PROTECTIVE CONNECTING ARRANGEMENTS C24 AND C2H

1. GENERAL

1.01 This section provides identification, installation, operation, maintenance, and connecting information for Protective Connecting Arrangements (PCAs) C24 and C2H (Fig. 1, 2, and 3). These PCAs provide for the connection of customer-provided (CP) 4-wire voice communications facilities to a tie trunk circuit associated with a Bell System PBX or Centrex system. They also provide an E and M type signaling interface. They are ***not*** intended for providing entrance facilities for CP microwave channels. PCA C24 provides for the connection of the CP facilities to a Bell System PBX trunk circuit and consists of an interconnecting unit J53050C, List 2 (Fig. 4), and a 24V4C repeater shelf J98615BJ, List 2, equipped with plug-in components. PCA C2H provides for the connection of the CP facilities to a trunk circuit associated with a Bell System Centrex system. When used with a Centrex-Customer (Centrex-CU) System, PCA C2H consists of the same equipment as PCA C24. For a Centrex-Central Office (Centrex-CO) system, PCA C2H consists of an interconnecting unit J53050C List 2, a signaling extension unit J98605AM, and either a 24V4C repeater shelf J98615BJ List 2, or a 44V4A intermediate repeater shelf J98615AH List 2 equipped with plug-in components. The 24V4C is used when the PCA is associated with Bell System 2-wire voice facilities while the 44V4A is used with Bell System 4-wire voice facilities. A KS-15620, List 22 rectifier, or equivalent, may be used to power the PCAs if other Bell System battery and ground are not available.

> ***Note:*** An X76090 loop-back panel may be provided at the customer's premises to facilitate testing the connecting arrangement from the serving central office.

1.02 This section is reissued to:

- Include coverage of the J98605AM signaling lead extension unit which replaces the J98605AH, now rated MD. (Information required for maintenance of existing installations using the J98605AH has been retained.)
- Include information on the KS-15620, List 22 rectifier which replaces the KS-15620, List 14, now rated MD.
- Add current drain information.
- Replace the term Voice Connecting Arrangement (VCA) with Protective Connecting Arrangement (PCA).
- Add post-installation test.
- Expand maintenance information.
- Remove KS-20944 protector from Design Features.

1.03 If the customer wants a copy of the Technical Reference which covers this interface specification, he should contact the local Telephone Company Business Office or the Marketing Representative.

1.04 This issue of the section is based on the following drawings:

CD-1E254, Issue 1 and SD-1E254, Issue 1 (J53050C, L2 IU)

CD-97047, Issue 5D, Appendix 2D, and SD-97047, Issue 16D (V4 Repeaters)

J98605AM, Issue 13 (J98605AM Signaling Lead Extension Unit)

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 a 4-wire connection between CP communications facilities and Bell System PBX or Centrex System

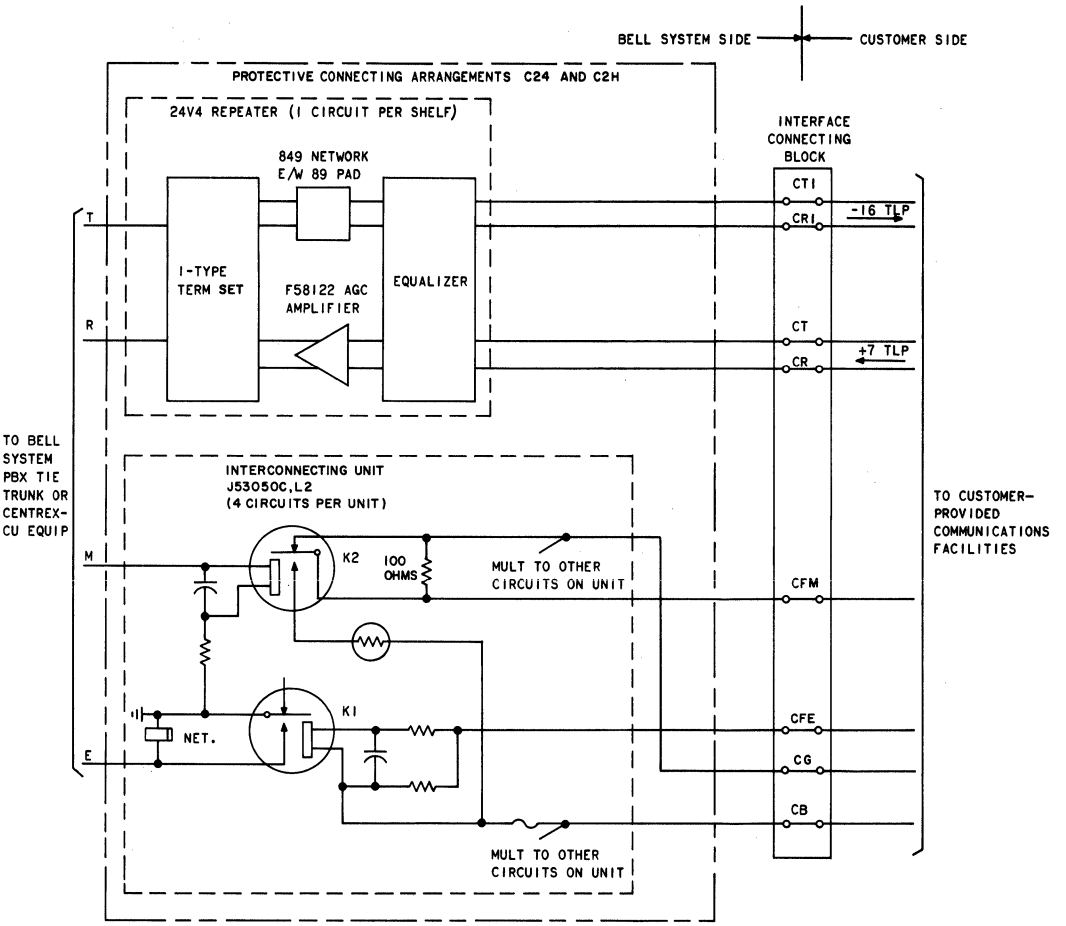


Fig. 1—Simplified Schematic—PCAs C24 (PBX) and C2H (Centrex-CU)

- To provide E and M signaling from and to CP communications facilities

- To provide for extension of the signaling and transmission leads to the central office when Centrex-CO is used

- To limit excessive levels from CP communications facilities, to provide protection for telephone company personnel against hazardous voltages, to insure longitudinal balance, and to repeat network control signaling.

ORDERING GUIDE

- Unit, Interconnecting, J53050C, List 2—for PCAs C24 and C2H. Each unit provides four signal isolation (applique) circuits.

- Shelf, Repeater, Terminal 24V4C, J98615BJ, List 2—for use with PCAs C24 (PBX), C2H (Centrex-CU), or when C2H (Centrex-CO) is used with Bell System 2-wire facilities. Each unit provides one voice coupler circuit; for plug-in components, see Note. (24V4A

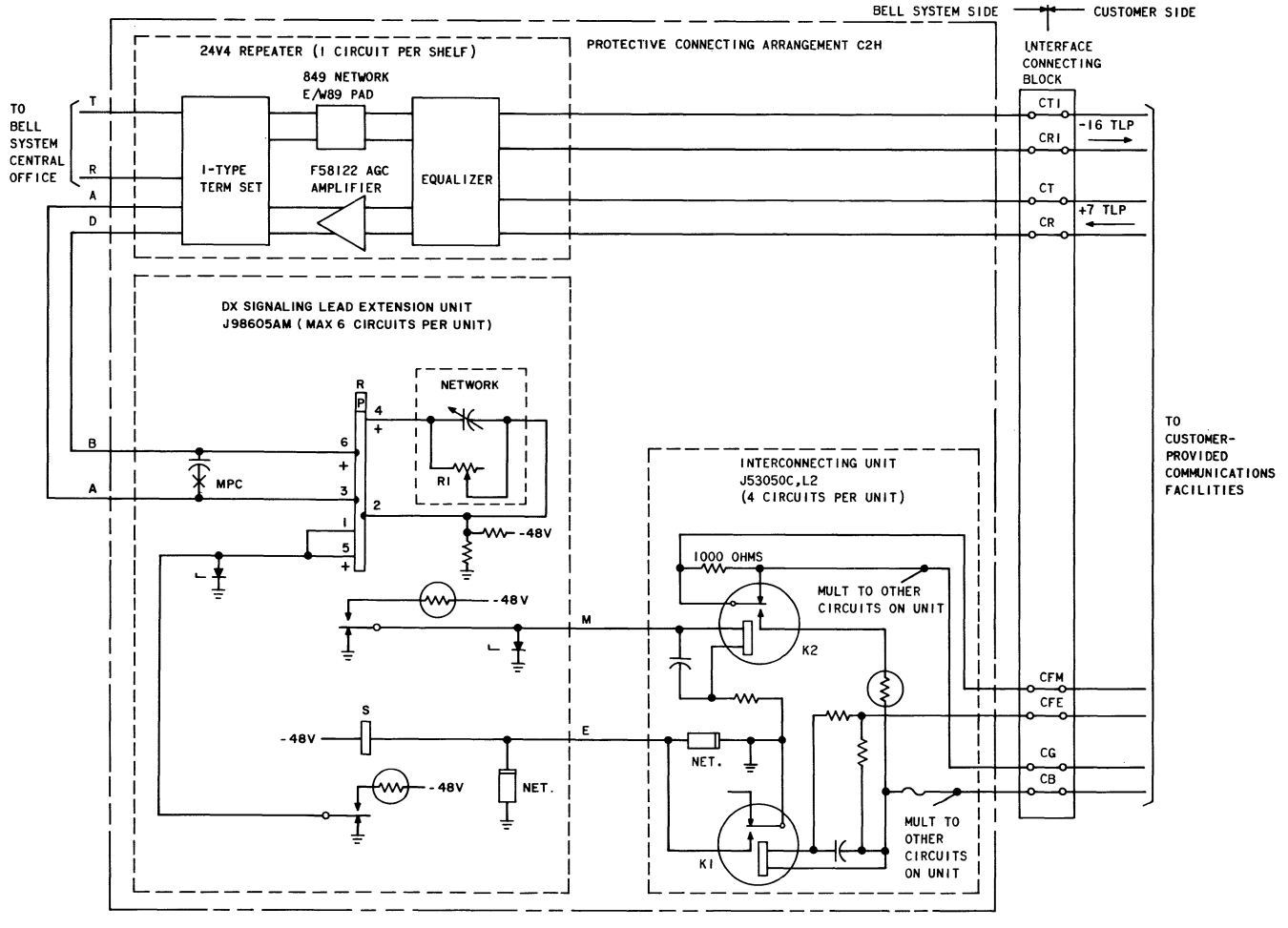


Fig. 2—Simplified Schematic—PCA C2H (Centrex-CO), 2-Wire Local Channel

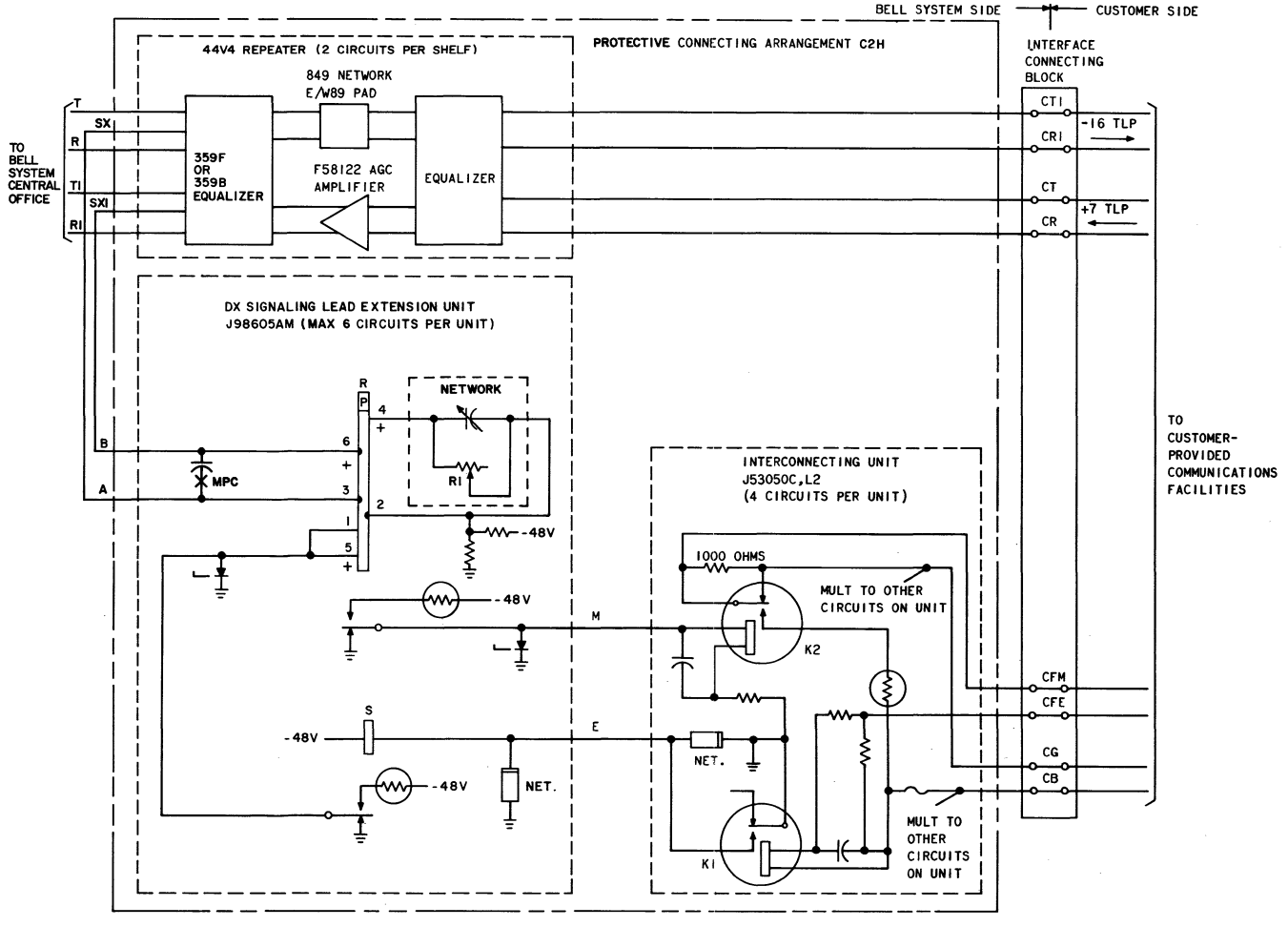


Fig. 3—Simplified Schematic—PCA C2H (Centrex-CO), 4-Wire Local Channel

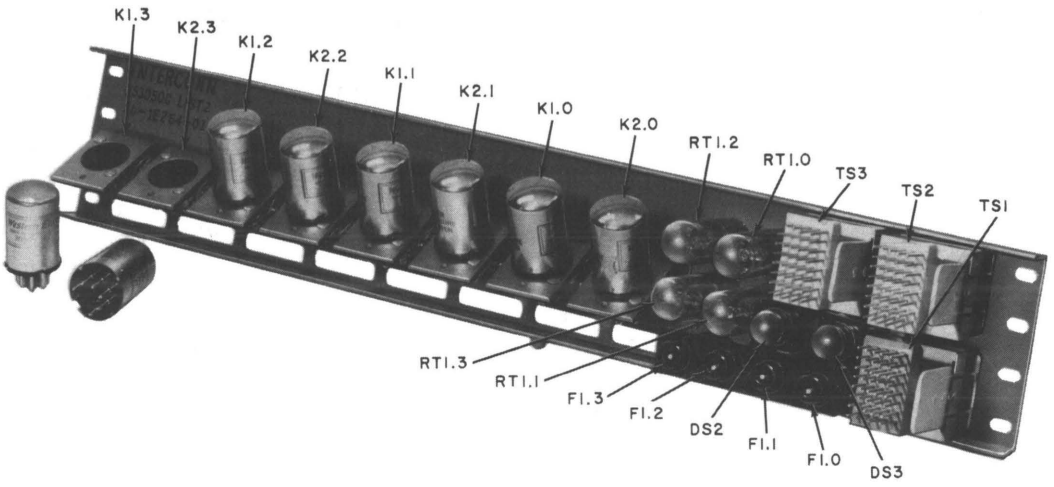


Fig. 4—J53050C, List 2 IU

can also be used but is not recommended because it does not have a terminal strip for easy connection to external circuits.)

- Shelf, Repeater, Intermediate 44V4A, J98615AH, List 2—for use when C2H (Centrex-CO) is used with Bell System 4-wire facilities. Each unit provides two voice coupler circuits per shelf. For plug-in components, see Note.

Note: For plug-in components, refer to Section 852-307-101. When automatic control of signal power level is required, order F58122 automatic gain control (AGC) amplifier for use in the ***transmitting leg from the CP facilities to Bell System equipment*** instead of the standard 227-type amplifier shown in Section 852-307-101. (See Fig. 1, 2, and 3.)

- Unit, Extension Lead Signaling, J98605AM-1 or 2—for use with PCA C2H (Centrex-CO):

  J98605AM-1: Order both List 1 and List A to get a mounting assembly with wiring and connectors for six circuits; order one List WA (A-B lead capacitor) for each 334B relay to be installed; order required number of 334B relays (Fig. 12) separately, one per circuit.

  J98605AM-2: Order List 1 to get a mounting assembly with wiring and connectors for six circuits; order required number of 334D relays (Fig. 12) separately, one per circuit.

Associated Apparatus (Order Separately)

- Rectifier, List 22, KS-15620 (2 amperes at −48 volts)—required when Bell System battery and ground are not available at installation site.

Note: This rectifier meets acceptable noise requirements as explained under Power Supplies in Section 332-104-102. Other rectifiers may be used when specified by local engineering. Typical current drain for a single C24 (PBX) or C2H (Centrex-CU) arrangement is 0.018 ampere; for a single C2H (Centrex-CO) arrangement, 0.205 ampere. Be sure that rectifier capacity is adequate for the number of PCAs installed.

- Adapter, Group 33, ED-90273-70 (two required)—for mounting 19-inch rectifier on relay rack.

- Cord, Power, KS-14532

  List 1—10 ft.

  List 2—2 ft.

  List 3—15 ft.

  List 4—20 ft.

  List 5—25 ft.

- Cable, Wiring, "D" Inside, or equivalent—for cabling from connecting arrangement to interface connecting block.

- Block, Connecting, 66M1-50 (Fig. 5).

Note: Other types of blocks may be used when specified by local engineering.

- Clip, Bridging, B (25 per pkg).

- Block, Connecting, 66 Type (for connecting telephone company facilities).

- Panel, Loop-Back, X76090 (optional).

Note: The loop-back panel mounts on a standard 23-inch relay rack. Four circuits are provided per panel. Power must be provided from a local −48 volt source with a local fusing arrangement.

- Protector, List 2, KS-20944 (optional)—***must*** be provided when CP power supply is used to power the PCAs. See Fig. 15 and 16.

- Block, Connecting, 66C1-16 or equivalent—for providing distribution of power when KS-20944 protector is used between CP power supply and *more than one* connecting arrangement of any type. See Fig. 17.

Note: The cumulative current drain of the connecting arrangements connected to a KS-20944 protector must not exceed the maximum current rating of the protector. For instance, if the maximum current drain for one connecting arrangement is 1.0 ampere and the maximum current rating of a KS-20944, List 2 protector is 15 amperes, no more than 15 connecting arrangements may be connected to the protector (this example is for illustrative purposes only).

- Wire, AM, 14 gauge, paired, red and black, P-384614 or equivalent—for cabling from the KS-20944 protector to the 66C1-16 connecting block. See Fig. 17.

Replaceable Components

- Fuses, 70A (1-1/3 amp) (J53050C, List 2 IU)

- Plug-in components of 44V4A repeater

- Plug-in components of 24V4C repeater

- Relay, 303K (J53050C, List 2 IU)

- Relay, 334B (J98605AM-1 Signaling Lead Extension Unit)

- Relay, 334D (J98605AM-2 Signaling Lead Extension Unit)

- Relay, 303E (J98605AH [MD] Signaling Lead Extension Unit).

DESIGN FEATURES

J53050C, List 2 Interconnecting Unit

- Mounts on standard 23-inch relay rack

- Size—4 by 23 inches

- Four signal isolation (applique) circuits per unit

- Accepts ground and battery supervisory signals over CFM lead from CP facilities

- Provides closure (to ground) and open supervisory signals over CFE lead to CP facilities

- Provides dc isolation of the signaling leads between the CP facilities and the signaling lead extension unit.

24V4C Repeater Shelf

- Mounts on standard 23-inch relay rack on 1-3/4 inch centers.

- Size—2 by 23 inches.
- One repeater circuit per shelf.
- Each circuit provides a 2-wire to 4-wire voiceband transmission path (voice coupler) from Bell System equipment to CP facilities and a 4-wire to 2-wire voiceband transmission path from CP facilities to Bell System equipment.
- Limits the inband signal power applied to Bell System facilities when equipped with F58122 AGC amplifier.
- Provides transformer isolation and hazardous voltage protection between CP facilities and Bell System equipment.
- Typical current drain per circuit: 0.018 ampere (single amplifier).

44V4A Repeater Shelf

- Mounts on standard 23-inch relay rack on 1-3/4 inch centers.
- Size—2 by 23 inches.
- Two repeater circuits per shelf.
- Each circuit provides a 4-wire voiceband transmission path (voice coupler) to and from the CP facilities.
- Limits the inband signal power applied to Bell System equipment when equipped with F58122 AGC amplifier.
- Typical current drain per circuit: 0.018 ampere (single amplifier).

J98605AM Signaling Lead Extension Unit

- Mounts on standard 23-inch relay rack
- Size—2 by 23 inches
- Six circuits per unit
- Provides signaling lead extension from connecting arrangement to central office
- Provides loop-strapping options
- Typical current drain per circuit: 0.187 ampere.

3. INSTALLATION

3.01 Locate the PCAs in an area free of dampness and excessive dust or dirt with adequate room for access to front and rear of equipment and connecting blocks. The associated equipment typically mounts on a standard 23-inch relay rack. (Fig. 6, 7, and 8).

3.02 Wire the equipment as shown in Fig. 9, 10, and 11. Mount the interface connecting block in a position that will facilitate testing between it and the PCA equipment. Use the "D" inside wiring cable or equivalent to terminate the leads associated with the CP equipment on the interface connecting block. Stencil trunk number and lead designations on interface connecting block designation strip (see Fig. 5). Install the proper plug-in components in the 24V4C or 44V4A repeaters. (When the AGC amplifier is used, see 7.02 for adjustment procedures.) For PCA C2H (Centrex-CO), make the signaling lead extension unit adjustments as given in 3.03. Apply power as shown in Fig. 9, 10, and 11. Before installing bridging clips on the block to connect Bell System wiring to CP wiring, perform the quick test in 3.08 to determine if the PCA operates properly. If it does not, recheck installation and connections; if necessary, perform the maintenance procedures in Part 5 of this practice.

> ***Note:*** The CB and CG terminals are for CP signal battery and CP signal ground, respectively. Telephone company battery and ground should ***never*** be connected to these terminals.

3.03 ***Signaling Lead Extension Unit Adjustments (J98605AM) (Fig. 2, 3, and 12)***

(a) Adjust network resistor R1 to equal the PBX or CO loop resistance, $\pm$125 ohms. When adjusting R1, be sure that at least one of the network capacitance screw switches (C1, C2, C3) is open (up). Using an ohmmeter, measure the resistance of R1 across test points TP1 and TP3 with the extension circuit (334-type relay) removed from its socket.

(b) It is desirable to have a 4 microfarad (μf) capacitor across the A and B leads. If the external circuit (the repeater) does not provide

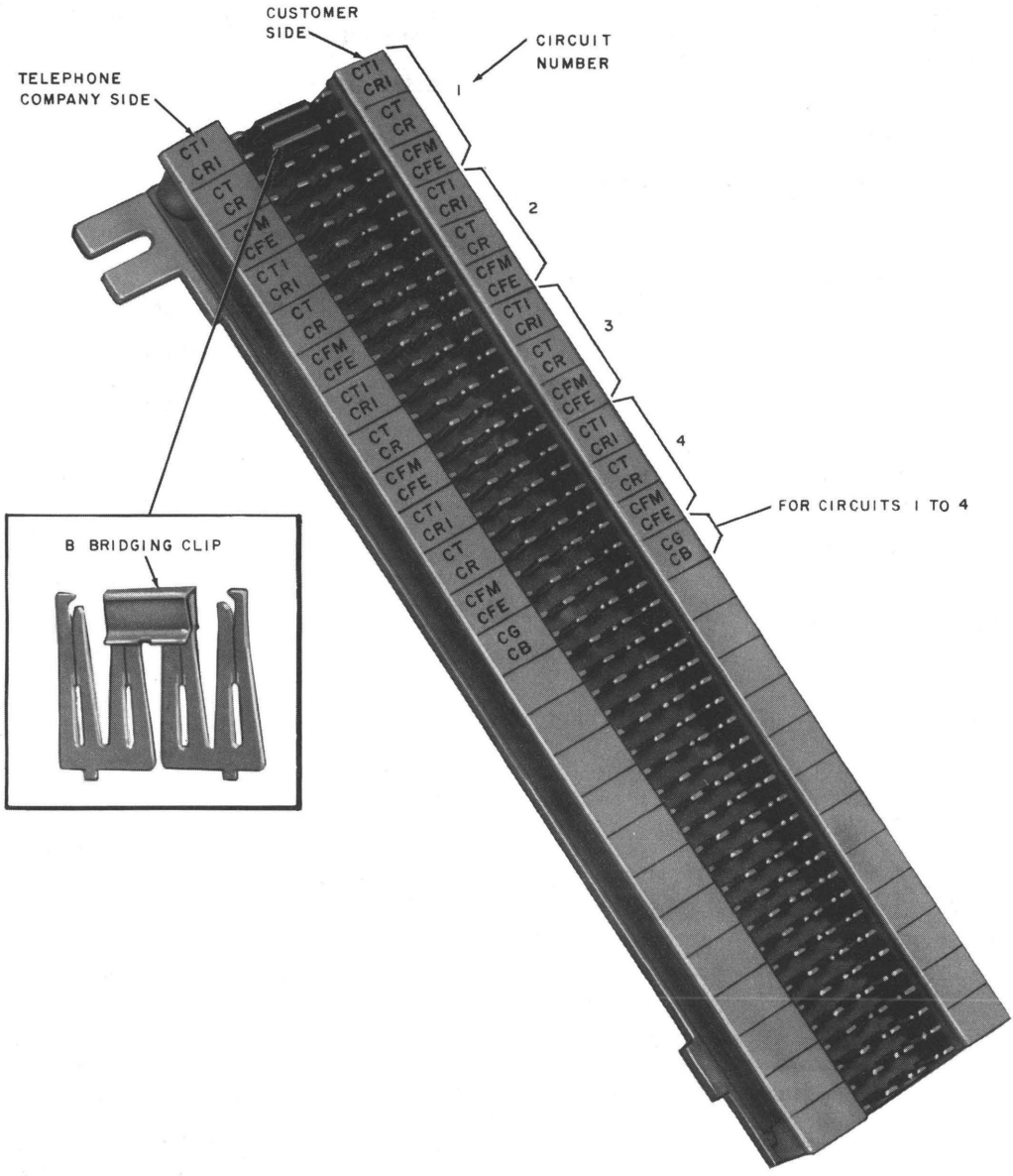


Fig. 5—Typical Interface Connecting Block

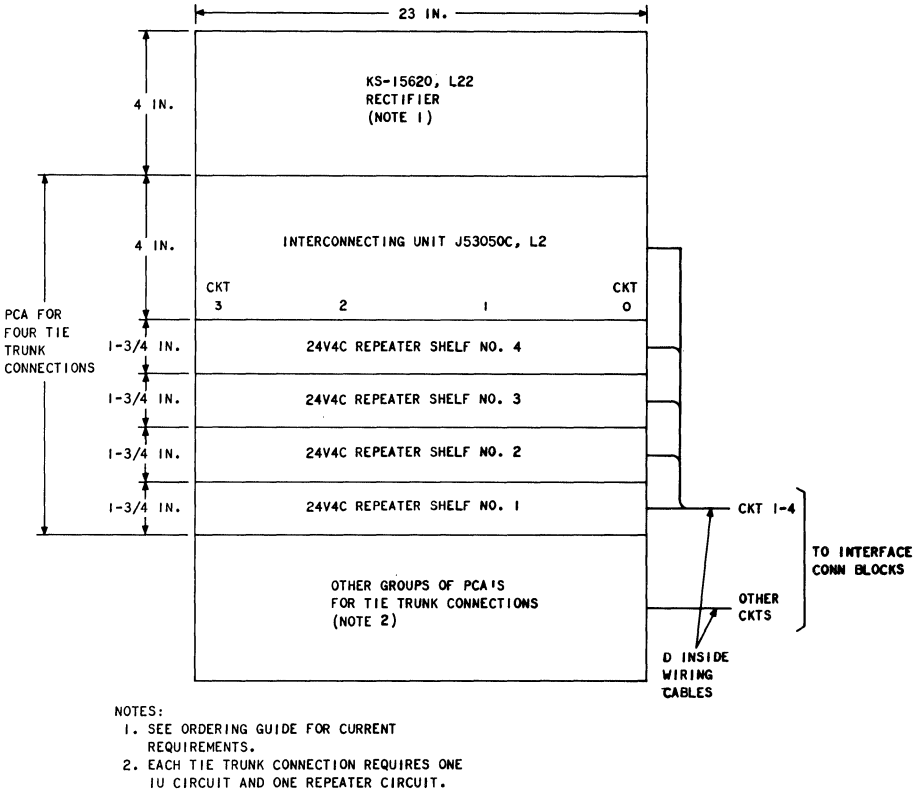


Fig. 6—Typical Rack Mounting—PCA C24 (PBX) or C2H (Centrex-CU), Front View

this, insert one by closing the MPC screw switch on the 334D relay, or, where 334B relays are used, by wiring one across the A and B leads. In no case should the A-B capacitance exceed 4 μf; therefore, if the external circuit has a capacitor of more or less than 4 μf, disconnect it before connecting the 4 μf capacitor of the extension circuit. To properly match the A-B capacitance of 4 μf, the extension circuit network capacitance should be 6 μf (C1 and C2 closed). Refer to SD-1C364-01 for more information on these adjustments.

Power Requirements

3.04 When required, the customer must provide a 117V 60-Hz power outlet within power cord length of the customer-designated mounting location of the connecting arrangement (see ORDERING GUIDE for cord lengths).

3.05 The power outlet supplying connecting arrangement(s) must not be under control of a switch and should be on a separately fused power circuit to prevent accidental loss of ac line voltage. Where local instructions permit, secure the power cord to the outlet with a power cord plug retainer assembly.

3.06 Refer to appropriate section in Division 167 for proper grounding of power plants.

3.07 ***KS-20944 Protector (Fig. 15 and 16):*** When a CP power source is used to power the

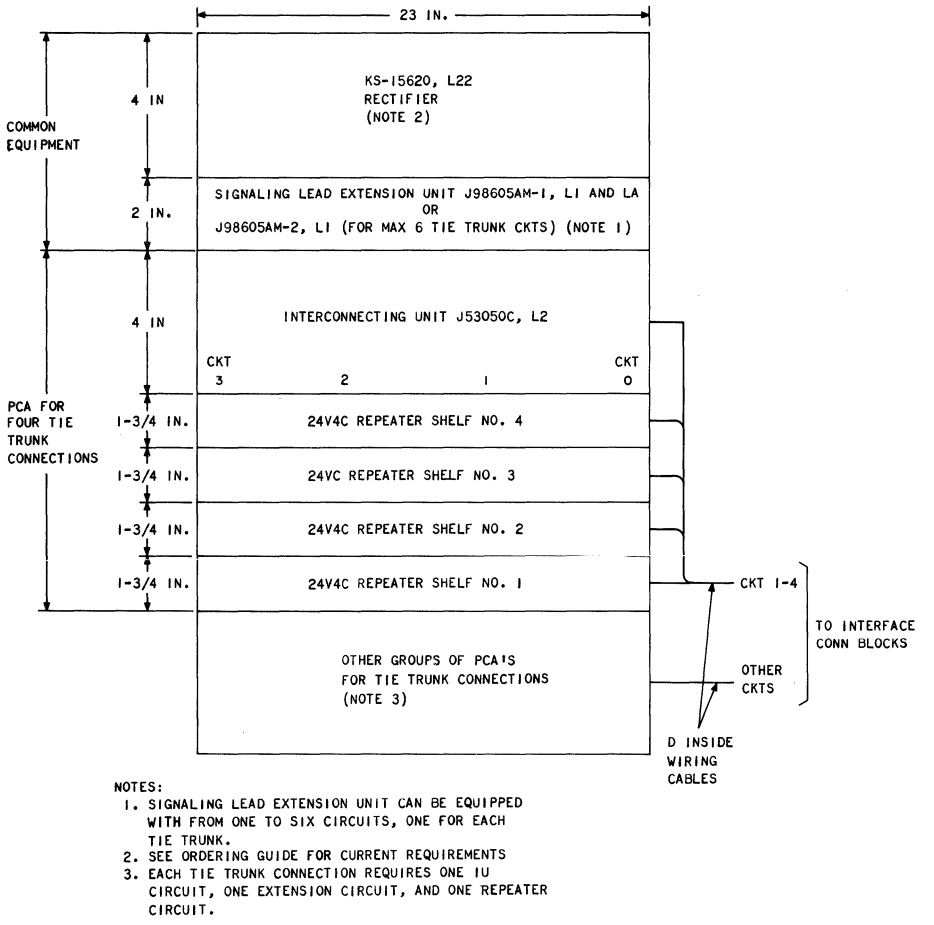
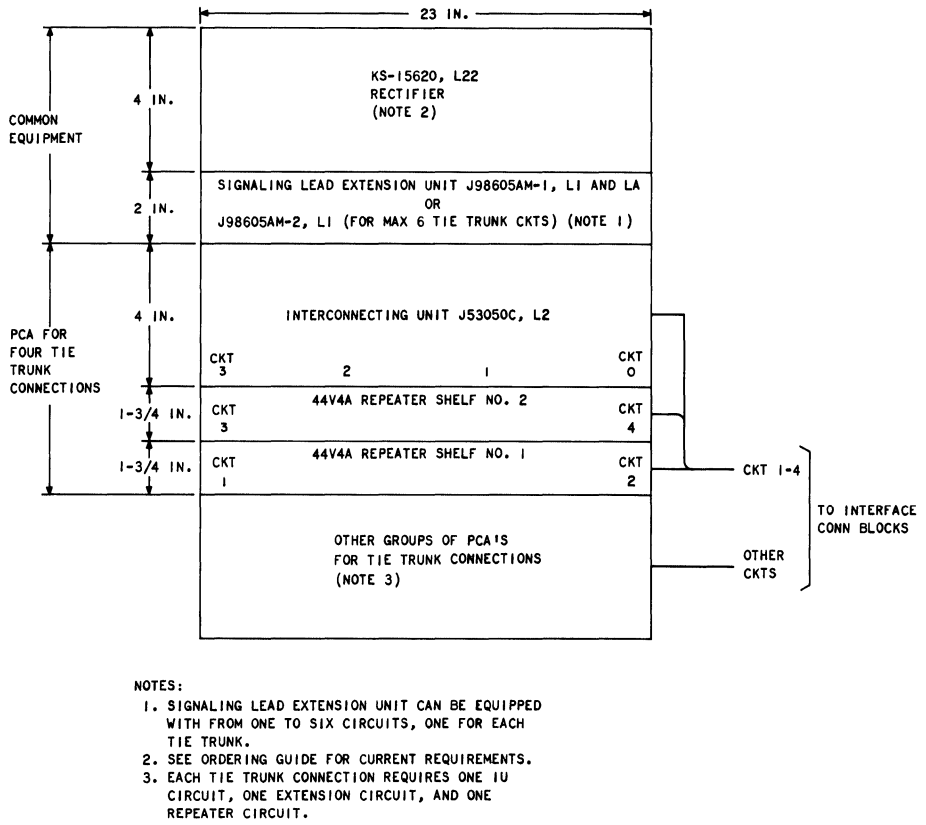


Fig. 7—Typical Rack Mounting—PCA C2H (Centrex-CO), 2-Wire Local Channel, Front View

connecting arrangement, a KS-20944 protector must be provided between the CP power source and the connecting arrangement. Mount the KS-20944 protector on a wall or suitable flat surface near the interface connecting block. Use the AM-type, 14-gauge wire or equivalent, to make connections from the protector to the 66C1-16 connecting block. Terminate one end of the wiring to the screw terminals (term. – and +) of the load terminal strip provided on the protector. Solder the other end of the wiring to terminals in column D of the connecting block as shown in Fig. 17. Using the 14-gauge wire, solder the multiple straps to the terminals in column D of the connecting block as shown in Fig. 17, depending on the number of connecting arrangements provided. Use "D" inside wire cable or equivalent to make connections from the quick-connect terminals in columns A, B, and C of the connecting block to the battery and ground terminals on the connecting arrangements. The customer must connect his power supply to the red (GRD) and black (–V) wires extending from the protector.

Warning: The circuit breaker switch removes voltage from the load (Bell System)



NOTES:
1. SIGNALING LEAD EXTENSION UNIT CAN BE EQUIPPED WITH FROM ONE TO SIX CIRCUITS, ONE FOR EACH TIE TRUNK.
2. SEE ORDERING GUIDE FOR CURRENT REQUIREMENTS.
3. EACH TIE TRUNK CONNECTION REQUIRES ONE IU CIRCUIT, ONE EXTENSION CIRCUIT, AND ONE REPEATER CIRCUIT.

Fig. 8—Typical Rack Mounting—PCA C2H (Centrex-CO), 4-Wire Local Channel, Front View

side of the protector only; voltage will be present on the upper terminals of the circuit breaker inside the box as soon as customer power is connected.

3.08 ***Post-Installation Test:*** At the telephone company side of the interface connecting block (Fig. 1, 2, and 3), connect a 4-wire telephone, such as a 500AD, to the CT, CR, CT1, and CR1 leads; −48 volt battery to the CB lead; ground to the CG lead; a 1013A handset from lead CFE to ground; and an 81A test set from lead CFM to ground. Connect talk battery from the −48 volt supply through a 500-ohm resistor to CR and ground to CT. (A 2A or 31A KTU can be used for battery feed instead of the resistor. Refer to Section 518-112-421 for connections.) With the 1013A in the TALK mode, dial the distant end while monitoring on the 500AD. The distant end should answer, and satisfactory transmission should be possible using the 500AD set. Ask the distant end to call you back. Put the 1013A in the MON mode and the 500AD on hook. When the distant end calls back, the 81A (in the "C" position) should buzz, indicating battery on the CFM lead. Use the 500AD to tell the distant end that the test is complete. Restore the circuit to normal.

4. OPERATION

Note: The operational details for PCAs C24 and C2H depend upon the requirement of the

switching system to which they are connected. The protective connecting arrangement provides a means of transmitting voice, dialing, and answer/disconnect signals between the telephone company switching equipment and the CP facility. When the distant end switching equipment is customer-provided, close coordination between the customer and the telephone company will be required to insure end-to-end compatibility of the terminal signaling and supervision circuits.

4.01 ***Incoming Call—PCAs C24 (PBX) and C2H (Centrex-CU) Fig. 1***

(a) The CP communications facility seizes the connecting arrangement by placing ground on lead CFE. This operates the K1 relay in the signal isolation (applique) circuit, which in turn places ground on the E lead toward the Bell System PBX tie trunk or the Centrex-CU equipment. The Bell System equipment responds to this seizure by connecting dial pulse receiving equipment to the E lead and returning dial tone, if provided, to the CP communications facility over leads CT1 and CR1 to indicate readiness to receive dial pulses.

(b) The CP communications facility transmits dial pulses by alternately opening and closing the CFE lead. Relay K1 in the signal isolation circuit repeats dial pulses to the Bell System equipment over lead E.

(c) When dial pulses have been received, the Bell System equipment may transmit answer supervision to the CP communications facility by placing battery on the M lead. This operates the K2 relay in the signal isolation circuit, which in turn places battery on the CFM lead toward the CP facility.

(d) The 24V4C repeater provides a 4-wire to 2-wire transmission path from the CP facility to the Bell System equipment.

4.02 ***Outgoing Call—PCAs C24 (PBX) and C2H (Centrex-CU) Fig. 1***

(a) The Bell System tie trunk or Centrex-CU equipment seizes the connecting arrangement by placing battery on the M lead. This operates the K2 relay in the signal isolation circuit, which in turn places battery on the CFM lead toward the CP facility; the CP facility returns dial tone, if provided, over leads CT and CR. The Bell System equipment then outpulses the digits by alternately applying battery and ground to lead M. The digits are repeated to the CP facility over lead CFM.

(b) The CP facility indicates answer supervision by placing ground on lead CFE which operates K1 relay in the signal isolation circuit in the same manner as an incoming call. The resulting K1 contact closure repeats the answer supervision to the Bell System equipment by grounding the E lead.

(c) The 24V4C repeater provides a 2-wire to 4-wire transmission path from the Bell System equipment to the CP facility.

4.03 ***Disconnect—PCAs C24 (PBX) and C2H (Centrex-CU) Fig. 1***

(a) When the Bell System end goes on-hook first, the Bell System equipment removes battery from lead M which releases the K2 relay in the signal isolation circuit. The K2 relay released removes battery from and applies ground to the CFM lead toward the CP facility. This ground should be recognized by the CP facility as a disconnect signal. The CP facility should then remove ground from the CFE lead, which in turn causes the K1 relay in the signal isolation circuit to release, removing ground from the E lead toward the Bell System equipment and restoring the connecting arrangement to the idle condition.

(b) When the customer end goes on-hook first, the CP facility removes ground from lead CFE toward the signal isolation circuit causing the K1 relay to release. K1 relay released removes ground from lead E toward the Bell System equipment. When the distant party goes on-hook, or is released by the switching system, the Bell System equipment subsequently removes battery from lead M which releases the K2 relay in the signal isolation circuit. Relay K2 released removes battery from and applies ground to the CFM lead toward the CP facility and restores the connecting arrangement to the idle condition.

4.04 ***Incoming Call—PCA C2H (Centrex-CO) 2-Wire or 4-Wire Local Channel (Fig. 2 and 3)***

(a) The CP communications facility seizes the connecting arrangement by placing ground on lead CFE. This operates the K1 relay in the signal isolation circuit, which in turn places ground on the E lead toward the signal lead extension circuit. This ground operates the S relay, which in turn causes the Bell System CO to connect dial pulse receiving equipment to the connecting arrangement and to return dial tone, if provided, to the CP communications facility over leads CT1 and CR1 to indicate readiness to receive dial pulses.

(b) The CP communications facility transmits dial pulses by alternately opening and closing the CFE lead. Relay K1 in the signal isolation circuit repeats dial pulses to the signal lead extension circuit over lead E. Relay S follows the dial pulses and subsequently extends them to the Bell System CO.

(c) When dial pulses have been received, the Bell System CO may transmit answer supervision to the CP communications facility by unbalancing the signal lead extension circuit in the connecting arrangement which causes R relay to operate which places battery on the M lead toward the signal isolation circuit. This operates the K2 relay, which in turn places battery on the CFM lead toward the CP facility.

(d) When 2-wire local channel to the Bell System CO is used, the 24V4C repeater provides a 4-wire to 2-wire transmission path from the CP facility to the CO.

(e) When 4-wire local channel to the Bell System CO is used, the 44V4A repeater provides a 4-wire transmission path to the CO.

4.05 ***Outgoing Call—PCA C2H (Centrex-CO) 2-Wire or 4-Wire Local Channel (Fig. 2 and 3)***

(a) The Bell System CO seizes the connecting arrangement by unbalancing the signal lead extension circuit which causes the R relay to operate, subsequently placing battery on the M lead toward the signal isolation circuit. Battery on the M lead operates the K2 relay, which in turn places battery on the CFM lead toward the CP facility; dial tone, if provided, is returned from the distant end over leads CT and CR. The Bell System CO equipment outpulses the digits to the connecting arrangement causing the R relay to follow the dial pulses. The R relay alternately applies battery and ground to the M lead toward the signal isolation circuit; the digits are subsequently repeated to the CP facility over lead CFM.

(b) The CP facility may provide answer supervision by placing ground on lead CFE which operates K1 relay in the signal isolation circuit in the same manner as an incoming call. The resulting K1 contact closure repeats the answer supervision by grounding the E lead toward the signal lead extension circuit. This ground operates the S relay which extends answer supervision to the Bell System CO.

(c) When 2-wire local channel to the Bell System CO is used, the 24V4C repeater provides a 2-wire to 4-wire transmission path from the CO to the CP facility.

(d) When 4-wire local channel to the Bell System CO is used, the 44V4A repeater provides a 4-wire transmission path to the CP facility.

4.06 ***Disconnect—PCA C2H (Centrex-CO) 2-Wire or 4-Wire Local Channel (Fig. 2 and 3)***

(a) When the Bell System end goes on-hook first, a disconnect signal is sent from the CO to the signal lead extension circuit. The signal lead extension circuit removes battery from lead M which releases the K2 relay in the signal isolation circuit. The K2 relay released removes battery from and applies ground to the CFM lead toward the CP facility. This ground should be recognized by the CP facility as a disconnect signal. The CP facility should then remove ground from the CFE lead, which in turn causes the K1 relay in the signal isolation circuit to release, removing ground from the E lead toward the signal lead extension circuit. This releases the S relay and restores the connecting arrangement to the idle condition.

(b) When the customer end goes on-hook first, the CP facility removes ground from lead CFE toward the signal isolation circuit causing the K1 relay to release, which removes ground from lead E toward the signal lead extension circuit. This releases the S relay, sending a disconnect to the CO. When the CO releases, the R relay operates, removing battery from

lead M toward the signal isolation circuit, subsequently releasing the K2 relay. The K2 relay released removes battery from and applies ground to the CFM lead toward the CP facility, restoring the connecting arrangement to the idle condition.

5. MAINTENANCE

5.01 Where there is an indication of trouble in the connecting arrangement(s), the circuit at fault must be opened at the interface connecting block to verify in which direction the trouble exists. The circuit can be opened at the connecting block by removing the B bridging clip associated with each lead.

5.02 Precautions should be taken when performing tests to avoid adversely affecting service to the customer. Local instructions should be followed with reference to notifying the customer before performing the tests.

Note: In no case should the CPE be used to perform end-to-end testing.

5.03 The repairman should first check the PCA for blown fuses, loose or broken wires and connectors, adequate battery and ground, and verify that the CO/PBX cable pairs are good. Any defects found should be repaired and tested before the equipment is reconnected to the customer's facility. If the trouble persists, continue with the trouble-shooting procedures described below.

5.04 Perform the post-installation tests described in 3.08 to determine if there is trouble in the PCA or the telephone company 2- or 4-wire facilities behind the PCA. If the tests in 3.08 can be completed successfully, and the areas checked in 5.03 are satisfactory, then the trouble is probably in the CPE.

5.05 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 BSP 660-101-312 entitled Maintenance of Service Charge on Services With Customer-Provided Equipment (CPE).

Do not attempt any tests or repairs to the customer-provided equipment.

5.06 If the trouble appears to be in the telephone company 2- or 4-wire facilities remote from the PCA, follow local practices to have them tested and repaired. If the PCA appears to be at fault, test the circuits which are most likely to be involved, based on the results of the test in 5.04. Faulty transmission probably points to the repeater as the source of trouble. Signaling difficulties are most likely to be caused by a defective J53050C IU or signaling lead extension unit plug-in relay. If CP power is being used, check the protector. When the faulty circuit is found, replace components or the entire unit, as necessary, or move leads to an idle circuit if one is available.

5.07 ***Apparatus Required to Perform Tests***

(a) Test cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), one KS-6278 connecting clip, and one 411B (test pick) tool (for connecting battery to alarm bar of 70-type fuses).

Note: To connect battery to the alarm bar of 70-type fuses mounted in a 21A fuse block, insert the tip of the 411B tool (attached to the 1W13B cord) into the aperture provided in the fuse block cover, and touch the alarm bar.

(b) Volt-ohm-meter capable of measuring −48 volts and 1000 ohms.

(c) Two clip leads, one of sufficient length to reach from the interface connecting block to the connecting arrangement.

5.08 ***Tests—J53050C, List 2 Interconnecting Unit***

(a) Using 893 cord, connect battery to alarm bar of fuse(s) on interconnecting unit—fuse alarm lamp DS3 should light.

(b) Open all of the leads of the circuit under test at the interface connecting block. Connect battery and ground to leads CB and CG. Remove leads E and M from the signal lead extension unit or the Bell System PBX or

Centrex-CU equipment. Apply battery (−48 volts) to lead M. The K2 relay should operate, indicated by battery (−48 volts) present between lead CFM and CG. If K2 relay does not operate, replace it with a relay known to be good; if battery still is not present across leads CFM and CG, measure the resistance between the two leads. If resistance measures zero, check for open on lead M; if resistance measures 1000 ohms, check for faulty RT1 resistance lamp or blown fuse; if resistance measures infinity, check for open on lead CFM or CG.

(c) Connect lead CFE to lead CG; K1 relay should operate, indicated by a ground on lead E. If K1 relay does not operate, replace it with a relay known to be good; if K1 relay still does not operate, check for open on leads CFE, CG, or E.

(d) On completion of tests, reconnect leads E and M to the signal lead extension unit or the Bell System PBX or Centrex-CU equipment. Remove battery and ground from leads CB and CG. Replace the B bridging clips at the interface connecting block associated with the circuit under test.

5.09 ***Tests—J98605AM Signaling Lead Extension Unit***

(a) Remove the 334-type relay in the faulty PCA from its socket to perform tests. It is not a repairable item and will be replaced if defective.

(b) Verify the adjustments described in 3.03 and correct any discrepancies.

(c) Return the 334-type relay to its connector in the signaling unit. If the trouble has not been cleared, replace the relay. (Perform 3.03 adjustments on any new relays before installing.)

5.10 ***Tests—J98605AH (MD) Signaling Lead Extension Unit***

(a) Remove the 303E relay in the faulty PCA from its socket and replace it with a known good one.

(b) Verify all option strapping (Fig. 13 and 14).

5.11 ***Tests—24V4C and 44V4A Repeaters:*** If the CO cable pairs are verified to be good and transmission trouble is still present, the repeater may be defective. The amplifiers, terminal sets, and equalizers are plug-in units which may be adjusted or removed and replaced individually to localize the fault. Refer to the practices listed in 5.14 for additional information. Alignment procedures for the F58122 AGC amplifier, when used with the repeater, is covered in Part 7.

5.12 ***Tests—KS-20944 Protector (Fig. 15 and 16):*** If circuit breaker switches are tripped (in the ***off*** position), return them to the ***on*** position; if circuit breaker switches cannot be operated to the ***on*** position, perform tests as follows:

(a) Disconnect telephone company-provided wiring from terminals 1 and 2 (− and +) of the load terminal strip on the protector under test. If the circuit breaker switches remain in the ***on*** position when operated, the trouble is in the telephone company-provided equipment. Check for proper polarity of the telephone company-provided leads at terminals 1 and 2 (− and +) of the load terminal strip on the protector; ascertain that the circuits connected to the protector do not exceed the current rating of the protector.

(b) If the trouble is not in the telephone company side, check the type, amount, and polarity of the CP voltage present on the leads provided for customer termination at the protector; this voltage should meet the specifications shown in Fig. 16.

5.13 After tests have been completed and defective equipment repaired or replaced, repeat the post-installation tests in 3.08 to determine that the PCA is operating correctly. If it is, restore all circuits to normal and close the connections between telephone company equipment and CPE.

5.14 When detailed maintenance information is required, refer to the following:

44V4A Repeater

- CD- and SD-97047-01
- Section 179-100-303
- Section 332-106-101

- Section 852-307-101.

24V4C Repeater

- CD- and SD-97047-01
- Section 179-100-303
- Section 332-105-103
- Section 852-307-101.

359-Type Equalizer

- Sections 332-116-101 through 332-116-113.

227-Type Amplifier

- Section 024-140-101.

Signal Isolation (Applique) Circuit (J53050C)

- CD- and SD-1E254.

Signal Lead Extension Circuit

- CD- and SD-95488-01 (for J98605AH)
- CD- and SD-1C364-01 (for J98605AM)
- Section 179-100-309
- Section 859-501-101.

KS-20944 Protector

- Section 463-300-109.

6. CONNECTIONS

6.01 For connecting information, refer to Fig. 9, 10, 11, 13, 16, and 17.

7. F58122 AUTOMATIC GAIN CONTROL (AGC) AMPLIFIER

7.01 *Physical and Electrical Characteristics*

(a) The F58122 AGC amplifier is identical in size and connections to the 227-type amplifier used in the V4 repeater shelf. It is used to limit the inband signal power in the transmitting leg from CP facilities to Bell System equipment.

(b) The gain of the F58122 AGC amplifier is continuously adjustable from −10 dB to +25 dB. The ability to insert loss is necessary when interfacing with a +7 transmission level point (TLP) transmit leg from CP facilities. The clamped output power of the amplifier is adjustable from −20 dBm to 0 dBm.

(c) The F58122 AGC amplifier is normally adjusted to clamp at a power level 13 dB below the TLP. When the output side of the amplifier is at the 0 TLP, the minimum protection criteria permits an inband 3-second average output power of −13 dBm. If the input signal to the amplifier should be increased to a level that produces an instantaneous signal greater than −7 dBm at the output of the amplifier, the AGC action of the amplifier changes the output to −7 dBm after 20 milliseconds and then to −13 dBm after a time interval varying from 300 to 500 milliseconds. When the input level to the amplifier is such that the output level of the amplifier is between −7 and −13 dBm, the AGC action of the amplifier changes the output level to −13 dBm after a time interval varying from 0.3 to 3 seconds.

7.02 ***Adjustments:*** Gain adjustments are made by means of the LEV ADJ control (R3) and switch S1 (see Fig. 18). The combined setting of these two controls provides a range of −10 to +25 dB gain. The setting of the AGC ADJ control (R20) determines the points at which clamping of the amplifier output begins. The range of the AGC ADJ control is from 0 to −20 dBm. Before making adjustments, refer to circuit order card to determine the TLP at the input and output of the amplifier. With an input signal 10 dB below the input TLP of the amplifier, the amplifier gain must be adjusted (using LEV ADJ and S1 as required) to provide an output level which is 10 dB below the output TLP of the amplifier. The AGC ADJ control must then be adjusted to reduce the output of the amplifier by 3 dB (13 dB below output TLP). The following example shows the method of adjusting F58122 AGC amplifier for a typical input and output TLP:

Example:

(a) Assume that the circuit order card shows an input TLP of −4 and an output TLP of +4.

(b) Set switch S1 to the counterclockwise position (when more than 10 dB of gain is required set S1 to clockwise position) and LEV ADJ control (R3) to the +8 position; set the AGC ADJ control (R20) fully clockwise to the 0 dBm position. This provides an amplifier gain of +8 dB, the amount of gain required to raise the TLP from −4 to +4.

(c) Adjust the oscillator test level of a 21A transmission measuring set (TMS), or equivalent, to −14 dBm at 1000 Hz (10 dB below input TLP).

(d) Connect the OSC jack of the 21A TMS to the amplifier input (AMPL IN jack on the V4 repeater associated with the AGC amplifier). Connect the DET jack of the 21A TMS to the amplifier output (AMPL OUT jack on the V4 repeater associated with the AGC amplifier).

(e) Adjust the LEV ADJ control on the AGC amplifier for a detector reading of −6 dBm on the 21A TMS (10 dB below output TLP).

(f) ***Slowly adjust*** the AGC ADJ control on the AGC amplifier in a counterclockwise direction until a detector reading of −9 dBm is obtained on the 21A TMS (13 dB below output TLP). Because of long time constants, this adjustment must be made by turning the AGC ADJ ***slowly*** while noting the change in the detector reading.

(g) The amplifier is now adjusted to clamp the output power to a level 13 dB below the TLP (−9 dBm at +4 TLP).

(h) Reduce the oscillator test level of the 21A TMS by 5 dB (15 dB below input TLP); the detector reading should drop by 2 dB (15 dB below output TLP). This checks the limiting action of the amplifier.

(i) Disconnect the 21A TMS from the V4 repeater.

(j) Use the preceding method and refer to Fig. 14 to adjust the AGC amplifier for other TLPs.

The AGC action of the amplifier will make it impossible to measure the overall loss of the circuit using test levels that exceed 13 dB below the TLP. It is suggested that loss measurements from the customer equipment to another location be conducted at a test level of 13 dB below TLP. To minimize the possibility of a misunderstanding, it is imperative that each individual involved with testing the circuit understands that a reduced test level is being used. Some testboards and VF patch bays are not equipped to send reduced test levels. Higher test levels may be used to test those portions or directions of the circuit in which an AGC amplifier (F58122) is not used.

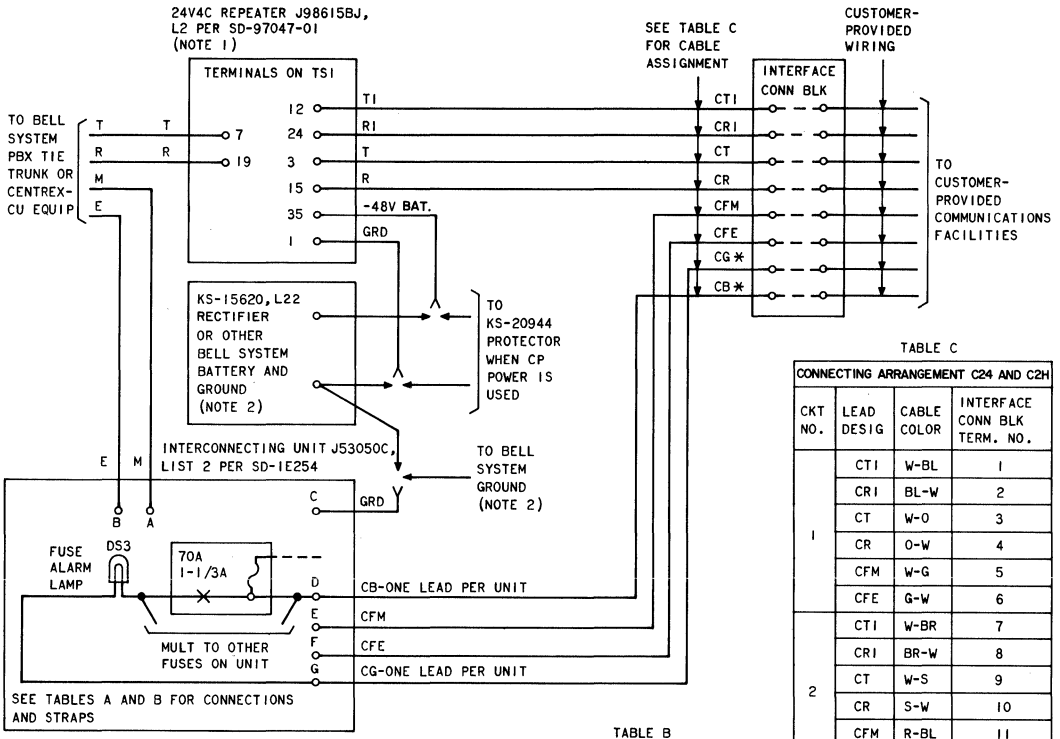


TABLE A

CKT NO.	TERMINALS ON J53050C, LIST 2 - TS(1)						
	A	B	C	D	E	F	G
0	38	28	52	41	48	58	22
1	37	27			47	57	
2	36	26			46	56	
3	35	25			45	55	

TABLE B

STRAPS ON J53050C, LIST 2					
TS(1)		TS(2)		TS(3)	
FROM	TO	FROM	TO	FROM	TO
54	33	58	28	58	28
44	33	48	38	48	38
34	43	38	57	38	57
24	43	47	37	47	37
11	21	27	17	27	17
21	31	56	46	56	46
31	41	23	42	23	42
		13	52	13	52
		52	22	52	22
		12	51	12	51
		41	31	41	31
		21	11	21	11

TABLE C

CONNECTING ARRANGEMENT C24 AND C2H			
CKT NO.	LEAD DESIG	CABLE COLOR	INTERFACE CONN BLK TERM. NO.
1	CTI	W-BL	1
	CRI	BL-W	2
	CT	W-O	3
	CR	O-W	4
	CFM	W-G	5
	CFE	G-W	6
2	CTI	W-BR	7
	CRI	BR-W	8
	CT	W-S	9
	CR	S-W	10
	CFM	R-BL	11
	CFE	BL-R	12
3	CTI	R-O	13
	CRI	O-R	14
	CT	R-G	15
	CR	G-R	16
	CFM	R-BR	17
	CFE	BR-R	18
4	CTI	R-S	19
	CRI	S-R	20
	CT	BK-BL	21
	CR	BL-BK	22
	CFM	BK-O	23
	CFE	O-BK	24
1-4	CG*	BK-G	25
	CB*	G-BK	26

NOTES:
1. EACH 24V4C REPEATER SHELF CONTAINS ONE CIRCUIT; CONNECTIONS FOR OTHER REPEATER CIRCUITS ARE IDENTICAL AS SHOWN. FOR ALIGNMENT PROCEDURES REFER TO EXISTING PRACTICES. WHEN F58122 AGC AMPLIFIER IS USED, ALIGN AS SHOWN IN PART 7.
2. BELL SYSTEM GROUND MUST BE CONNECTED TO THE J53050C,L2 INTERCONNECTING UNIT; BELL SYSTEM OR CUSTOMER-PROVIDED BATTERY AND GROUND MUST BE CONNECTED TO THE 24V4C REPEATER SHELF. KS-15620, L22 RECTIFIER MAY BE USED, HOWEVER, CONNECTIONS MAY BE MADE TO OTHER BELL SYSTEM BATTERY AND GROUND. WHEN CP POWER IS USED, CONNECT BELL SYSTEM GROUND TO J53050C IU.

* ONLY ONE CG AND CB LEAD PER FOUR CIRCUITS.

Fig. 9—Connections—PCAs C24 (PBX) and C2H (Centrex-CU)

TABLE A

CKT NO.	TERMINALS ON J53050C, L2-TS(1)						
	A	B	C	D	E	F	G
0	38	28	52	41	48	58	22
1	37	27			47	57	
2	36	26			46	56	
3	35	25			45	55	

TABLE B

STRAPS ON J53050C, LIST 2					
TS(1)		TS(2)		TS(3)	
FROM	TO	FROM	TO	FROM	TO
54	33	58	28	58	28
44	33	48	38	48	38
34	43	38	57	38	57
24	43	47	37	47	37
11	21	27	17	27	17
21	31	56	46	56	46
31	41	23	42	23	42
		13	52	13	52
		52	22	52	22
		12	51	12	51
		41	31	41	31
		21	11	21	11

TABLE C

CKT NO.	TERMINALS ON TS(A) OF J98605AM			
	A	B	C	D
1	41	51	32	42
2	52	13	43	53
3	14	24	54	15
4	25	35	16	26
5	36	46	27	37
6	47	57	38	48

TABLE SHOWS CONNECTIONS FOR FULLY EQUIPPED UNIT. SELECT REQUIRED CIRCUITS

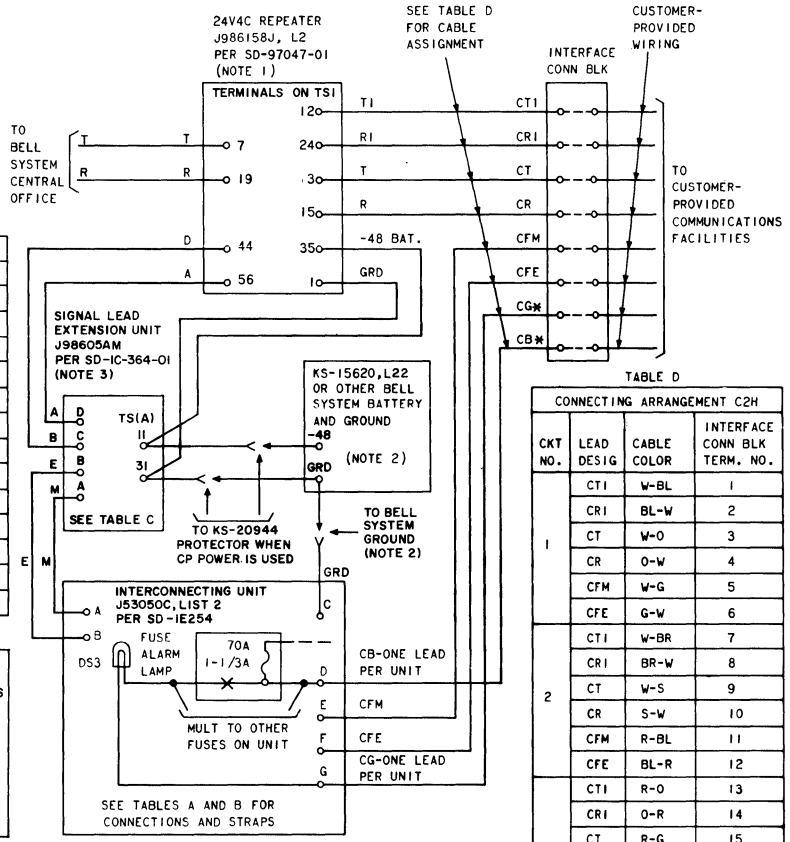


TABLE D

CONNECTING ARRANGEMENT C2H			
CKT NO.	LEAD DESIG	CABLE COLOR	INTERFACE CONN BLK TERM. NO.
1	CTI	W-BL	1
	CRI	BL-W	2
	CT	W-O	3
	CR	O-W	4
	CFM	W-G	5
	CFE	G-W	6
2	CTI	W-BR	7
	CRI	BR-W	8
	CT	W-S	9
	CR	S-W	10
	CFM	R-BL	11
	CFE	BL-R	12
3	CTI	R-O	13
	CRI	O-R	14
	CT	R-G	15
	CR	G-R	16
	CFM	R-BR	17
	CFE	BR-R	18
4	CTI	R-S	19
	CRI	S-R	20
	CT	BK-BL	21
	CR	BL-BK	22
	CFM	BK-O	23
	CFE	O-BK	24
1-4	CG*	BK-G	25
	CB*	G-BK	26

* ONLY ONE CG AND CB LEAD PER FOUR CIRCUITS

NOTES:
1. EACH 24V4C REPEATER SHELF CONTAINS ONE CIRCUIT; CONNECTIONS FOR OTHER REPEATER CIRCUITS ARE IDENTICAL AS SHOWN. FOR ALIGNMENT PROCEDURES REFER TO EXISTING PRACTICES. WHEN F58122 AGC AMPLIFIER IS USED, ALIGN AS SHOWN IN PART 7.
2. BELL SYSTEM GROUND MUST BE CONNECTED TO THE J53050C, L2 INTERCONNECTING UNIT; BELL SYSTEM OR CUSTOMER-PROVIDED BATTERY AND GROUND MUST BE CONNECTED TO THE 24V4C REPEATER SHELF. KS-15620, L22 RECTIFIER MAY BE USED, HOWEVER CONNECTIONS MAY BE MADE TO OTHER BELL SYSTEM BATTERY AND GROUND. WHEN CP POWER IS USED, CONNECT BELL SYSTEM GROUND TO J53050C IU.
3. REFER TO SD-95488-01, SHEET 4 (FIG. 4), AND SHEET 6 (FIG. 56) FOR STRAPPING OF A1,B1,C1, AND D1 LEADS (R,V,W, AND J OPTIONS).

Fig. 10—Connections—PCA C2H (Centrex-CO) Using Signaling Lead Extension Unit J98605AM, 2-Wire Local Channel

TABLE A

CKT NO.	TERMINALS ON J53050C, L2-TS(1)						
	A	B	C	D	E	F	G
0	38	28	52	51	48	58	22
1	37	27			47	57	
2	36	26			46	56	
3	35	25			45	55	

TABLE B

STRAPS ON J53050C, LIST 2					
TS(1)		TS(2)		TS(3)	
FROM	TO	FROM	TO	FROM	TO
54	33	58	28	58	28
44	33	48	38	48	38
34	43	38	57	38	57
24	43	47	37	47	37
11	21	27	17	27	17
21	31	56	46	56	46
31	41	23	42	23	42
		13	52	13	52
		52	22	52	22
		12	51	12	51
		41	31	41	31
		21	11	21	11

TABLE C

CKT NO.	TERMINALS ON TS(A) OF J98605AM			
	A	B	C	D
1	41	51	32	42
2	52	13	43	53
3	14	24	54	15
4	25	35	16	26
5	36	46	27	37
6	47	57	38	48

TABLE SHOWS CONNECTIONS FOR FULLY EQUIPPED UNIT. SELECT REQUIRED CIRCUITS

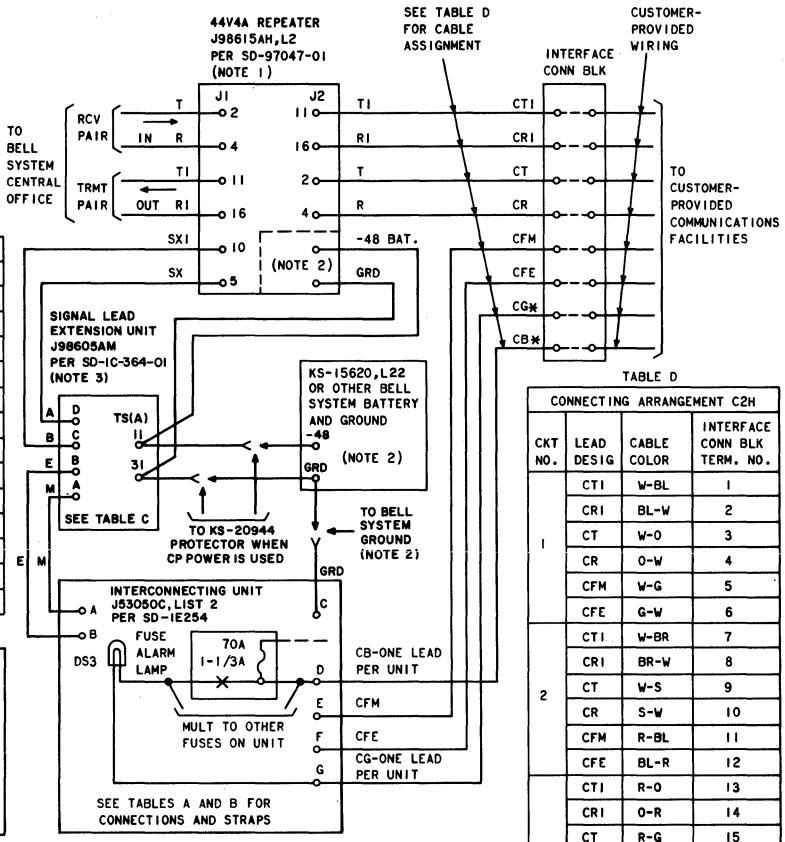


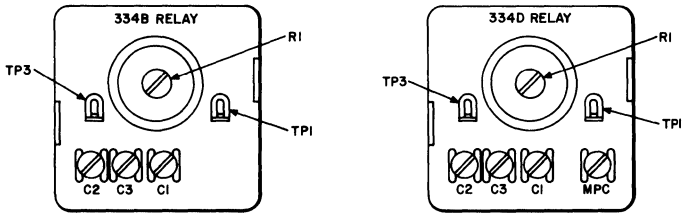
TABLE D

CONNECTING ARRANGEMENT C2H			
CKT NO.	LEAD DESIG	CABLE COLOR	INTERFACE CONN BLK TERM. NO.
1	CTI	W-BL	1
	CRI	BL-W	2
	CT	W-O	3
	CR	O-W	4
	CFM	W-G	5
	CFE	G-W	6
2	CTI	W-BR	7
	CRI	BR-W	8
	CT	W-S	9
	CR	S-W	10
	CFM	R-BL	11
	CFE	BL-R	12
3	CTI	R-O	13
	CRI	O-R	14
	CT	R-G	15
	CR	G-R	16
	CFM	R-BR	17
	CFE	BR-R	18
4	CTI	R-S	19
	CRI	S-R	20
	CT	BK-BL	21
	CR	BL-BK	22
	CFM	BK-O	23
	CFE	O-BK	24
1-4	CG*	BK-G	25
	CB*	G-BK	26

* ONLY ONE CG AND CB LEAD PER FOUR CIRCUITS

NOTES:
1. EACH 44V4A REPEATER SHELF HAS FACILITIES FOR 2 CIRCUITS. SHOWN ARE THE CONNECTIONS FOR 1 CIRCUIT. CONNECTIONS FOR OTHER 3 CIRCUITS ARE IDENTICAL AS SHOWN, EXCEPT FOR BATTERY AND GROUND CONNECTIONS, WHICH ARE EXPLAINED IN NOTE 2. FOR ALIGNMENT PROCEDURES FOLLOW EXISTING PRACTICES AND PART 7.
2. BELL SYSTEM GROUND MUST BE CONNECTED TO THE J53050C, L2 INTERCONNECTING UNIT; BELL SYSTEM OR CUSTOMER-PROVIDED BATTERY AND GROUND MUST BE CONNECTED TO THE 44V4A REPEATER SHELF. KS-15620, L22 RECTIFIER MAY BE USED, HOWEVER CONNECTIONS MAY BE MADE TO OTHER BELL SYSTEM BATTERY AND GROUND. WHEN CP POWER IS USED, CONNECT BELL SYSTEM GROUND TO J53050C IU. VIEWING THE 44V4A REPEATER SHELF FROM THE BACK, CONNECT BATTERY TO THE FIRST STANDOFF ON THE LEFT AND GROUND TO TERMINAL 15 OF J4 LOCATED ON THE LEFT. BATTERY AND GROUND IS FACTORY WIRED TO OTHER CIRCUIT ON THE SAME SHELF.
3. REFER TO SD-95488-01, SHEET 4 (FIG. 4), AND SHEET 6 (FIG. 56) FOR STRAPPING OF A1,B1,C1, AND D1 LEADS (R,V,W, AND J OPTIONS).

Fig. 11—Connections—PCA C2H (Centrex-CO) Using Signaling Lead Extension Unit J98605AM, 4-Wire Local Channel



NOTE:
334B IS USED WITH J98605AM-1 SIGNALING LEAD EXTENSION UNIT; 334D IS USED WITH J98605AM-2.

Fig. 12—334B and 334D Relays, End Views

TABLE A

CKT NO.	TERMINALS ON J53050C,L2-TS(I)						
	A	B	C	D	E	F	G
0	38	28	52	41	48	58	22
1	37	27			47	57	
2	36	26			46	56	
3	35	25			45	55	

TABLE B

STRAPS ON J53050C, LIST 2					
TS(1)		TS(2)		TS(3)	
FROM	TO	FROM	TO	FROM	TO
54	33	58	28	58	28
44	33	48	38	48	38
34	43	38	57	38	57
24	43	47	37	47	37
11	21	27	17	27	17
21	31	56	46	56	46
31	41	23	42	23	42
		13	52	13	52
		52	22	52	22
		12	51	12	51
		41	31	41	31
		21	11	21	11

TABLE C

CKT NO.	TERMINALS ON TS(E) OF J98605AH(MD)			
	A	B	C	D
1	28	38	48	58
2	27	37	47	57
3	26	36	46	56
4	25	35	45	55

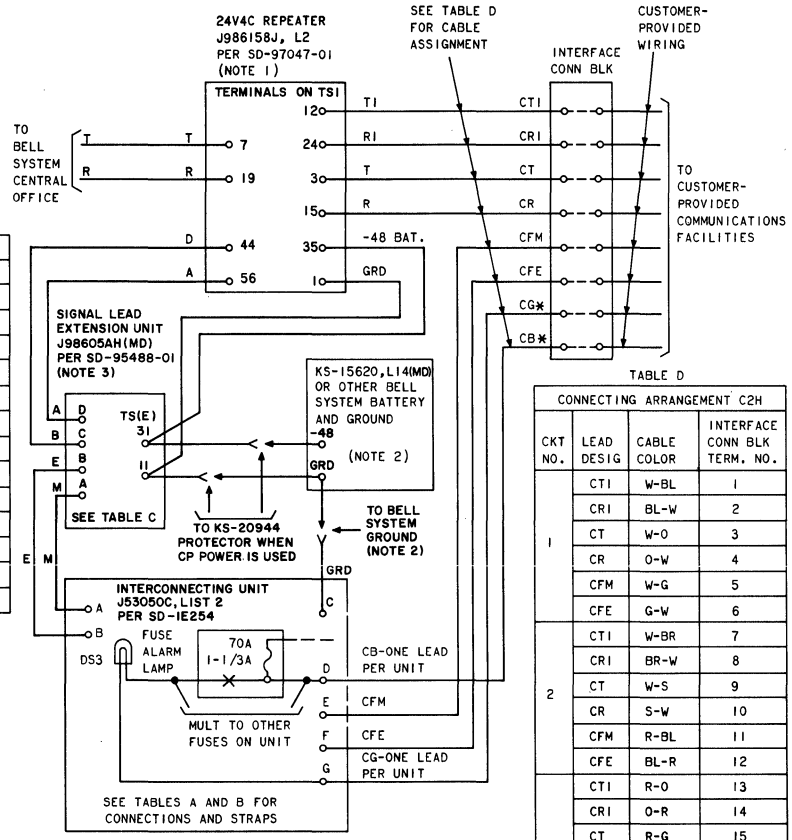


TABLE D

CONNECTING ARRANGEMENT C2H			
CKT NO.	LEAD DESIG	CABLE COLOR	INTERFACE CONN BLK TERM. NO.
1	CTI	W-BL	1
	CRI	BL-W	2
	CT	W-O	3
	CR	O-W	4
	CFM	W-G	5
	CFE	G-W	6
2	CTI	W-BR	7
	CRI	BR-W	8
	CT	W-S	9
	CR	S-W	10
	CFM	R-BL	11
	CFE	BL-R	12
3	CTI	R-O	13
	CRI	O-R	14
	CT	R-G	15
	CR	G-R	16
	CFM	R-BR	17
	CFE	BR-R	18
4	CTI	R-S	19
	CRI	S-R	20
	CT	BK-BL	21
	CR	BL-BK	22
	CFM	BK-O	23
	CFE	O-BK	24
1-4	CG*	BK-G	25
	CB*	G-BK	26

* ONLY ONE CG AND CB LEAD PER FOUR CIRCUITS

NOTES:
1. EACH 24V4C REPEATER SHELF CONTAINS ONE CIRCUIT; CONNECTIONS FOR OTHER REPEATER CIRCUITS ARE IDENTICAL AS SHOWN. FOR ALIGNMENT PROCEDURES REFER TO EXISTING PRACTICES. WHEN F58122 AGC AMPLIFIER IS USED, ALIGN AS SHOWN IN PART 7.
2. BELL SYSTEM GROUND MUST BE CONNECTED TO THE J53050C, L2 INTERCONNECTING UNIT; BELL SYSTEM OR CUSTOMER-PROVIDED BATTERY AND GROUND MUST BE CONNECTED TO THE 24V4C REPEATER SHELF. KS-15620, L22 RECTIFIER MAY BE USED, HOWEVER CONNECTIONS MAY BE MADE TO OTHER BELL SYSTEM BATTERY AND GROUND. WHEN CP POWER IS USED, CONNECT BELL SYSTEM GROUND TO J53050C IU.
3. REFER TO SB-95488-01, SHEET 4 (FIG. 4), AND SHEET 6 (FIG. 56) FOR STRAPPING OF A1,B1,C1, AND D1 LEADS (R,V,W, AND J OPTIONS).

Fig. 13—Connections—PCA C2H (Centrex-CO) Using Signaling Lead Extension Unit J98605AH (MD), 2-Wire Local Channel

TABLE A

CKT NO.	TERMINALS ON J53050C,L2-TS(1)						
	A	B	C	D	E	F	G
0	38	28	52	51	48	58	22
1	37	27			47	57	
2	36	26			46	56	
3	35	25			45	55	

TABLE B

STRAPS ON J53050C, LIST 2					
TS(1)		TS(2)		TS(3)	
FROM	TO	FROM	TO	FROM	TO
54	33	58	28	58	28
44	33	48	38	48	38
34	43	38	57	38	57
24	43	47	37	47	37
11	21	27	17	27	17
21	31	56	46	56	46
31	41	23	42	23	42
		13	52	13	52
		52	22	52	22
		12	51	12	51
		41	31	41	31
		21	11	21	11

TABLE C

CKT NO.	TERMINALS ON TS(E) OF J98605AH(MD)			
	A	B	C	D
1	28	38	48	58
2	27	37	47	57
3	26	36	46	56
4	25	35	45	55

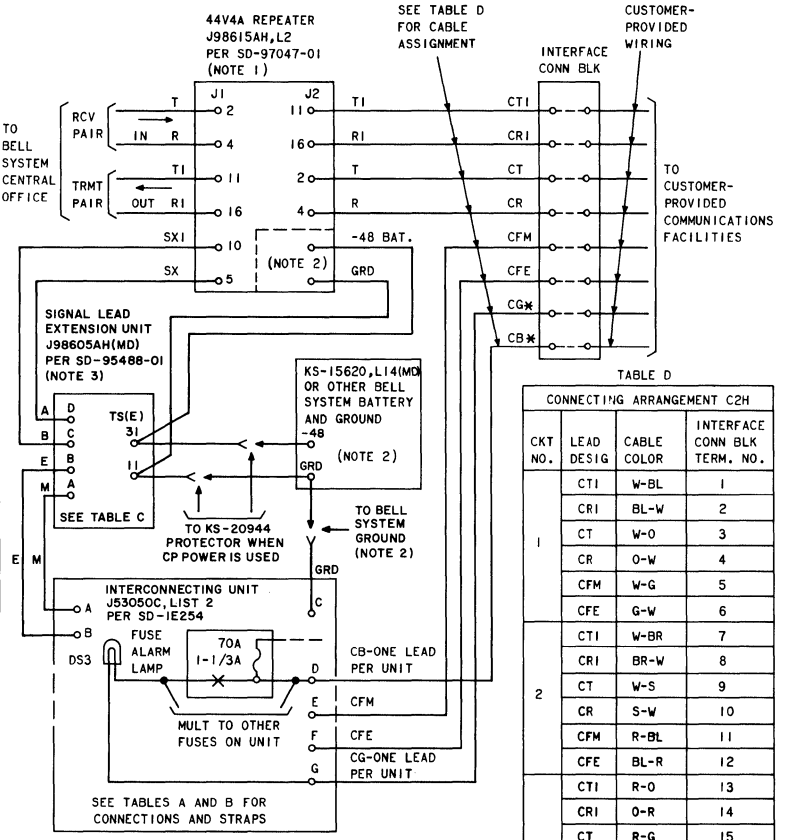


TABLE D

CONNECTING ARRANGEMENT C2H			
CKT NO.	LEAD DESIG	CABLE COLOR	INTERFACE CONN BLK TERM. NO.
1	CTI	W-BL	1
	CRI	BL-W	2
	CT	W-O	3
	CR	O-W	4
	CFM	W-G	5
	CFE	G-W	6
2	CTI	W-BR	7
	CRI	BR-W	8
	CT	W-S	9
	CR	S-W	10
	CFM	R-BL	11
	CFE	BL-R	12
3	CTI	R-O	13
	CRI	O-R	14
	CT	R-G	15
	CR	G-R	16
	CFM	R-BR	17
	CFE	BR-R	18
4	CTI	R-S	19
	CRI	S-R	20
	CT	BK-BL	21
	CR	BL-BK	22
	CFM	BK-O	23
	CFE	O-BK	24
1-4	CG*	BK-G	25
	CB*	G-BK	26

* ONLY ONE CG AND CB LEAD PER FOUR CIRCUITS

NOTES:
1. EACH 44V4A REPEATER SHELF HAS FACILITIES FOR 2 CIRCUITS. SHOWN ARE THE CONNECTIONS FOR 1 CIRCUIT. CONNECTIONS FOR OTHER 3 CIRCUITS ARE IDENTICAL AS SHOWN, EXCEPT FOR BATTERY AND GROUND CONNECTIONS, WHICH ARE EXPLAINED IN NOTE 2. FOR ALIGNMENT PROCEDURES FOLLOW EXISTING PRACTICES AND PART 7.
2. BELL SYSTEM GROUND MUST BE CONNECTED TO THE J53050C, L2 INTERCONNECTING UNIT; BELL SYSTEM OR CUSTOMER-PROVIDED BATTERY AND GROUND MUST BE CONNECTED TO THE 44V4A REPEATER SHELF. KS-15620, L22 RECTIFIER MAY BE USED, HOWEVER CONNECTIONS MAY BE MADE TO OTHER BELL SYSTEM BATTERY AND GROUND. WHEN CP POWER IS USED, CONNECT BELL SYSTEM GROUND TO J53050C IU. VIEWING THE 44V4A REPEATER SHELF FROM THE BACK, CONNECT BATTERY TO THE FIRST STANDOFF ON THE LEFT AND GROUND TO TERMINAL 15 OF J4 LOCATED ON THE LEFT. BATTERY AND GROUND IS FACTORY WIRED TO OTHER CIRCUIT ON THE SAME SHELF.
3. REFER TO SD-95488-01, SHEET 4 (FIG. 4), AND SHEET 6 (FIG. 56) FOR STRAPPING OF AI,BI,CI, AND DI LEADS (R,V,W, AND J OPTIONS).

Fig. 14—Connections—PCA C2H (Centrex-CO) Using Signaling Lead Extension Unit J98605AH (MD), 4-Wire Local Channel

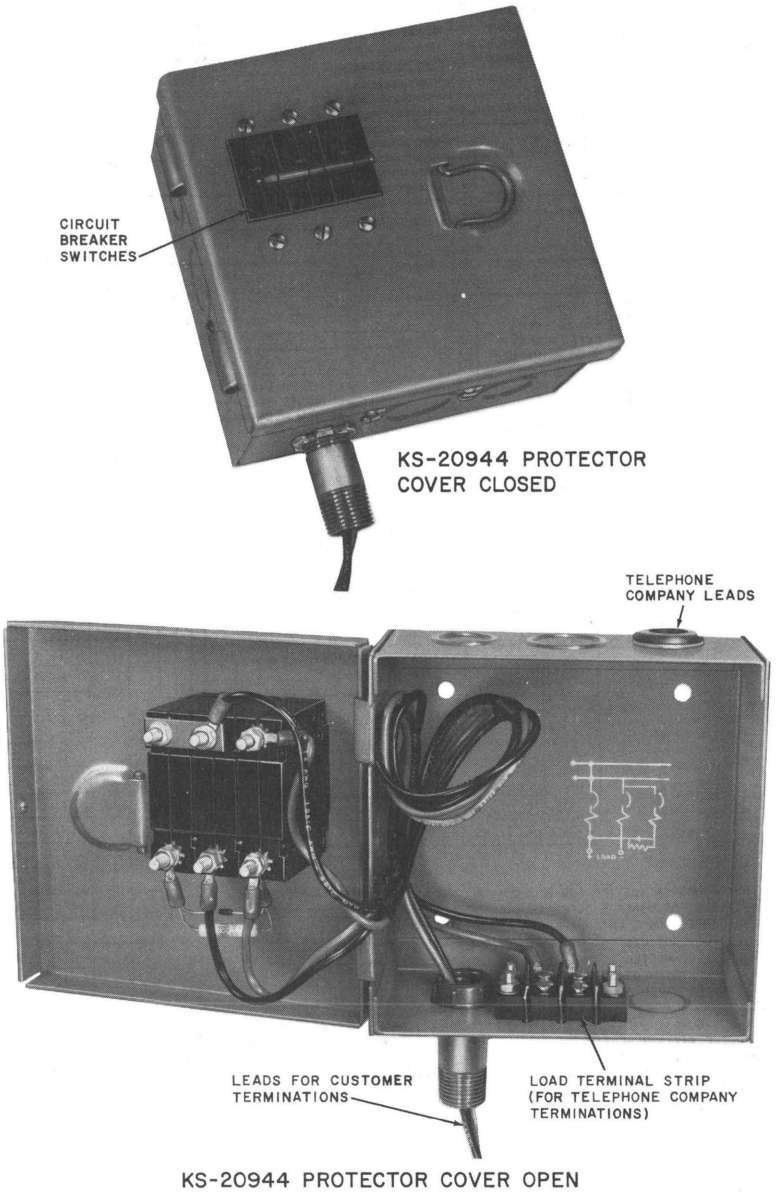
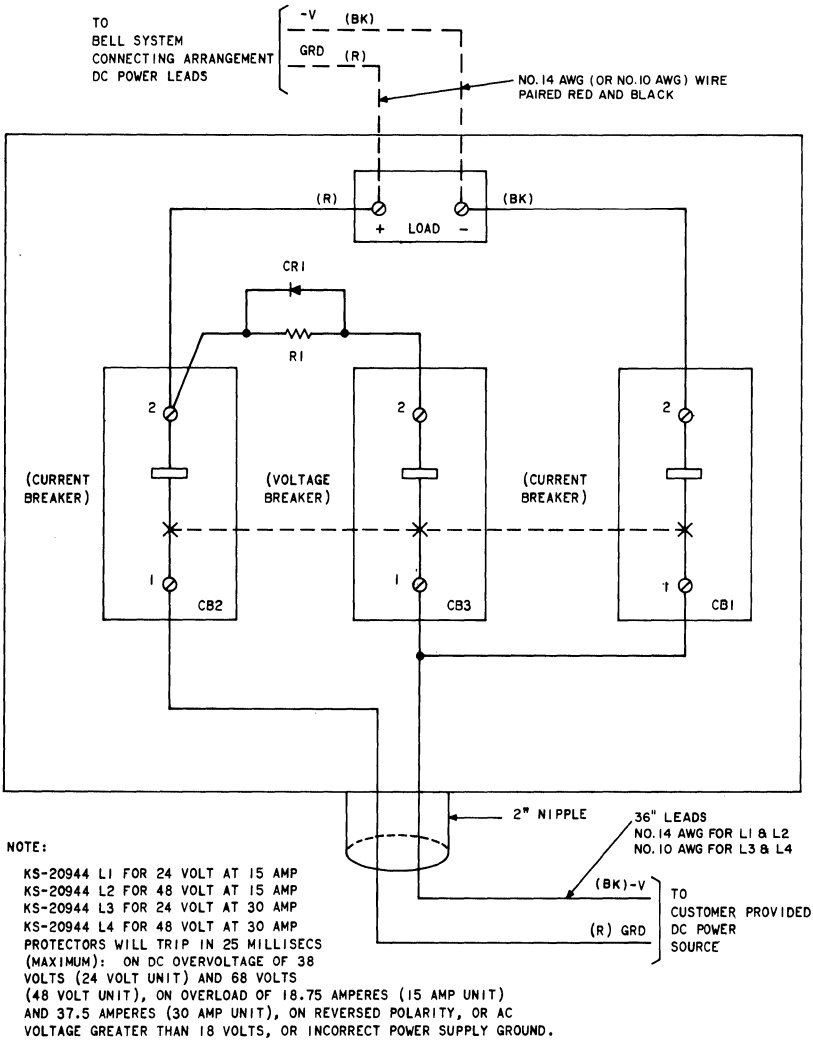


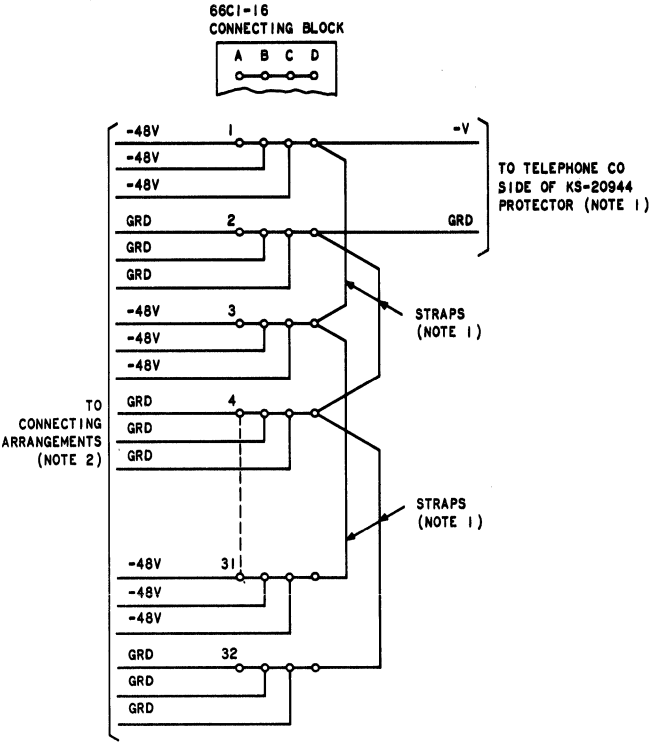
Fig. 15—KS-20944 Protector



NOTE:

KS-20944 L1 FOR 24 VOLT AT 15 AMP
KS-20944 L2 FOR 48 VOLT AT 15 AMP
KS-20944 L3 FOR 24 VOLT AT 30 AMP
KS-20944 L4 FOR 48 VOLT AT 30 AMP
PROTECTORS WILL TRIP IN 25 MILLISECS (MAXIMUM): ON DC OVERVOLTAGE OF 38 VOLTS (24 VOLT UNIT) AND 68 VOLTS (48 VOLT UNIT), ON OVERLOAD OF 18.75 AMPERES (15 AMP UNIT) AND 37.5 AMPERES (30 AMP UNIT), ON REVERSED POLARITY, OR AC VOLTAGE GREATER THAN 18 VOLTS, OR INCORRECT POWER SUPPLY GROUND.

Fig. 16—Schematic—KS-20944 Protector



NOTES:

1. USE 14-GAUGE WIRE TO CONNECT FROM KS-20944 PROTECTOR TO CONNECTING BLOCK; PROVIDE MULTIPLE STRAPS AS DETERMINED BY NUMBER OF CONNECTING ARRANGEMENTS TO BE CONNECTED TO. USE SOLDER TO MAKE THE CONNECTION OF THE 14-GAUGE WIRE AND STRAPS TO THE CONNECTING BLOCK.
2. USE "D" INSIDE WIRE OR EQUIVALENT TO MAKE CONNECTIONS FROM CONNECTING BLOCK TO CONNECTING ARRANGEMENTS. EACH CONNECTING BLOCK PROVIDES MEANS FOR CONNECTING TO 48 CIRCUITS, HOWEVER, DO NOT EXCEED THE MAXIMUM CURRENT RATING OF THE KS-20944 PROTECTOR.

Fig. 17—Typical Power Distribution—Connections Between KS-20944 Protector and PCAs

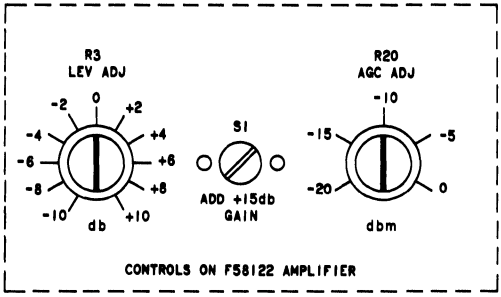


Fig. 18—Adjustment Controls on F58122 Automatic Gain Control Amplifier