

## VOICE CONNECTING ARRANGEMENTS

### RDMZR AND RDY

#### KS-20721 STATION COUPLER

##### 1. GENERAL

**1.01** This section provides identification, installation, operation, maintenance and connection information for the KS-20721, List 1 and KS-20721, List 2 general purpose station couplers when used in Voice Connecting Arrangements (VCA) RDMZR and RDY.

**1.02** This section is reissued to:

- Add information on noise pickup (6.04)
- Add lead designations to Fig. 7
- Delete reference to TELCO Engineering Department (6.03)
- Clarify connection of tel sets (3.03).

**1.03** The KS-20721 station coupler (Fig. 1) is used to provide services similar to those provided by the KS-19522 recorder coupler for answering sets and recorders. However, the plug and wiring connections may be different and substitution should not be made without customer approval.

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

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

**1.06 *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.

**1.07** The KS-20721 station coupler is a general purpose station coupler used with several different VCAs. Only features and options used with the arrangements in Table A are covered.

**1.08 *Voice Connecting Arrangements RDMZR and RDY:*** These connecting arrangements are used with customer-provided equipment (CPE), typically answering sets, recorder dictation equipment and loudspeaker paging systems. VCA RDY, by means of the List 12 voice control, provides automatic volume limiting of incoming signals, optional voice control disconnect, and other features of RDMZR.

**1.09** An associated telephone set may make a normal outgoing call with either of the arrangements when the station coupler is not in operation.

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

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

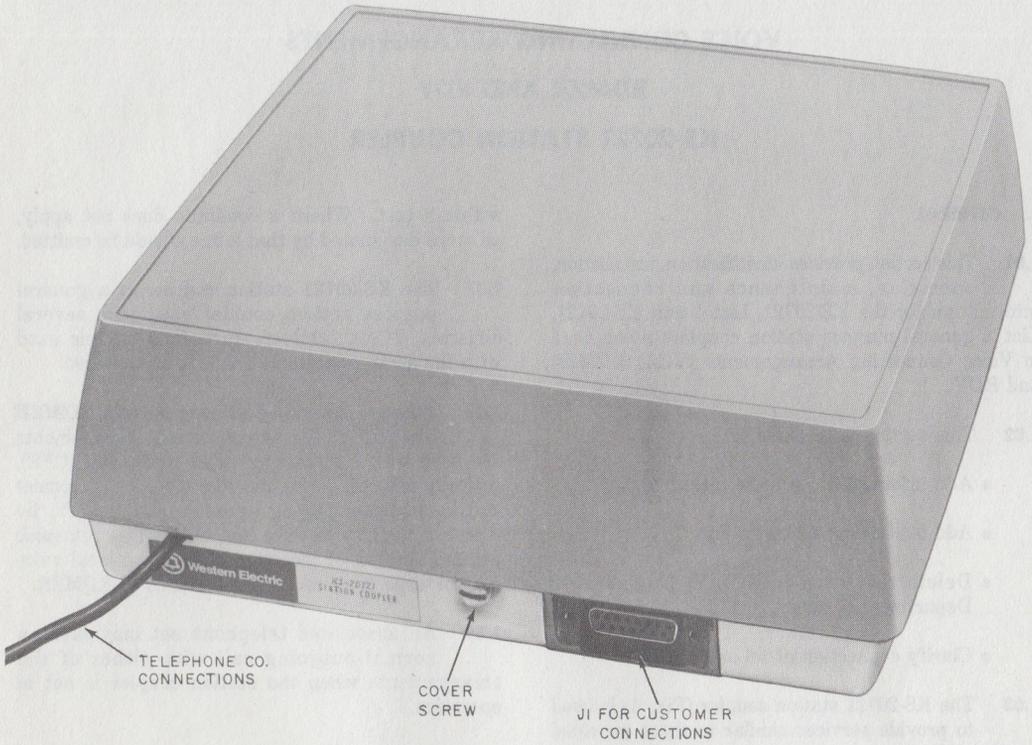
SD-69903-01, Issue 5B—KS-20721 Station Coupler

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 various types of CPE to the telephone line



**Fig. 1—KS-2021, List 1 and List 2 Station Coupler**

**TABLE A  
OPTION TABLE**

VOICE CONNECTING ARRANGEMENT	TYPICAL CUSTOMER-PROVIDED EQUIPMENT	KS-2021 STATION COUPLER LIST NUMBERS	WIRING OPTIONS †
RDMZR	Answering Set	List 1	Q,R,Z
RDY	Answering Set	List 2*	Q,R,Y,Z

\* List 2 consists of Lists 1, 10, and 12.

† Features described in Table C.

- To limit excessive levels from CPE and to provide protection for personnel and facilities against hazardous voltages.

#### APPLICATION

Used to connect a CP recorder and/or announcement set to an exchange line for 2-way transmission.

#### ORDERING GUIDE

- Coupler, Station, KS-20721, L1 (Fig. 1 and 2)
- Coupler, Station, KS-20721, L2 (Fig. 1 and 3)
- Assembly, Hinge, KS-20721, L10 (Fig. 3) (if required for field installation)
- Control, Voice, KS-20721, L12 (Fig. 4) (if required for field installation)
- 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)
- Unit, Power, 19-type (or equivalent when required for multiple installations, see 6.03).

#### DESIGN FEATURES

**2.01** The KS-20721 station coupler provides the following features:

- DC isolation and high-voltage surge protection
- 20-Hz ringing detection
- Network control signaling (off-hook, tone address signaling, and disconnect)
- Talk battery to customer equipment
- 2-way voice transmission
- Automatic or voice-controlled 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. The circuit pack is equipped with quick connect connectors for easy installation.

**2.03** The KS-20721, List 2 station coupler (Fig. 3) consists of a KS-20721, List 1 station coupler with a KS-20721, List 10 hinge assembly and KS-20721, List 12 voice control, factory installed.

**2.04** The List 12 voice control (Fig. 4) consists of a speech detector and a 13-second timer that is kept reset by pulses from the speech detector when voice signals are present on the telephone line. In the absence of speech signals, the timer will time out in approximately 13 seconds disconnecting the coupler from the line. However, the CO receiver off-hook tone generator will prevent operation of the List 12 voice control. An automatic volume limited (AVL) amplifier is part of the speech detector and provides a relatively constant -5 dBm speech level at 600 ohms to leads AVL and ground. The customer may use this AVL amplifier to drive a tape recorder, paging system, or other equipment. The List 12 voice control is required only with VCA RDY. The List 12 voice control is added to the List 1 coupler by providing option Y as shown in Table B.

**2.05** 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 test the operation of the coupler independent from the CPE (Fig. 5).

#### 3. INSTALLATION—KS-20721, LISTS 1 AND 2 STATION COUPLERS (Refer to Tables A and 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.)

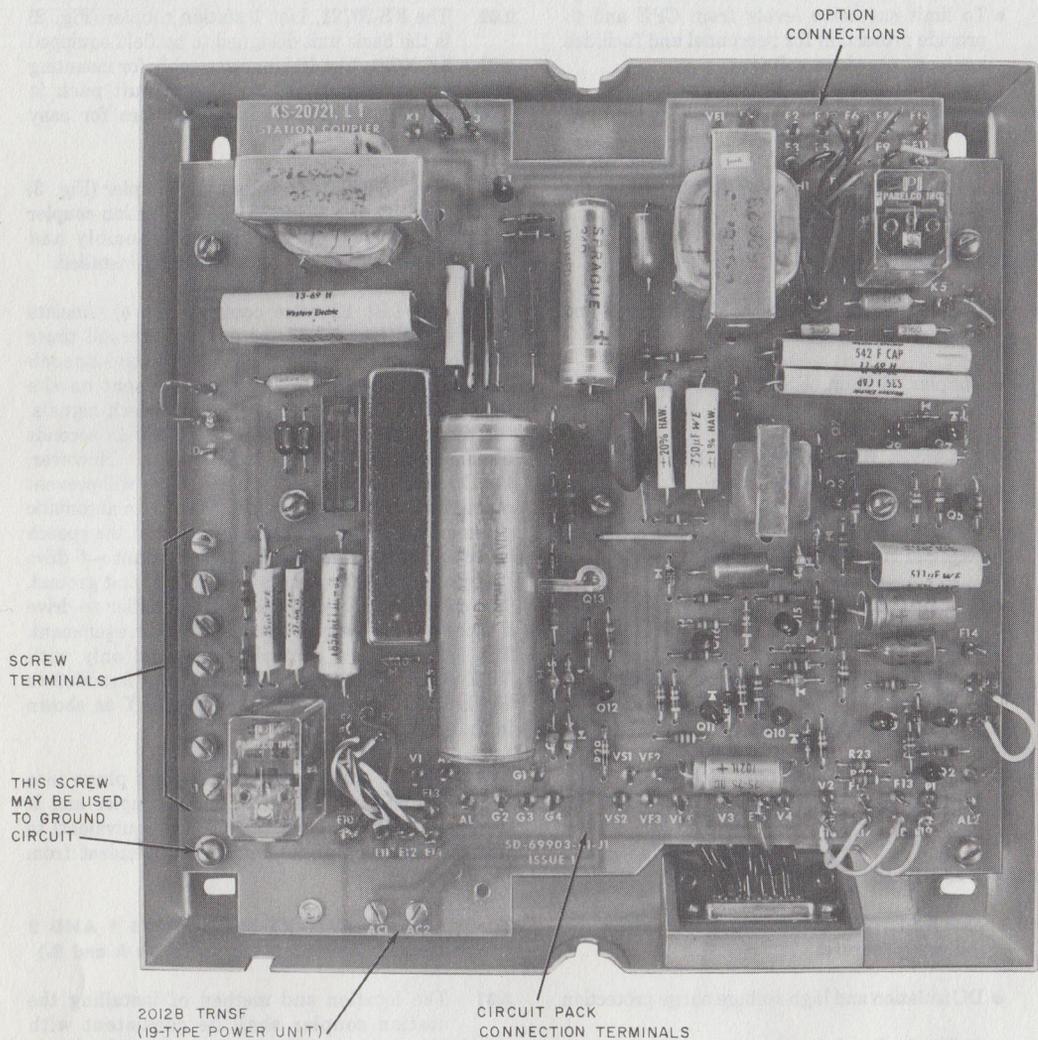


Fig. 2—KS-20721, List 1 Station Coupler, Cover Removed

**3.02** A 15-pin connector (J1, Fig. 1) is located on the base of the unit to connect the transmission path and control leads to the CPE. The mating plug (P1) is an ITT-Cannon Electric or Cinch Mfg. Co. No. DA-19603-403 plug with hood No. DA-51225-1 and is customer provided. Screw terminals on the left side of the printed circuit board provide

connections to the CO line, 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

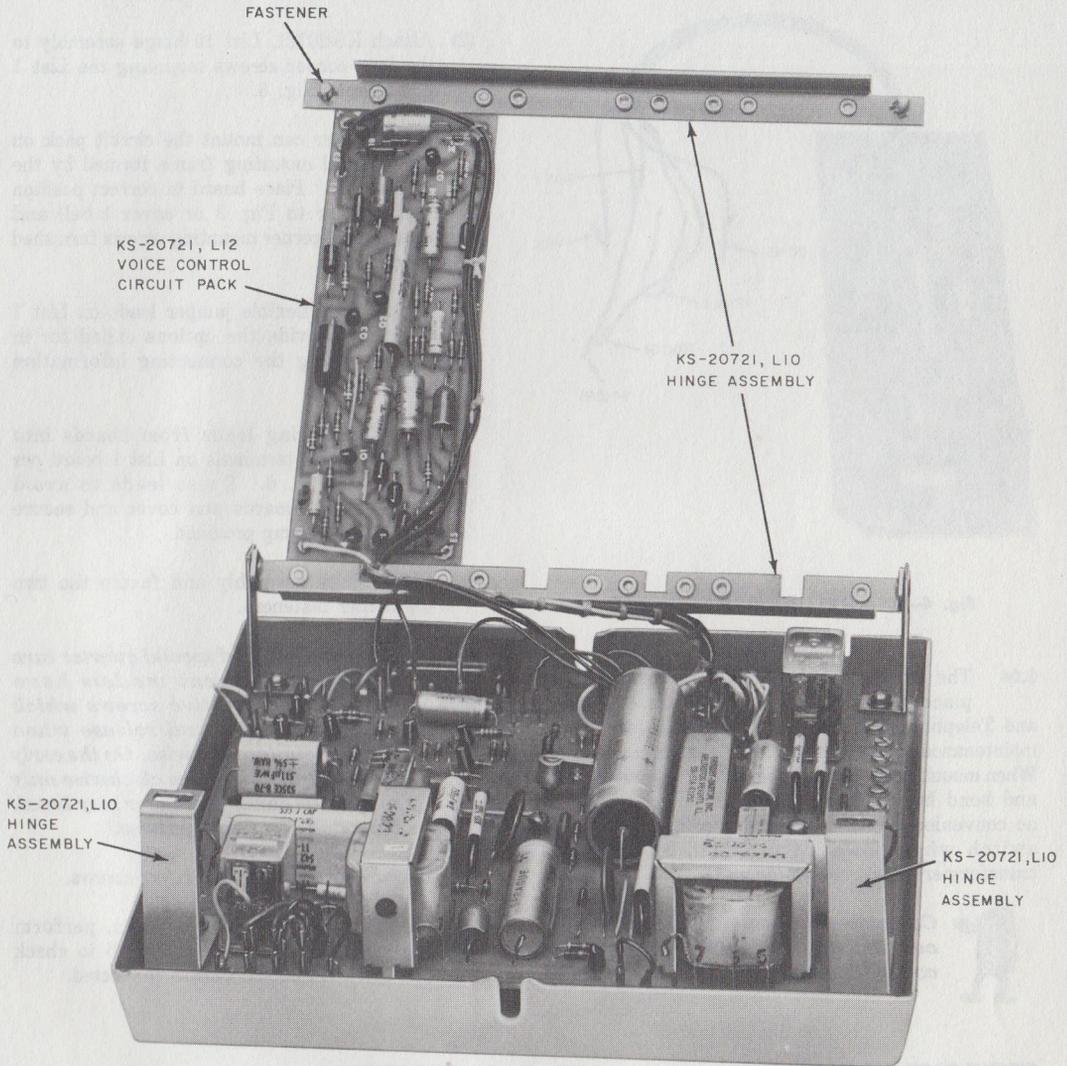


Fig. 3—KS-20721, List 2 Station Coupler With Optional Circuit Pack

5 feet of the telephone set, if practical, and connect telephone set mounting cord directly to station coupler; otherwise, interconnect set and station coupler using D station wire. Secure telephone set mounting cord or D station wire to clamp at lower left corner of station coupler. All telephone sets on line must be connected to T1 and R1 of coupler.



*If there is no telephone set on the line, use a ringer simulator (to prevent line testing open). Use an AA-1A ringer simulator. If not available, an E1C ringer installed and silenced as described in Section 501-251-100, 3.05, may be used.*

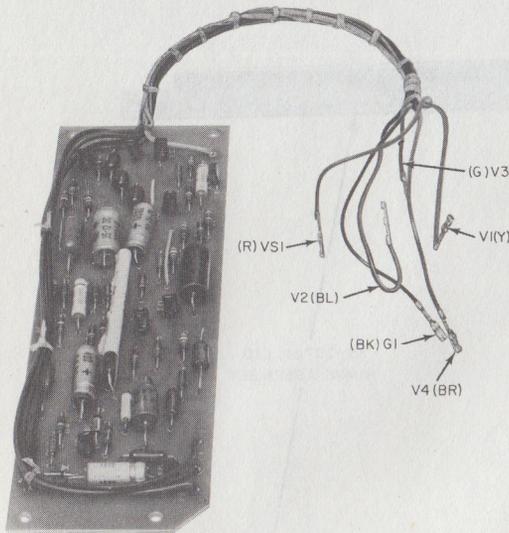


Fig. 4—KS-20721, List 12 Voice Control

**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.



**Complete all installation work before connecting the power supply or connecting the CPE.**

#### CIRCUIT PACK INSTALLATION

**3.05** The KS-20721, List 12 circuit pack (if not provided) may be added 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 the circuit pack 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. 6. Dress leads to avoid 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 the early models, turn fasteners clockwise only 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

##### GENERAL

**4.01** The KS-20721, List 1 station coupler (Fig. 6) consists of a 20-Hz ringing signal detector operating ringup (RU) relay, a supervisory control circuit operating line transfer (TR) relay, dial pulsing (PR) relay, and CPC relay, a transmission circuit consisting of two transformers in tandem, a peak voltage limiter, and a power supply rectifier and filter circuit.

TABLE B  
WIRING OPTIONS FOR FIELD INSTALLATION

	OPTION LEADS COLOR	FROM TERMINAL ON L1†	TO TERMINAL ON L1 BOARD			
			OPTIONS			
			Q	R	Z	Y
LEADS ON L1	G	N			N	
	BL	K1				
	S	K4				
	O	F10				
	BR	F6				
	V	F4				
	BK	F5		F1		
	Y	P2	P2			
	S*	F8			F8	
	BL*	F7			F7	
	W	M				
LEADS ON L12	R					VS1
	BK					G1
	Y					V1
	BL					V2
	G					V3
	BR					V4

\* These leads originate from J1 connector.

† Store on these terminals when not in use.

**4.02** When 20-Hz ringing is detected by the ring detector circuit, relay RU will operate for approximately 1 second during each ringing cycle closing leads RU1 and RU2 to indicate ringing to the CPE. The ring detector circuit also causes PR relay to operate and hold for about 4 seconds. The CPE may answer the call by:

- (a) Closing leads OH1 and OH2
- (b) Closing lead ANS to lead B1+ momentarily (at least 1 second).

Performing (a) causes TR relay to operate causing line seizure, since PR relay was already operated by the ring detector. Performing (b) causes PR

relay to stay operated and causes TR relay to operate. Telephone line current operates CPC relay which causes PR and TR relays to stay operated after lead ANS is disconnected from lead B1+. Any of the actions listed above will cause the coupler to terminate the telephone line and answer the incoming call. Two-way transmission is provided immediately on line seizure; leads TR2 and TR3 are opened, and leads TR1 and TR2 are closed indicating line seizure. When the ANS lead is closed to B1+ to answer the call, leads OH1 and OH2 must not be connected, and there should be no dc termination across CT and CR. Line current must be present at all times for operation of the connecting arrangement. If line current is interrupted momentarily, inadvertently or otherwise, after using

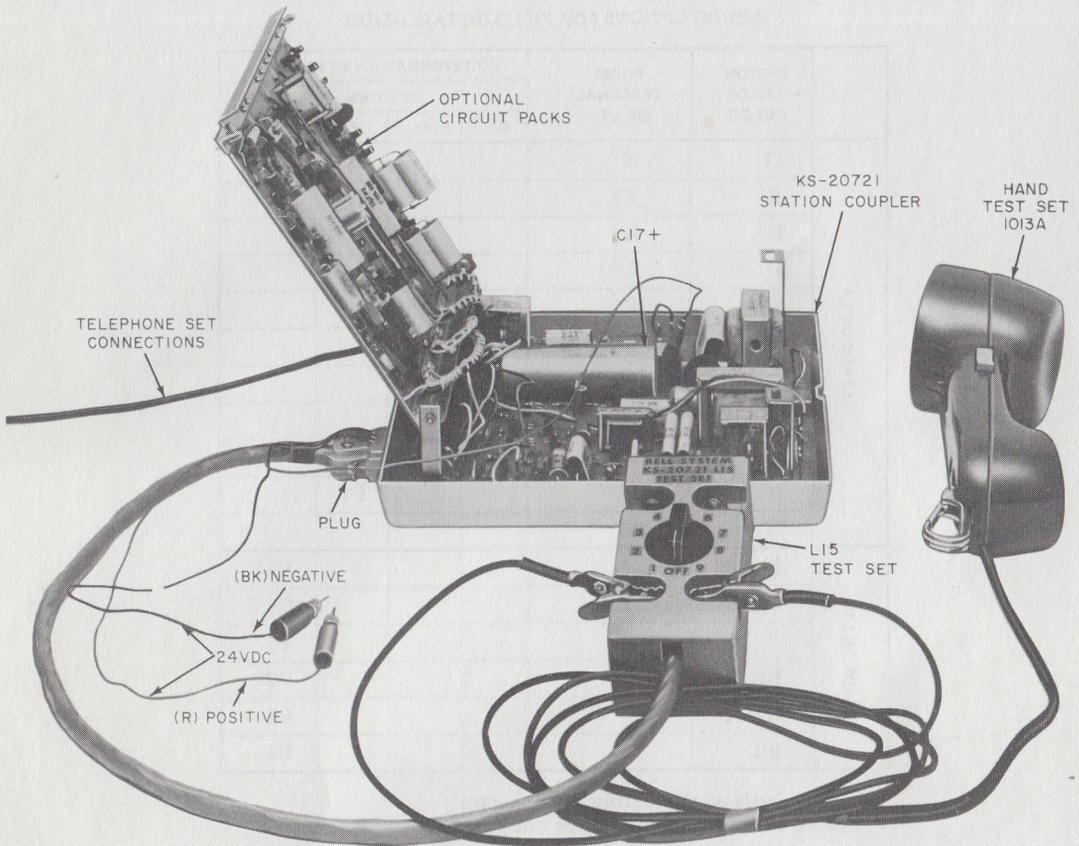


Fig. 5—KS-20721 Station Coupler with KS-20721, List 15 Test Set and 1013A Hand Test Set

the ANS and B1+ leads to establish line seizure, a disconnect signal will be given to the CPE via the status leads (TR1, TR2, TR3).

#### DISCONNECT INCOMING CALL

**4.03** The coupler will remain connected to the telephone line until:

- (a) The CPE opens the closure between leads OH1 and OH2.
- (b) The CPE closes lead DIS to lead B2—.

- (c) List 12 voice control causes disconnect when speech is absent for approximately 13 seconds.

Any of the actions described cause TR and PR relays to release disconnecting the coupler from the line.

#### LIST 15 TEST SET

**4.04** The List 15 test set (Fig. 5 and 7) used with the 1013A hand test set (or equivalent) and a connecting cable terminated in a plug for connection to the station coupler permits checking of the coupler independent of 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.
R	Connects RU relay to ring detector.
Z	Connects transmission circuit to tip side of telephone line. Used with option R to provide an isolated contact closure to customer over leads RU1 and RU2.
Y	Adds List 12 circuit to provide voice controlled disconnect supervision and volume limited output to CP equipment.

**4.05** 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:

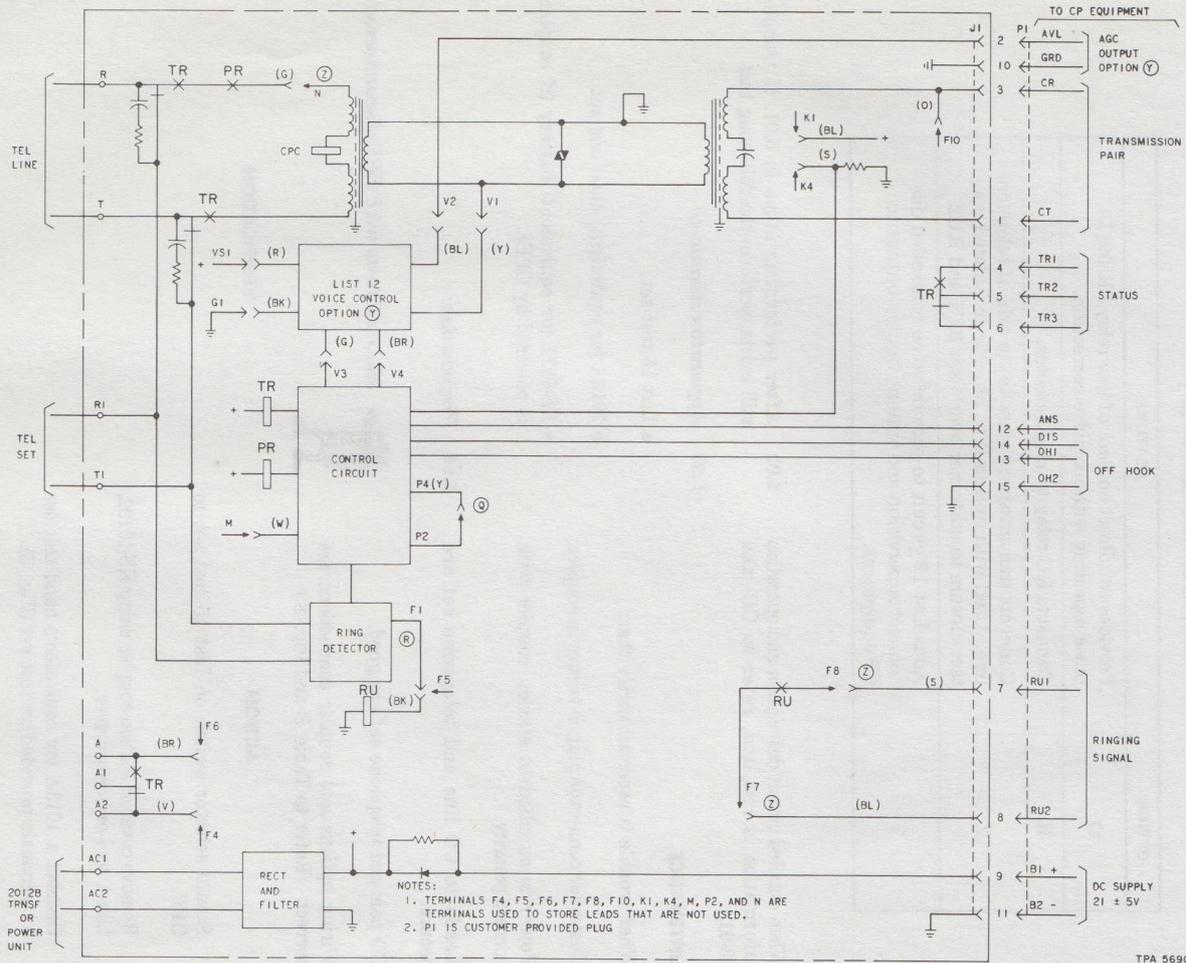
- List 15 test set
- 1013A (or equivalent) hand test set
- KS-6571 (or equivalent) battery (if coupler is powered by CPE).

#### 5.04 Preparation:



**Make all tests with CPE disconnected.**

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	



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Fig. 6—KS-20721 Station Coupler, Internal Wiring Options

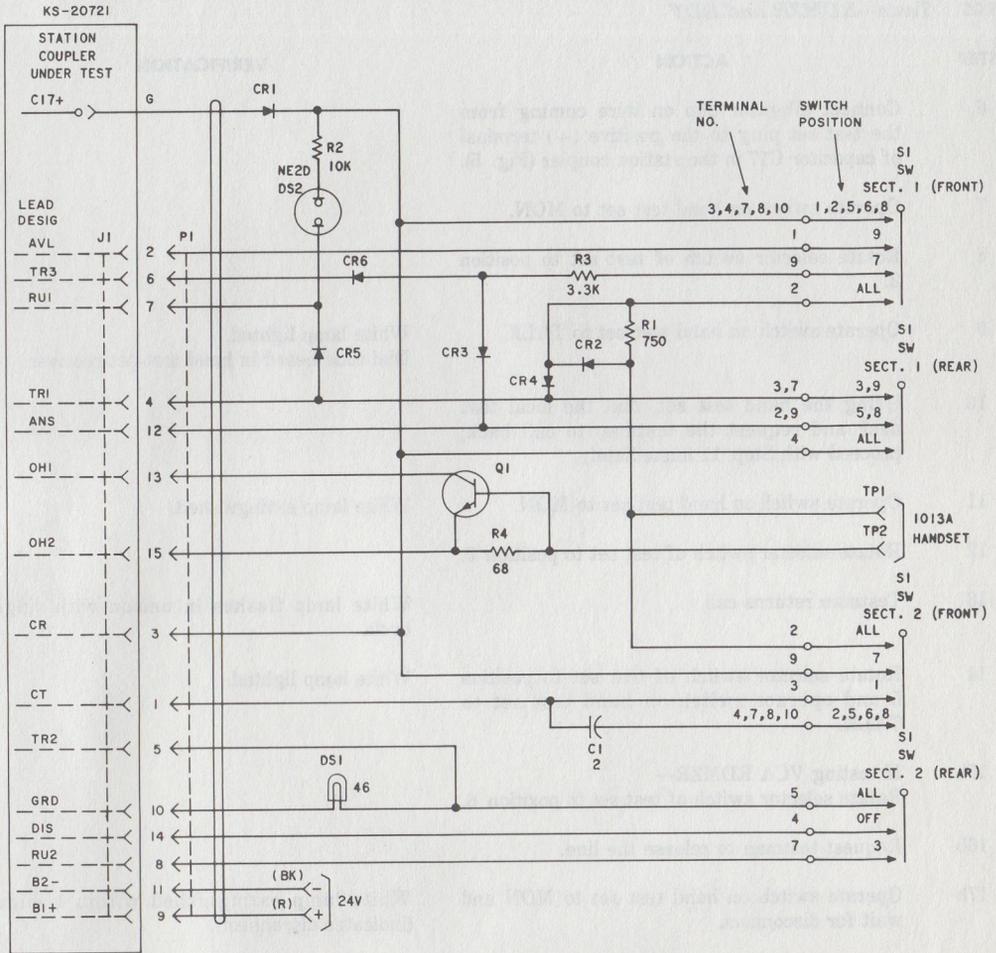


Fig. 7—KS-20721, List 15 Test Set Schematic

STEP	ACTION	VERIFICATION
	and connect the pin-tipped red lead from the test set to +24V and black lead to -24V.	
5	Connect test set plug to receptacle on station coupler.	White lamp extinguished. Red lamp extinguished.

## 5.05 Tests—RDMZR and RDY

STEP	ACTION	VERIFICATION
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).	
7	Operate switch on hand test set to MON.	
8	Rotate selector switch of test set to position 2.	
9	Operate switch on hand test set to TALK.	White lamp lighted. Dial tone heard in hand test set receiver.
10	Using the hand test set, dial the local test desk and request the testman to call back; proceed with Step 11 immediately.	
11	Operate switch to hand test set to MON.	White lamp extinguished.
12	Rotate selector switch of test set to position 3.	
13	Testman returns call.	White lamp flashes in unison with ringing cycle.
14	Rotate selector switch of test set to position 5 and operate switch on hand test set to TALK.	White lamp lighted.
15b	If testing VCA RDMZR— Rotate selector switch of test set to position 6.	
16b	Request testman to release the line.	
17b	Operate switch on hand test set to MON and wait for disconnect.	White lamp extinguished within 1 minute (indicates disconnect).
18c	If testing VCA RDY— Request the testman to disable his transmitter while retaining talk battery on the line.	
19c	Operate switch on hand test set to MON, wait 20 seconds then operate switch to TALK.	White lamp remains lighted.
20c	Rotate selector switch of test set to position 6 and talk for at least 10 seconds and request testman to remain silent for 20 seconds then disconnect.	
21c	After talking, immediately operate switch on hand test set to MON and wait for disconnect.	White lamp extinguished in approximately 13 seconds after talking ends.

STEP	ACTION	VERIFICATION
22	Rotate selector switch of test set to position 7.	White lamp remains extinguished. (If white lamp lights, verify that switch on hand test set is in MON position. Rotate selector switch of test set back to position 6, wait for lamp to extinguish, then rotate back to position 7 and proceed with test.)
23	Rotate selector switch of test set to position 8.	White lamp lighted. Dial tone heard in hand test set receiver. (If there is an abnormal delay before proceeding to the next step, some offices may return a dial tone time-out indication. If this happens, rotate selector switch to OFF then back to position 8; dial tone will return; proceed with test.)
24c	If testing VCA RDY— Rotate selector switch of test set to position 9. (The 13-second time-out starts at this time and may cause disconnect. If this happens, rotate selector switch to position 8 then back to 9 and proceed with test.)	White lamp remains lighted. Dial tone level is increased.
25b	If testing VCA RDMZR— Rotate selector switch of test set to position 9.	White lamp remains lighted. Dial tone silenced.
26	Rotate selector switch of test set back to position 8.	White lamp remains lighted.
27	Rotate selector switch of test set to OFF.	White lamp extinguished.
28	Disconnect test set from station connector and reconnect CPE.	
5.06	If coupler does not meet the above tests, replace coupler and/or circuit pack.	
5.07	If the tests are satisfactory, remove all test connections, restore circuit to normal, and follow local reporting procedures for CP trouble.	
5.08	When in the repairman's judgment the trouble is located in the CPE, the Repair 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).	



***Do not attempt any test or repair to the 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 ITT-Cannon Electric Co. No. DA-19603-403 plug with a No. DA-51225-1 hood (or equivalent).

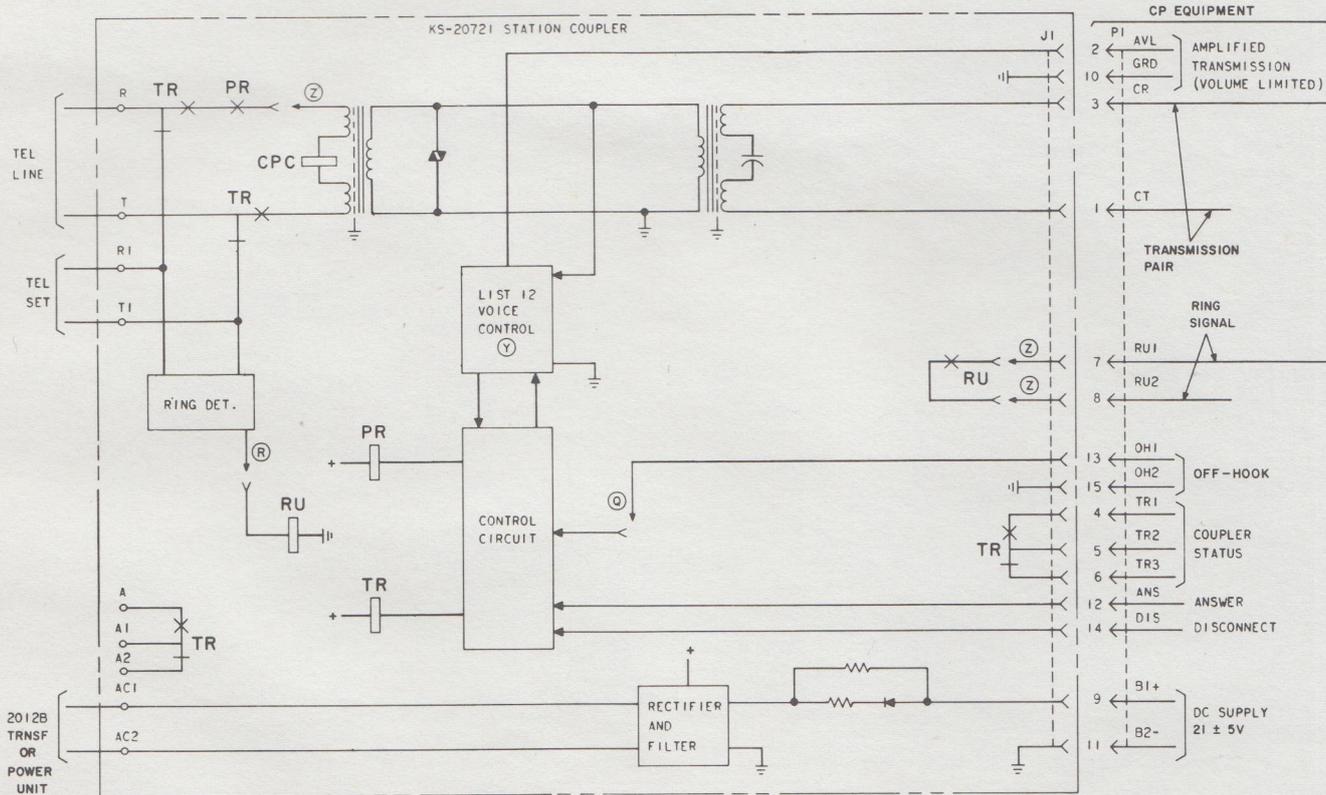
**6.02** Provide the correct wiring options from Table B; connect the CO line to screw terminals T and R, the 2012B power transformer (or 19-type power unit) leads to screw terminals AC1 and AC2, and associated telephone set to the screw terminals T1 and R1. If an associated telephone set is not used (and no telephone set is on line), connect a ringer simulator (see 3.03) to T1 and R1. Lightly tighten all unused terminal screws.

**6.03** A 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 output). The dc power supply should

be of the current limiting type, or it should be connected through a 20-ohm, 1-watt resistor 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.

**6.04** 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.

**6.05** When power is supplied by a 2012B transformer (or 19-type power unit), a 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).



- NOTES:
1. CIRCLED LETTERS (Z), (P), ETC DENOTE WIRING OPTIONS
  2. PI IS CUSTOMER PROVIDED PLUG.

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