

PROTECTIVE 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 which is used to connect customer-provided (CP) dc pulse dialers in Protective Connecting Arrangement (PCA) SU7QW.

1.02 This section is reissued to:

- Remove information on the KS-20721, List 11 pulse corrector which has been rated MD
- Revise Tables A, B, and C
- Add Tables E and F to show connections for installation of PCA SU7QW with most commonly used telephone sets
- Rearrange Ordering Guide
- Change the term Voice Connecting Arrangement (VCA) to Protective Connecting Arrangement (PCA)
- Change figures to show only items used with SU7QW arrangement.

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

1.04 If the customer wants a copy of the Technical Reference which covers the above PCA, 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 protective connecting arrangements. All features and options are not shown; only those applying to SU7QW are shown. Avoid alteration of the PCA to provide services other than design intent.

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

1.08 *Protective Connecting Arrangement SU7QW:*

This connecting arrangement is intended to connect CP dial pulse dialers that require no transmission paths to the telecommunications network. It replaces PCA SU7 which used a modified KS-20445 control unit (repertory dialer) and was an interim PCA.

1.09 An associated telephone company 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 for the connection of CP dc dial pulse repertory dialers which require no

voice transmission path to the telecommunications network

- To provide protection for telephone company personnel against hazardous voltages.

APPLICATION

- Associated with telephone company-provided telephone sets equipped with rotary or TOUCH-TONE® dials, telephone company switchboards, and miscellaneous key equipment.

ORDERING GUIDE

Basic Unit

- Coupler, Station, KS-20721, L1 (Fig. 1 and 2).

Optional Equipment

2.01 If coupler is to be powered by telephone company, provide:

- Transformer, 2012B (one per coupler)

or

- Unit, Power, 19-type (or equivalent dc supply) when required for multiple coupler installations; see 3.11.

Associated Apparatus

- Set, Test, KS-20721, L15 (Fig. 3)—see 2.03
- Set, Test, Hand, 1013A (or equivalent)
- Battery, KS-6571 (or equivalent) if coupler is powered by CP equipment (CPE)
- Tool, KS-19192, L1 (not required on later model units which have slotted screws).

DESIGN FEATURES

2.02 Protective Connecting Arrangement SU7QW provides the following features:

- DC isolation and high-voltage surge protection
- Provides leads for the connector to the muting contacts in CPE

- Network control signaling (off-hook, dial pulse, and disconnect)
- AC or DC powered
- Can be powered by either telephone company or CP power supply.

2.03 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. 3 and 4).

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

3.01 The location and method of installing the KS-20721 station coupler shall be consistent with standard practices. The 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.)



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

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 by means of a CP cable equipped with an ITT-Cannon Electric or Cinch Manufacturing Company plug No. DA-19603-403 with hood No. DA-51225-1. Screw terminals on the left side of the printed circuit board (Fig. 2) provide connections to the 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 The station coupler should be located in a place mutually agreeable to the customer and telephone company, readily accessible for maintenance, and convenient for customer connection. When associated with a telephone company telephone set, the coupler should be within 5 feet of the

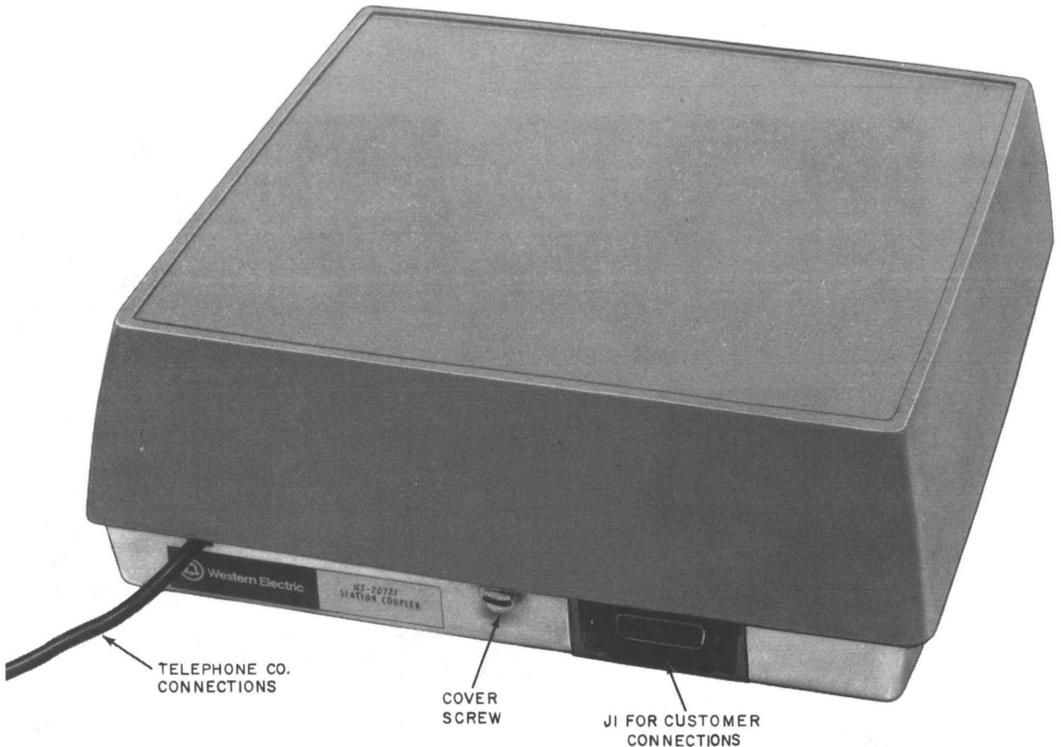


Fig. 1—KS-20721, List 1 Station Coupler

telephone set, if practical. 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 2012B transformer, 19-type power unit, or the CPE.

3.04 Options: Provide the wiring options given in Table A. (The features provided by these options are explained in Table C.) These are the only options which are to be provided. Wire the options by moving the flexible jumper leads with connectors to the terminals given in Table B.

Verify that the unused leads are stored on the proper terminals given in Table B.⚡

CONNECTIONS

3.05 The connections to be made between the coupler and the associated telephone company equipment are similar to those made when installing a Magically* KS-19594 repertory dialer.

* Registered trademark of DASA Corporation

3.06 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. 6 and Table E or F.) Secure D4BN mounting cord or D station wire to clamp at lower left corner of

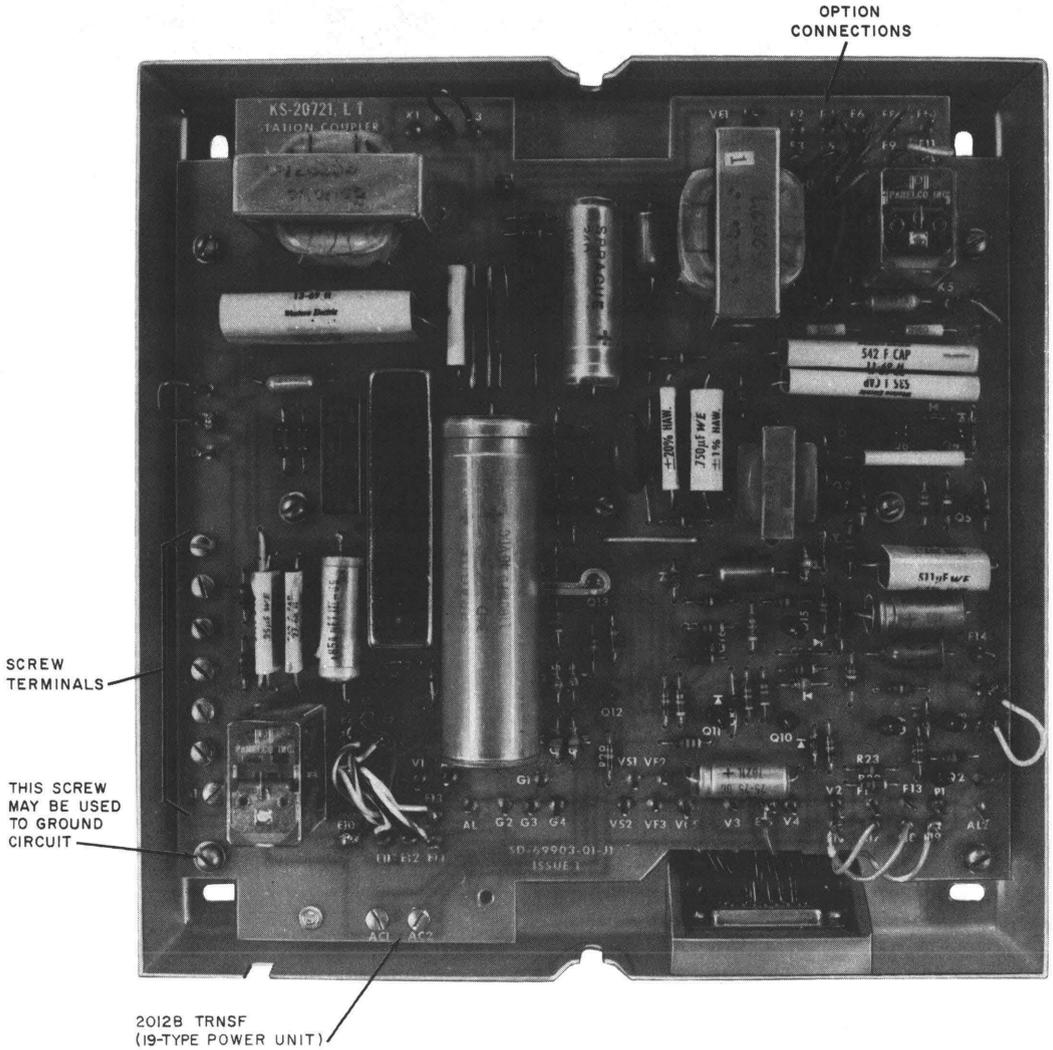


Fig. 2—KS-20721, List 1 Station Coupler, Cover Removed

station coupler. The coupler pulsing contacts are connected in series with the telephone set dial by using screw terminals R and R1 in the coupler. Leads from screw terminals A and A2 connect across the telephone set receiver to provide muting

during outpulsing. Refer to Table E or F and Fig. 6 for connections to be made with the most commonly used telephone sets. For those sets not covered in Table E or F, refer to Section 512-125-400 for telephone sets equipped with rotary dials and

◆ TABLE A ◆

OPTION TABLE ‡

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

* Options P and Q are factory-wired.

† Features described in Table C.

‡ Never provide more than required wiring options.

◆ TABLE B ◆

WIRING OPTIONS FOR FIELD INSTALLATION

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

* These leads originate from J1 connector.

† Verify that leads are stored on these terminals when not in use.

‡ Options P and Q are factory-wired.

◆ TABLE C ◆

WIRING OPTION FEATURES

| OPTION | FEATURE |
|--------|--|
| Q * | Provides for direct control of line relay PR for DC pulse repeating. |
| P † | Removes line seizure delay feature. |
| W | Used for repertory dialer connections. |

* Option Q is factory-wired.

† Option P is required and is factory-wired.

3.08 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. 7 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.

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

POWER

3.10 Power for the coupler may be supplied by either the telephone company or the customer. If power is supplied by the telephone company,

Section 512-125-410 for telephone sets equipped with TOUCH-TONE dials.

3.07 Typical connections to a 608-type PBX are shown in Fig. 7 and Table D.

TABLE D
CONNECTIONS FOR 608-TYPE PBX

| ROTARY OR ROTARY AND TOUCH-TONE® DIALS (FIG. 7) | | | | |
|---|-------------------------|-------------------------|----------------|-------------|
| 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 |

♦TABLE E♦

**CONNECTIONS FOR INSTALLATION OF PCA SU7QW
WITH MOST COMMONLY USED TELEPHONE SETS**

| CORD FROM KS-20721 COUPLER | | TELEPHONE SETS, SERIES (NOTE) | | | | | |
|---|----|---|--------------|-------------------------|----------------------|------|----------------------------------|
| | | 500D 554B | 511D 558D | 565GK 565HK 565LK | 630-TYPE 632-TYPE | 702D | 830-TYPE 831-TYPE 851-TYPE |
| P U L S I N G | R | Remove BL dial lead from F terminal of network and connect to R of coupler telephone cord using D-161488 connector or spare terminal. | | | | | |
| | R1 | Connect to F terminal of network. | | | | | |
| O F F N O R M A L | A | Connect to GN terminal of network. | | | | | |
| | A2 | Connect to R terminal of network. | | | | | |

Note: For connections to sets not covered in table, refer to Section 512-125-400.

either a 2012B transformer or suitable dc supply (19-type or equivalent) may be used.

3.11 ♦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 output [20-26V dc]). 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

◆TABLE F◆

CONNECTIONS FOR INSTALLATION OF PCA SU7QW
WITH MOST COMMONLY USED TELEPHONE SETS

| CORD FROM KS-20721 COUPLER | | TELEPHONE SETS, SERIES (NOTE) | | | | | | | | |
|---|----|---|--|---|---|--|---|--|--|--|
| | | 2500D 2554B | 2511D 2558D | 2565GK | 2565HK 2565LK | 2630-TYPE 2632-TYPE | 2702D | 2830-TYPE 2831-TYPE | 2851-TYPE | |
| P U L S I N G | R | Remove G dial lead from F on the network and connect to R of dialer tel cord with D-161488 connector. | Remove G dial lead from G on the network <i>and</i> | Remove G dial lead from L2 on the network <i>and</i> | Remove G dial lead from 4 on the terminal block <i>and</i> | Remove G dial lead from F on the network <i>and</i> | Remove G dial lead from 8 on the terminal board <i>and</i> | Remove G dial lead from 20 on the terminal board <i>and</i> | Connect to R of dialer telephone cord with D-161488 connector. | |
| | G | Connect to F terminal on network. | Connect to G terminal on the network. | Connect to L2 on the network. | Connect to terminal 4 on the terminal block. | Connect to F terminal on the network. | Connect to terminal 8 of the terminal block. | Connect to terminal 20 of the terminal block. | | |
| O F F N O R M A L | W | Connect to R terminal on the network. | | | | | | | | |
| | BL | Connect to S terminal on the network. | Connect to S terminal on the network. | | For 2630-type, connect to R terminal. For the 2632-type, connect to GN terminal on the network. | Connect to terminal 5 of the terminal block. | | Connect to S terminal on the network. | | |

Note: For connections to sets not covered in table, refer to Section 512-125-400 for rotary dials and Section 512-125-410 for TOUCH-TONE® dial.

ground either terminal of the power supply used for the PCA SU7QW. Due to noise considerations, a power supply used in this application is an exception to the grounding instructions stated in Section 167-440-201. Power supply current drain during normal operation is 0.060 ampere. Initial surge current is 1 ampere. Standby current is .012 ampere.⚡

3.12 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 coupler.

3.13 When power is supplied by a 2012B transformer (or by the dc signal terminals of a 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).

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

4. OPERATION

DIAL PULSE REPERTORY DIALER (PCA SU7QW With no Transmission Path)

4.01 With PCA SU7QW (Fig. 5), 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. 3 and 4), 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. 6.)

5.02 After performing steps in 5.01, if trouble still exists, perform the test described in 5.05.

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.

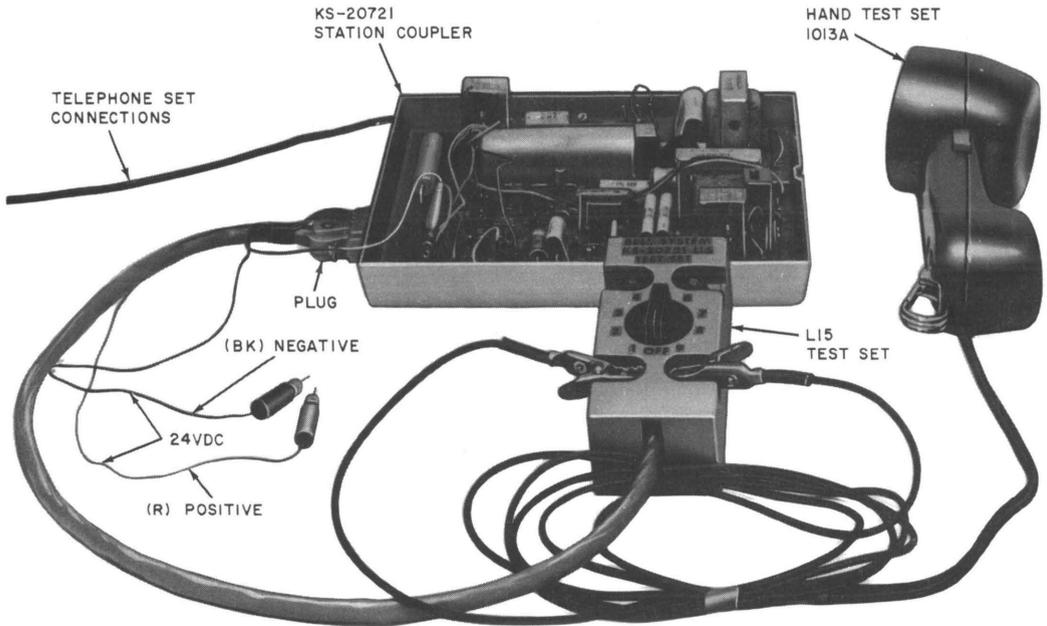


Fig. 3—KS-20721 Station Coupler With KS-20721, List 15 Test Set and 1013A Hand Test Set

| 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. 3). | |
| 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. | White lamp extinguished. Red lamp extinguished. |
| 5 | Connect test set plug to receptacle on station coupler. | |
| 6 | Connect alligator clip on wire coming from the test set plug to the positive (+) terminal of capacitor C17 in the station coupler (Fig. 3). | |

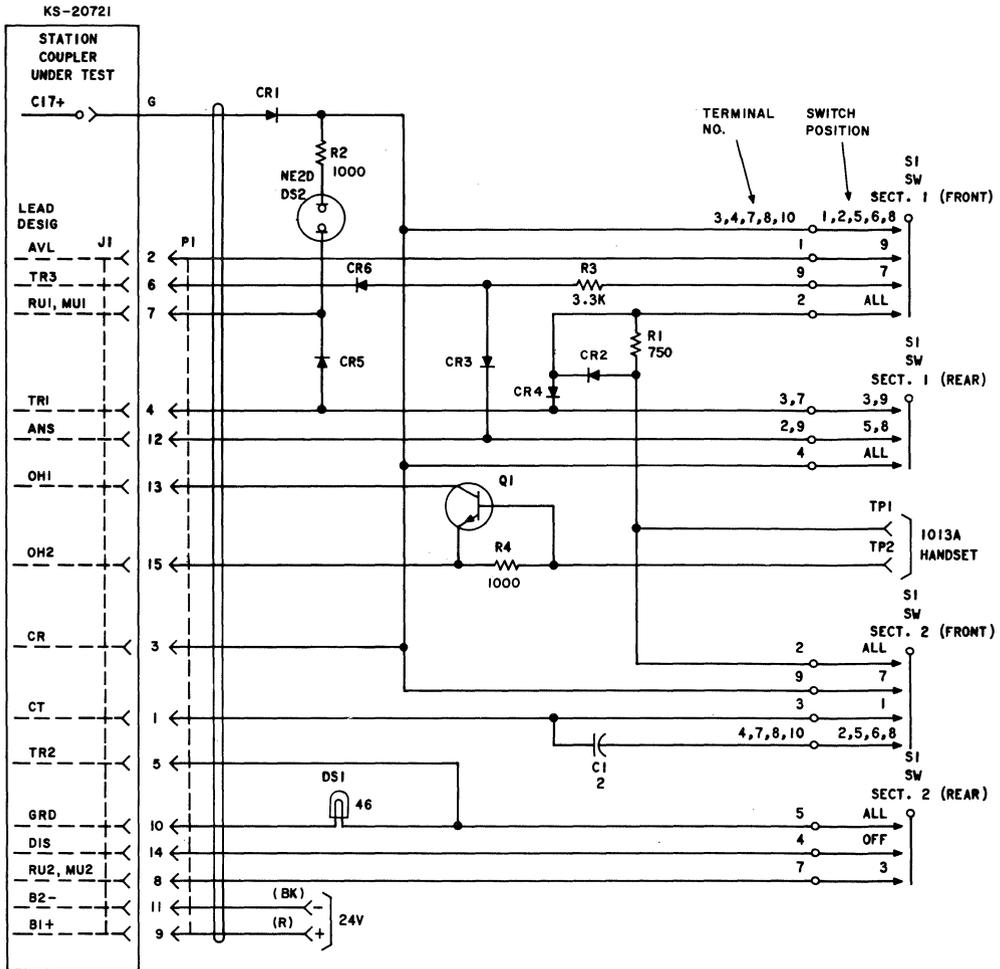
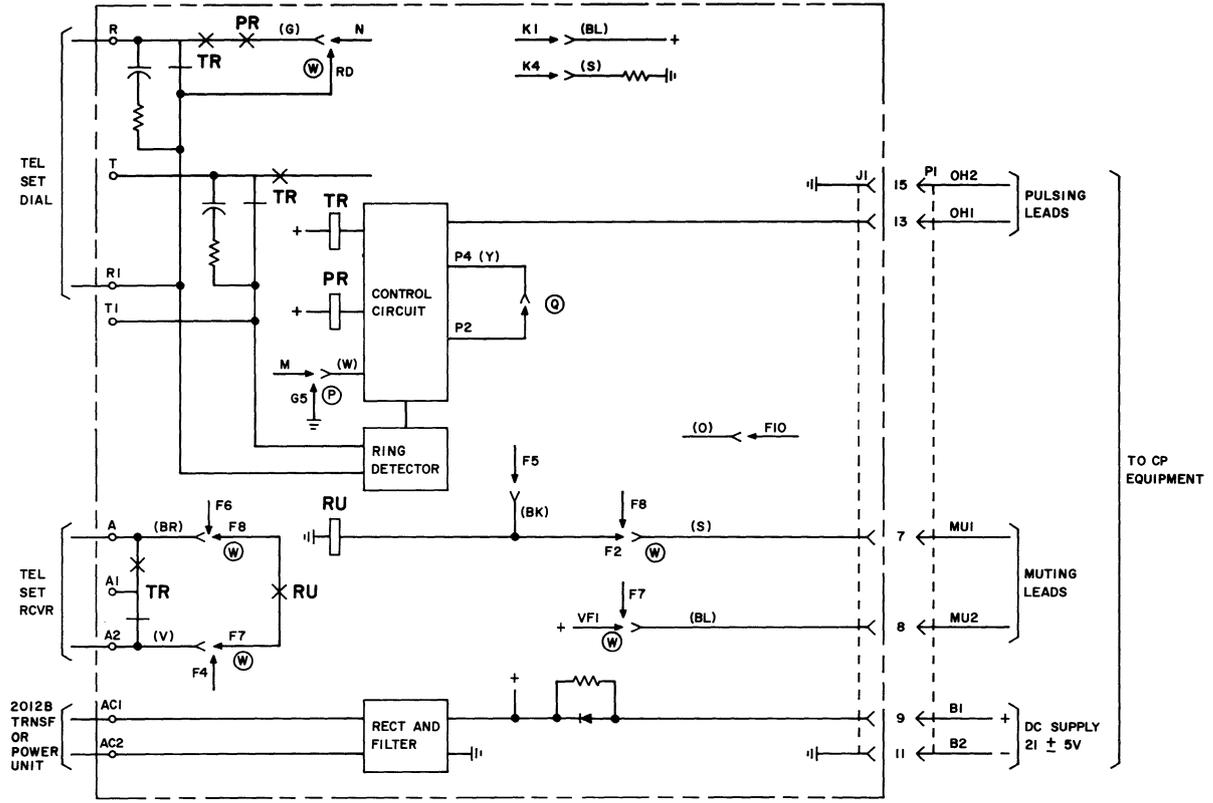


Fig. 4—KS-20721, List 15 Test Set, Schematic

5.05 Test—SU7QW

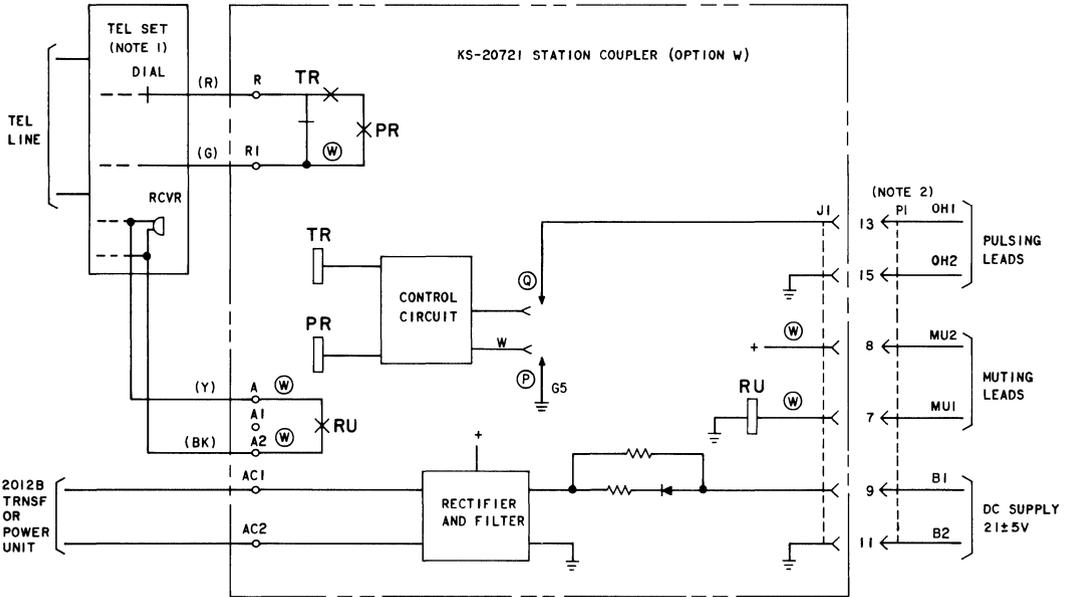
| STEP | ACTION | VERIFICATION |
|------|---|---------------------|
| 7 | Operate switch on hand test set to MON. | |
| 8 | Rotate selector switch to position 1. | Relay RU operated. |
| 9 | Rotate selector switch to position 3. | White lamp lighted. |

| STEP | ACTION | VERIFICATION |
|---|--|---|
| 10 | Rotate selector switch back to position 1. | White lamp extinguished. |
| 11 | Operate switch on hand test set to TALK. | Relay TR operated. White lamp lighted. |
| 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 to OFF and check for normal performance of associated telephone. | White lamp extinguished. Associated telephone performs normally. |
| 14 | Disconnect test set from station coupler and reconnect CPE. | |
| 5.06 | If coupler does not meet the above test, replace coupler. | of Service Charge on Services with Customer-Provided Equipment (CPE). |
| 5.07 | If the test is satisfactory, remove all test connections to restore circuit to normal and follow local reporting procedures for CP trouble. | |
|  | <i>Do not attempt any test or repair to the CPE.</i> | |
| 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 | |
| 6. CONNECTIONS | | |
| 6.01 | Refer to Fig. 6 and Table E or F for connections to a repertory dialer. | |
| 6.02 | Refer to Fig. 7 and Table D for typical connections to a 608-type PBX. | |
| 6.03 | Refer to Fig. 7 and Table D for connections to 6044B dial mounting. | |
| 6.04 | Refer to Section 512-125-430 for dialer connections to other switchboards and key equipment. | |



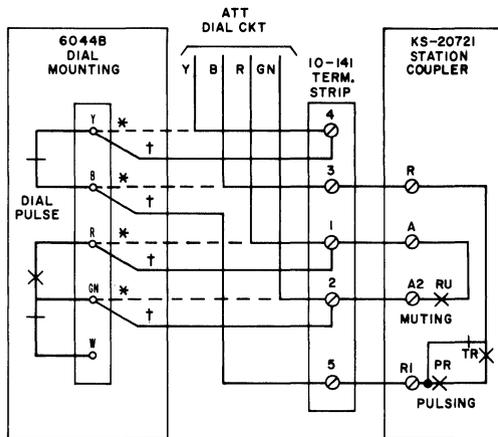
- NOTES:
1. TERMINALS F4, F5, F6, F7, F8, F10, K1, K4, M, N, AND P2 ARE TERMINALS USED TO STORE LEADS THAT ARE NOT USED
 2. P1 IS CUSTOMER PROVIDED PLUG.
 3. OPTION Q IS FACTORY WIRED.

Fig. 5—KS-20721 Station Coupler, Repertory Dialer, Internal Wiring Options



- NOTES:
1. REFER TO TABLE E AND F FOR INTERNAL TEL SET CONNECTIONS.
 2. PI IS CUSTOMER-PROVIDED PLUG.
 3. CIRCLED LETTERS (W) AND (Q) DENOTE WIRING OPTIONS.
 4. OPTION Q IS FACTORY WIRED.

Fig. 6—KS-20721 Station Coupler, Repertory Dial, Simplified Schematic



- * REMOVE EXISTING WIRE AND CONNECT TO TERM STRIP
 † ADD WIRE STRAPS

Fig. 7—Connections for 608-Type PBX