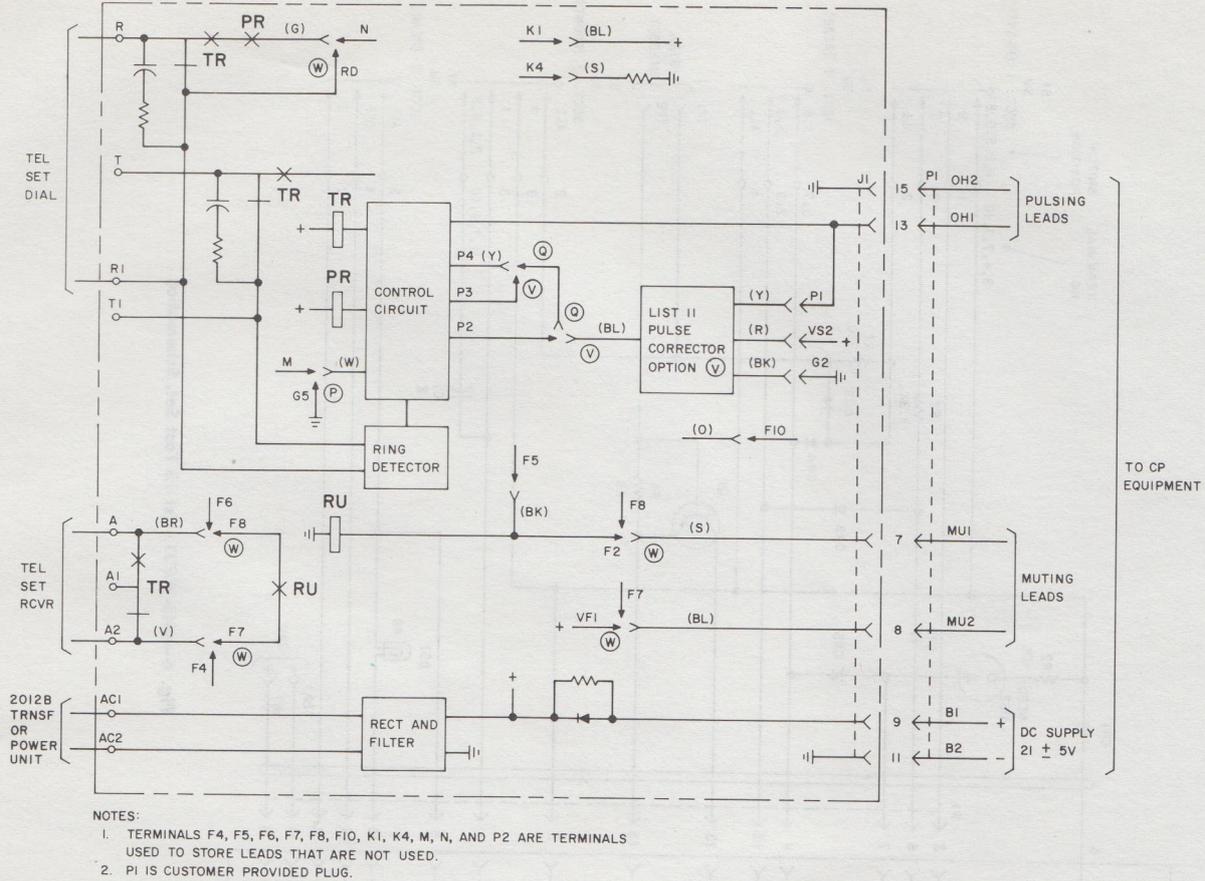
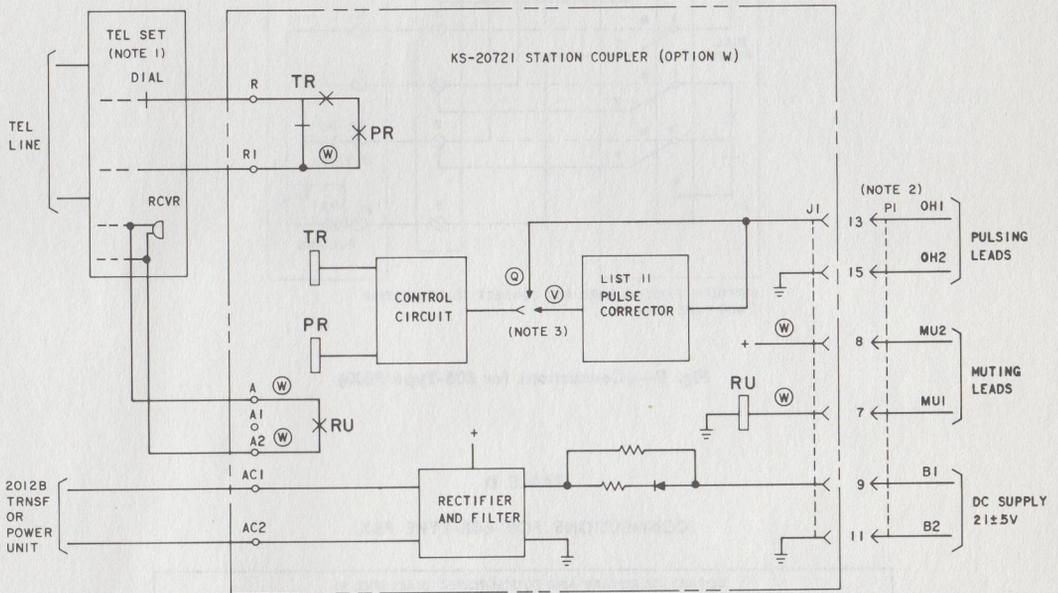


Fig. 7—KS-20721 Station Coupler, Repertory Dialer, Internal Wiring Options



- NOTES:
1. REFER TO SECTION 512-125-400 FOR INTERNAL TEL SET CONNECTIONS.
  2. P1 IS CUSTOMER-PROVIDED PLUG.
  3. CIRCLED LETTERS (W), (V), AND (Q) DENOTE WIRING OPTION.

TPA 550312

Fig. 8—KS-20721 Station Coupler, Repertory Dialer, Simplified Schematic

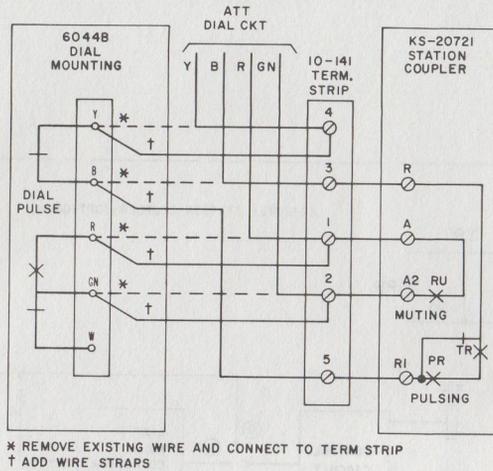


Fig. 9—Connections for 608-Type PBX

TABLE D  
 CONNECTIONS FOR 608-TYPE PBX

ROTARY OR ROTARY AND TOUCH-TONE® DIALS (FIG. 9)				
LEAD FROM KS-16323 CONN PIN NUMBER	REMOVE FROM 6044B	CONNECT TO 10-141	CONNECT STRAPS	
			FROM 10-141	TO 6044B
1	B	3		
2	Y	4	4	Y
3	R	1	1	R
21	GN	2	2	GN
			5	B