MOBILE RADIO

ASSEMBLY, OPERATION & MAINTENANCE

GENERAL ELECTRIC TEST ADAPTOR MODEL 4EX21K10

Maintenance Manual LBI30728

DATAFILE FOLDER DF10008

4EX21K10

GENERAL ELECTRIC

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ILLUSTRATIONS

DESCRIPTION

General Electric GE STAR Test Adaptor, Model 4EX21K10, is used to test digital encoders and decoders used in a GE STAR Digital Communication System. Test Adaptor 4EX21K10 provides interfacing between an encoder and a decoder. A selector switch is provided to select the cable with a connector matching the encoder used. Three cables are available for encoders. Cable W1 is for an encoder used with a PE radio. Cable W2 is for a universal encoder and cable W3 is for an encoder used with a mobile radio. Cable W4 connects to the decoder. Three push button switches initiate an emergency message, PTT and reset. Two Light Emitting Diodes (LED) are provided to monitor the output of the decoder. Connectors are provided for an oscilloscope to observe data burst from the encoder.

OPERATION

To use Test Adaptor 4EX21K10 place selector switch S1 in the OFF position. Connect a 7.5 VDC power supply with a current capability of 150 milliamps between the two connectors labeled 7.5 VDC. Red is positive and Black is ground. The 7.5 VDC is needed only when PE is used. Connect a 13.8 VDC power supply with a current capability of 175 milliamps between the two connectors labeled 13.8 VDC. Connect an oscilloscope between any Red and Black connector labeled DATA. Plug connector P4 of cable W4 into connector J1 on the back of the decoder. Connect the applicable connector to the encoder. When using the Test Adapter, it is necessary to have either a known good encoder or a known good decoder. Switch the selector switch to the applicable position; PE, UNIVERSAL or MOBILE. Press the PTT switch. The decoder should decode and display the encoder identification number. The LED labeled MUTE should light during the data transmission. Press the EMERGENCY switch. The LED labeled EMERGENCY should light. Again, the MUTE indicator should light during data transmission. Press the RESET switch. The EMERGENCY indicator should go out. Disconnect equipment.

ASSEMBLY AND WIRING INSTRUCTIONS

The Assembly and Wiring Instructions in this manual are listed in the proper sequence for assembling the Test Set in a minimum amount of construction time. Following each step in the order listed will help eliminate wiring errors and incorrect assembly procedures.

The first step in the assembly is to collect all of the necessary equipment in a suitable work area. The following equipment is required:

- A 30 to 100-Watt soldering iron or gun.
- A roll of rosin core solder - Important: Do <u>not</u> use acid core solder for this assembly.
- A set of wire cutters (diagonal cutters preferred).

- A knife or other tool for stripping insultation from wires.
- A pair of pliers (long-nosed pliers will also be helpful in attaching wires and component leads to terminals).
- A 5/64-inch Allen wrench.
- A Phillips screwdriver.
- A set of nut drivers would be helpful in assembly of the front panel.

PARTS LIST

The second step is to carefully unpack the kit and check off each part in the space provided on the following Parts List.

PARTS LIST

GE STAR TEST ADAPTOR
4EX21K10 (19A137285G1)

√	SYMBOL	GE PART NO.	DESCRIPTION
			- - - - - - - - - - CAPACITORS - - - - - - - - - -
	C1	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
			- - - - - - - DIODES AND RECTIFIERS - - - - - - - -
	CR1 and CR2	19A134146P1	Diode, optoelectronic: red; sim to Opcoa LSM-3L.
			- - - - - - - JACKS AND RECEPTACLES - - - - - - - -
	J1	19B209152P2	Jack, tip, nylon: red; sim to E.F. Johnson 108-902.
	J2	19B209152P3	Jack, tip, nylon: black; sim to E.F. Johnson 108-903.
	J3	19B209152P2	Jack, tip, nylon: red; sim to E.F. Johnson 108-902.
	J4	19B209152P3	Jack, tip, nylon: black; sim to E.F. Johnson 108-903.
	J5	19B209152P2	Jack, tip, nylon: red; sim to E.F. Johnson 108-902.
	J6	19B209152P3	Jack, tip, nylon: black; sim to E.F. Johnson 108-903.
	J7	19B209152P2	Jack, tip, nylon: red; sim to E.F. Johnson 108-902.
	J8	19B209152P3	Jack, tip, nylon: black; sim to E.F. Johnson 108-903.
			- - - - - - - - - - RESISTORS - - - - - - - - - -
	R1	3R77P271K	Composition: 270 ohms ±10%, 1/2 W.
	R2	3R77P181K	Composition: 180 ohms ±10%, 1/2 W.
	R3	3R77P621K	Composition: 620 ohms ±10%, 1/2 W.
	R4	3R77P222K	Composition: 2.2K ohms ±10%, 1/2 W.
	R5	3R77P181K	Composition: 180 ohms ±10%, 1/2 W.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

√	SYMBOL	GE PART NO.	DESCRIPTION
	R6	3R77P621K	Composition: 620 ohms ±10%, 1/2 W.
	R7	3R79P151J	Composition: 150 ohms ±5%, 1/2 W.
	R8 and R9	3R77P102K	Composition: 1K ohms ±10%, 1/2 W.
			- - - - - - - - - - SWITCHES - - - - - - - - - -
	S1	19C307127P2	Rotary: 2 section, 4 pole, 5 position, non-shorting contacts, 2 amps at 28 VDC or 1 amp at 110 VAC; sim to Oak Type "F".
	S2	4033364P1	Push: DPST, 1/2 amp at 115 VAC, normally open; sim to Grayhill 35-1.
	S3 and S4	7481654P1	Pushbutton: single pole, normally open, 1 amp at 115 VAC; sim to Grayhill 30-3.
			- - - - - - - - TERMINAL BOARDS - - - - - - - -
	TB1	7775500P15	Phen: 5 terminals.
	TB2	7775500P11	Phen: 5 terminals.
			- - - - - - - - - - CABLES - - - - - - - - - -
	W1	19B232347G1	5 conductor, approx. 21 inches long.
	W2	19B232348G1	5 conductor, approx. 14 inches long. Includes:
	P2A	19B209505P101	Plug. Includes 19B209505P20 contact.
	P2B	7489183P7	Receptacle: 9 contacts rated at 7.5 amps max; sim to Winchester 9S-LR-H19C.
	W3	19B232349G1	5 conductor, approx. 17 inches long.
	P3A	19B209505P101	Plug. Includes 19B209505P20 contact.
	P3B	19A116779P1	Contact, electrical; sim to Molex 08-50-0404.
	P3C thru P3E	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
	W4	19B232350G1	7 conductor, approx. 41 inches long. Includes:
	P4	19B209336P1	Receptacle: 25 pins; sim to Cinch DB-25S.
		19B209336P5	Hood. (Used with P4).
			- - - - - - - - - MISCELLANEOUS - - - - - - - - -
		19B212634G1	Box.
		19B232341G1	Front plate.
		5491541P312	Spacer threaded. (Located between front plate and box).
		N84P13004C6	Machine screw, phillips: No. 6-32 x 1/4. (Secures front plate to box).
		N404P13C6	Lockwasher, internal tooth: No. 6. (Secures front plate to box).
		7115195P2	Hex nut: No. 15/32-32. (Secures S2-S4).
		N404P11C6	Lockwasher, internal tooth: No. 4. (Quantity 6).
		7115130P11	Lockwasher, internal tooth: sim to Shakeproof 1222-1. (Secures S2-S4).
		5490407P29	Rubber grommet. (Used with W1-W4).
		4029851P8	Clip, loop. (Used with W1-W4).
		N80P9004C6	Machine screw, phillips: No. 4-40 x 1/4. (Secures clip loop).
		7141225P2	Hex nut: No. 4-40. (Secures clip loop).
		N402P5C6	Flatwasher: No. 4. (Secures clip loop).
		19B200785P15	Terminal stud. (Located on TB1).
		NP280440	Nameplate, faceplate.
		19A115431P1	Knob. (Used with S1).

STEP-BY-STEP PROCEDURE

When performing the step-by-step assembly procedure, be sure to read each step all the way through before beginning the work. Where illustrations are indicated, study the figure carefully. After completing each step, check it off in the box provided.

The letter (S) used in the instructions indicates a solder connection. The letters (NS) indicate that the connection is not to be soldered at this time, as another wire or lead is to be added. Where two or more leads are connected to the same terminal, solder all of the leads when indicated by the designation (S-#). The # is the number of leads to be soldered to that terminal. As an example, (S-2) means two leads are to be soldered.

Assembly of TB1 (See Figure 1).

☐ Connect jumper between terminals 3(NS), 4(NS) and 5(NS).

☐ Connect 2.2K resistor (R4) from terminal 1(NS) to terminal 3(NS).

☐ Connect 1 µf capacitor (C1) from 1(NS) to terminal 2(NS).

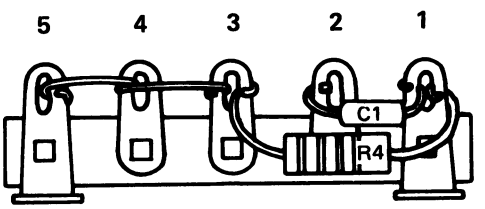


Figure 1 - Assembly of TB1

Assembly of TB2 (See Figure 2).

☐ Connect 1K resistor (R8) from terminal 2(NS) to terminal 4(NS).

☐ Connect 1K resistor (R9) from terminal 4(NS) to terminal 5(NS).

☐ Connect 150 ohm resistor (R7) from terminal 1(NS) to terminal 4(NS).

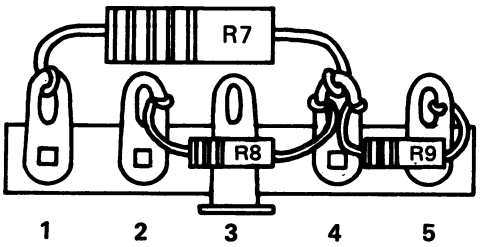


Figure 2 - Assembly of TB2

Selector Switch Assembly (See Figure 3).

☐ Peel protective film off nameplate and align with the backplate.

☐ Install selector S1 with a 3/8-inch nut and lockwasher.

☐ Connect 270 ohm resistor from terminal 4 on S1-A(NS) to terminal 4 on S1-B(NS).

☐ Sleeve and connect 180 ohm resistor from terminal 8 on S1-A(NS) to terminal 2 on S1-B(NS).

☐ Sleeve and connect 180 ohm resistor from terminal 9 on S1-A(NS) to terminal 3 on S1-B(NS).

☐ Connect 620 ohm resistor from terminal 8 on S1-A(NS) to terminal 8 on S1-B(NS).

☐ Connect 620 ohm resistor from terminal 9 on S1-A(NS) to terminal 9 on S1-B(NS).

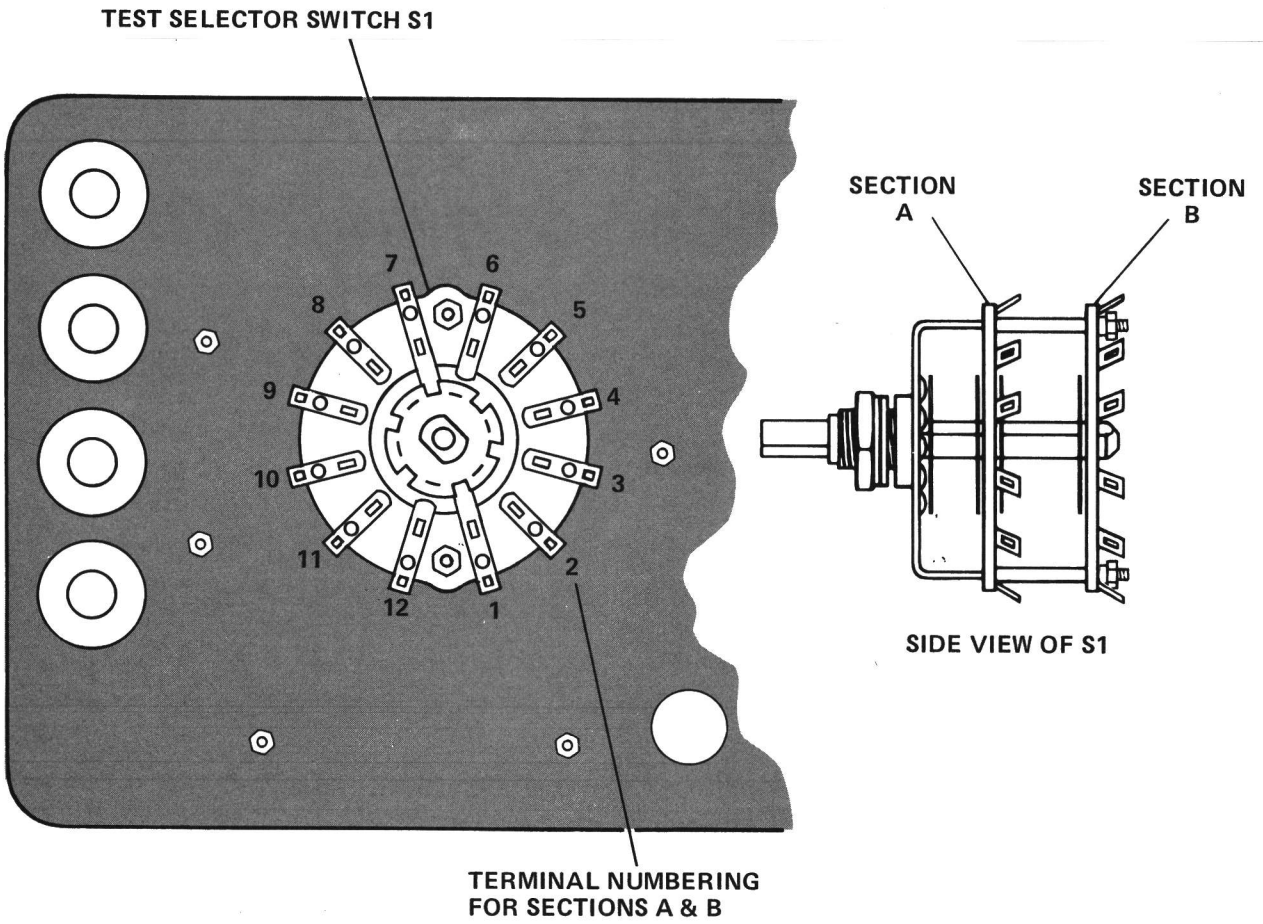


Figure 3 - Selector Switch Assembly

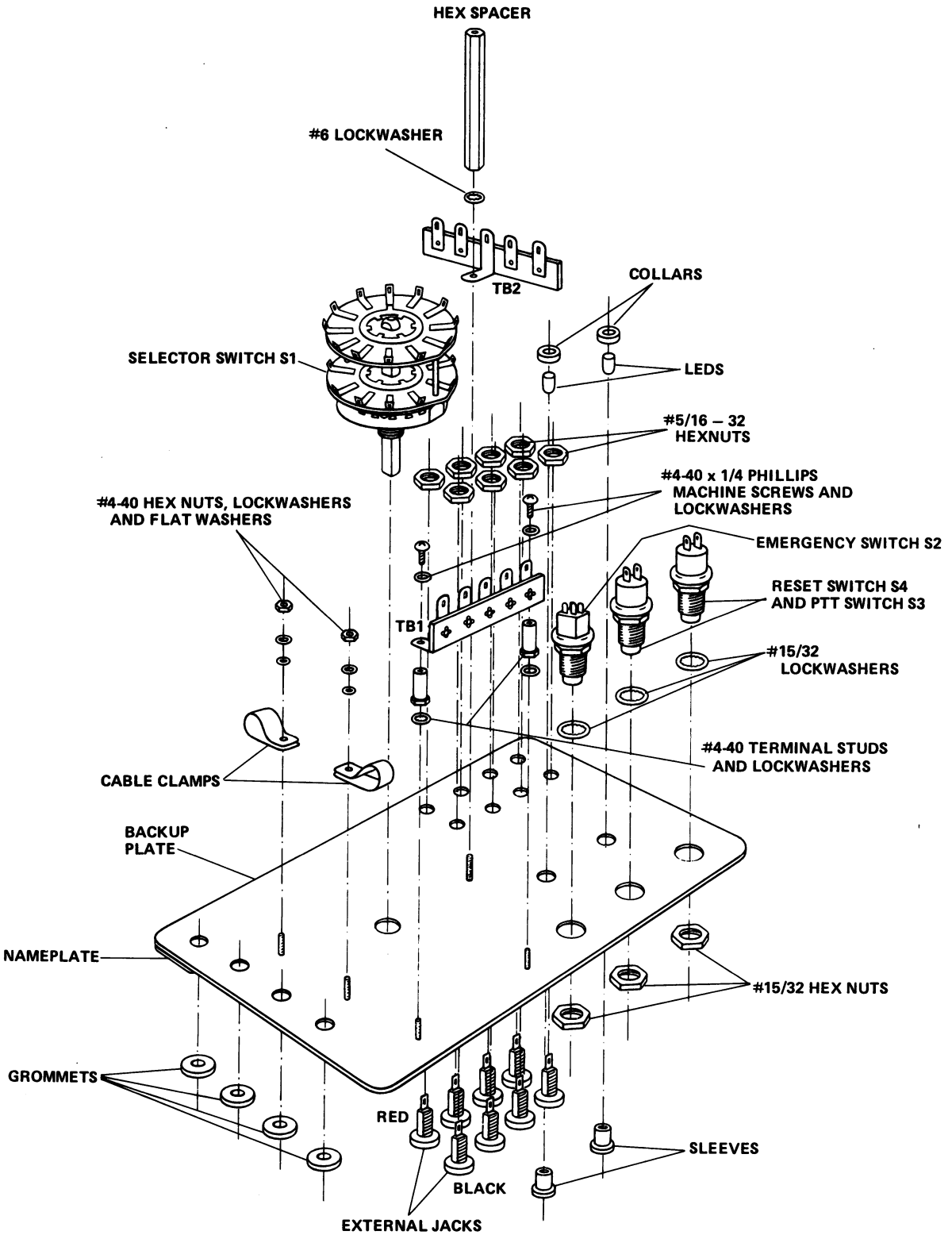


Figure 4 - Front Panel Assembly

Front Panel Assembly (See Figure 4).

☐ Install cables W1, W2, W3 and W4. Use cable clamps to secure.

☐ Install TB1 using standoffs and 4-40 screws and washers.

☐ Install TB2 using hex spacer and 4-40 washer.

☐ Install EMERGENCY switch S2 using 15/32-inch nut and lockwasher.

☐ Install RESET switch S4 using 15/32-inch nut and lockwasher.

☐ Install PTT switch S3 using 15/32-inch nut and lockwasher.

☐ Install red and black VDC and DATA jack using the 15/32-inch nuts supplied.

Install Light Emitting Diode (LED) indicators CR1 and CR2. See Figure 5.

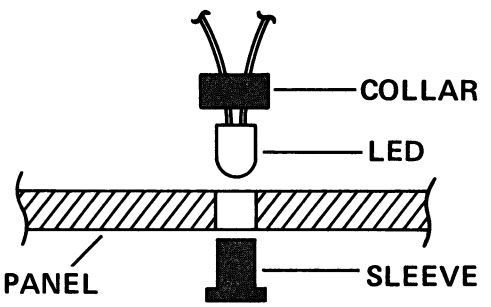


Figure 5 - LED Assembly

Wiring of Panel (See Figure 6).

☐ Using bare hook-up wire, connect all black, VDC and DATA jacks, J2, J4, J6 and J8 together. Solder at J4 and J6.

☐ Using bare hook-up wire, connect the two red DATA jacks, J5 and J7, together. Solder at J5.

☐ Using black hook-up wire, connect a lead from the black 13.8 VDC jack, J2, (S-2) to EMERGENCY switch S2-2A(NS).

☐ Using black hook-up wire, connect a lead from the black DATA jack, J8, (S-2) to TB1-5(NS).

☐ Using red hook-up wire, connect a lead from red 13.8 VDC jack, J1, (S) to S1-A, terminal 12(NS).

☐ Using red hook-up wire, connect a lead from S1-A, terminal 12 (S-2) to TB2-4(NS).

☐ Using red hook-up wire, connect a lead from red 7.5 VDC jack, J3, (S) to S1-A, terminal 6(S).

☐ Using red hook-up wire, connect a lead from red DATA jack J7, (S-2) to S1-B, terminal 12(NS).

☐ Using red hook-up wire, connect a lead from S1-B, terminal 6 (S) to PTT switch S3, terminal 1 (S).

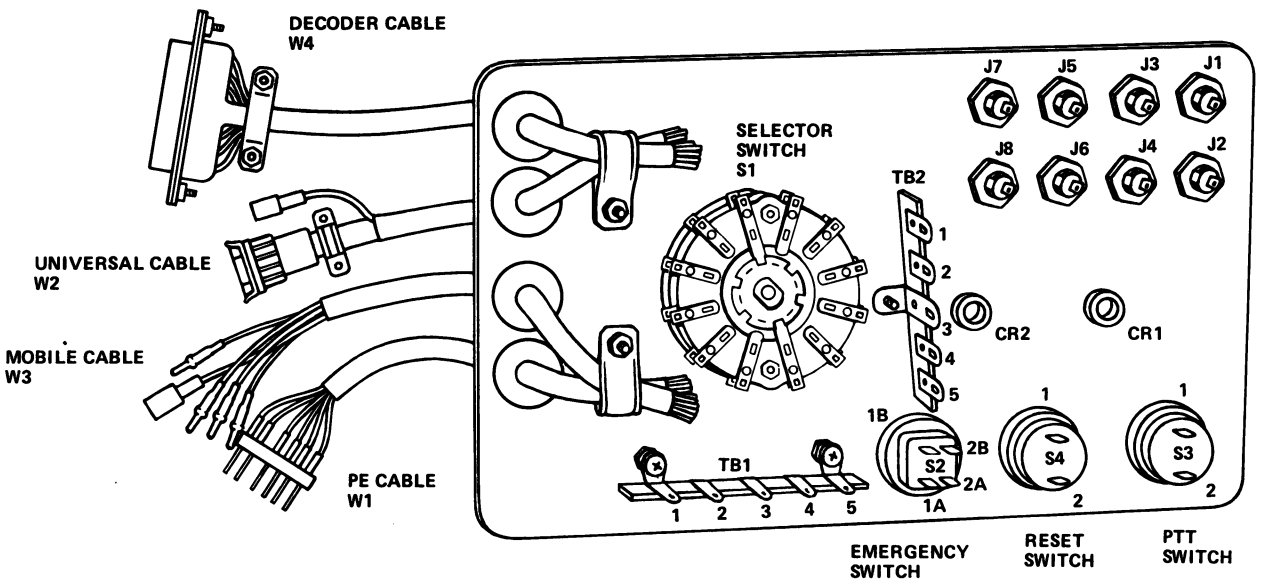


Figure 6 - Front Panel Wiring Guide

☐ Using red hook-up wire, connect a lead from S1-B, terminal 10 (S) to TB1-2(S-2).

☐ Using red hook-up wire, connect a lead from S1-A, terminal 4(NS) to EMERGENCY switch S2, terminal 1B(S).

☐ Using bare hook-up wire, connect a lead, sleeved with yellow sleeving, from EMERGENCY switch S2, terminal 2A(S-2) to PTT switch S3, terminal 2(NS).

☐ Using bare hook-up wire, connect a lead, sleeved with yellow sleeving, from PTT switch S3, terminal 2(S) to RESET switch S4, terminal 2(S-2).

☐ Connect WR wire of cable W4 to RESET switch, terminal 1(S).

☐ Sleeve with yellow sleeving, the cathode lead of LED CR2 and connect the cathode lead to TB2-1(NS). See Figure 7a.

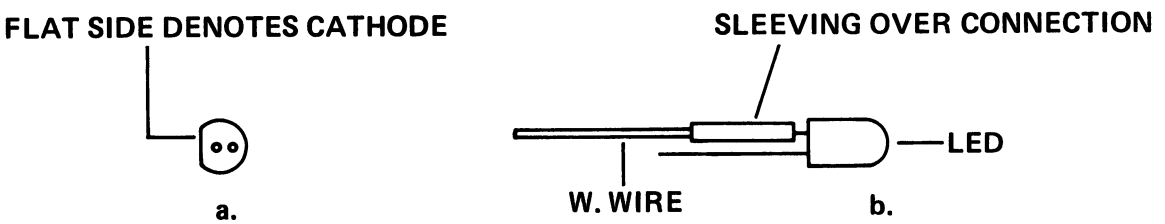


Figure 7 - LED Lead Identification

☐ Connect the anode lead of LED CR2 to TB2-2(S-5).

☐ Sleeve with yellow sleeving, the anode lead of LED CR1 and connect the anode lead to TB2-5(S-3). See Figure 7a.

☐ Place a piece of green sleeving, approximately 3/8-inch long, on the cathode lead of LED CR1. Connect and solder the W wire of cable W4 to the cathode lead of CR1 and slide the green sleeving over the connection. See Figure 7b.

☐ Connect the R wire of cable W1 to S1-A, terminal 4(S-3).

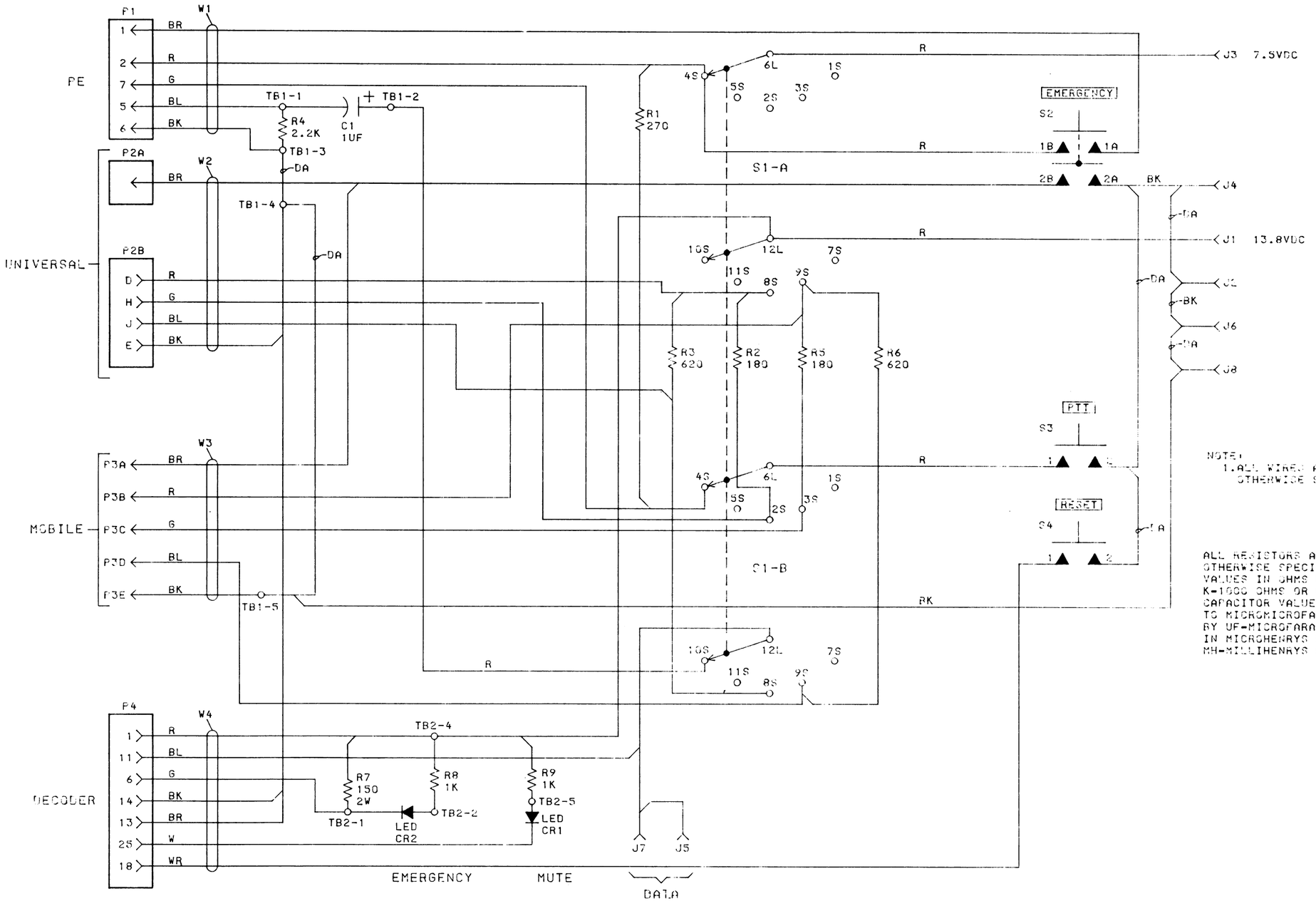
☐ Connect the G wire of cable W1 to S1-B, terminal 4(S-2).

- ☐ Connect the G wire of cable W3 to S1-B, terminal 3(S-2).
- ☐ Connect the G wire of cable W2 to S1-B, terminal 2(S-2).
- ☐ Connect the BL wire of cable W4 to S1-B, terminal 12(S-2).
- ☐ Connect the R wire of cable W3 to S1-A, terminal 9(S-3).
- ☐ Connect the BL wire of cable W3 to S1-B, terminal 9(S-2).
- ☐ Connect the R wire of cable W2 to S1-A, terminal 8(S-3).
- ☐ Connect the BL wire of cable W2 to S1-B, terminal 8(S-2).
- ☐ Connect the BL wire of cable W1 to TB1-1(S-3).
- ☐ Connect the BK wire of cable W1 to TB1-3(NS).
- ☐ Connect the BK wire of cable W3 to TB1-5(S-3).
- ☐ Connect the BK wire of cable W4 to TB1-4(NS).
- ☐ Connect the BK wire of cable W2 to TB1-4(S-4).
- ☐ Connect the BR wire of cable W4 to TB1-3(S-4).
- ☐ Connect the BR wire of cable W1 to EMERGENCY switch S2-1A(S).
- ☐ Connect the BR wire of cable W2 to EMERGENCY switch S2-2B(NS).
- ☐ Connect the BR wire of cable W3 to EMERGENCY switch S2-2B(S-2).
- ☐ Connect the R wire of cable W4 to TB2-4(S-2).
- ☐ Connect the G wire of cable W4 to TB2-1(S-2).

- [ ] Attach selector switch knob. Position the knob so the set screw opposite the white pointer will screw into the flat side of the shaft. Tighten the two screws with a 5/64-inch Allen wrench.

- [ ] Check the test adapter carefully and remove any loose bits of solder or wire clippings. Check the assembled test adaptor against Figures 1 through 7 for any wiring mistakes. Check all solder connections.

- [ ] Attach the back cover.



NOTE:
1. ALL WIRES ARE #22 UNLESS OTHERWISE SPECIFIED.

ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

(19D429134, Sh. 1, Rev. 1)

SCHEMATIC DIAGRAM

MOBILE DATA TEST
SET 4EX21K10