



**for
Manual No.
68P81021C95-O
PORTABLE REPEATER**

This revision outlines changes that have occurred since the printing of the manual or previous revisions. Use this information to supplement your manual. Installation of these changes in earlier equipment is not necessary except as recommended in Motorola Service and Repair Notes (SRN's).

**REVISIONDETAILS
(N/C = no change in suffix)**

<u>NO.</u>	<u>CHANGE AFFECTS</u>	<u>ITEM NO.</u>	<u>SUFFIX</u>
1,4	General Information	---	---
2	Parts List	PCN6010A	N/C
3	Parts List	PCN6010A	---
5	Parts List	PLN6175A	1
6	Parts List	PLN6263A	---
7	Parts List	PLN6167A	---
8	Parts List	PPN6001A	---
9,10,11	General Information	---	---
12	Parts List	PPN6001A	1
13	Parts List	PLN6175A	---
		PLN6263A	---

- NO.**
1 **On page 3-1 SECTION 3 (Theory of Operation), replace 3-2 Primary Power Source with the following:**
3-2 **PRIMARY POWER SOURCE**

The repeater is designed to operate from an external ac line (120 volts or 240 volts) or an external dc source of 13.8 volts. A simplified diagram of the primary power supply is shown in Figure 3-2. For ac operated units, power is applied via a connector on the back of the case. The fused (3 amperes) input line is then connected to a slide switch which selects either 120-or 240-volt operation. The On/Off/Charge switch connects the input power to the power supply circuit in the On or Charge position of the 3-position toggle switch. Protection against ac line surges is provided by varistors which help limit the voltage at the power supply input in excess of 430 volts peak.

The power supply converts the ac input power to a dc output rated at 13.8 volts and 9 amperes. Conversion efficiency is better than 80%. As shown in Figure 3-2, the dc voltage is routed through the power connector and a 15-ampere fuse to provide both a continuous operating voltage for the rf amplifier, and a switched voltage for the balance of the repeater circuits.

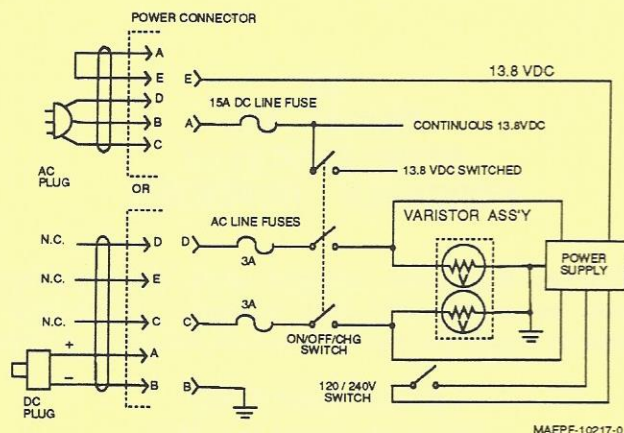
In case of loss of primary power, an 8-volt internal battery provides back-up operating power. In this mode, the Hi-Lo Power switch is inactive and only low power operation is possible. The red battery indicator lights to indicate that the internal battery is being charged. This occurs automatically whenever external power is provided and the On/Off/Charge power switch is in the On or Charge position.

NO.

1

(Cont'd)

On page 3-3 Figure 3-2 Power Supply Simplified Schematic Diagram, replace with the following:



On page 3-3 Figure (Duplexer Simplified Schematic Diagram), change as follows:

- a. TRANSMITTER PORT should read: HIGH FREQUENCY PORT.
- b. REC PORT should read: LOW FREQUENCY PORT.

On page 3-11 Table 3-1 Squelch Controls, replace with the following:

Table 3-1. Squelch Controls

	TYPE SQUELCH			AND		PL		CARRIER	
	PL SWITCH	I-O	E-O	ON	OFF	ON	OFF	ON	OFF
				JU4	JU5	IN	IN	IN	IN
U34-10	OUTPUT			OUT	OUT	IN	IN	IN	IN
U44-8		I-O	E-O	PL					
		0	0	0	0	0	0	0	0
		0	0	0	0	X	0	0	0
		0	0	1	0	0	X	X	X
		0	0	1	1	X	X	X	X
		0	1	0	0	0	0	0	0
		0	1	0	1	0	0	0	0
		0	1	1	0	0	1	1	1
		0	1	1	1	1	1	1	1
		1	--	--	--	0	0	0	0
U35-11	OUTPUT								
		0	0	0	0	1	1	1	1
		0	0	0	1	1	1	1	1
		0	0	1	0	1	0	0	0
		0	0	1	1	0	0	0	0
		0	1	0	0	1	1	1	1
		0	1	0	1	1	1	1	1
		0	1	1	0	1	0	0	0
		0	1	1	1	0	0	0	0
		1	--	--	--	1	1	1	1

- = DON'T CARE
 0 = LOW
 1 = HIGH
 X = NO CHANGE

NO.
1
(Cont'd)

On page 4-2 (Figure 4-2, Cover Removed Showing Circuit Boards), references to Transmitter should be Receiver and references to Receiver should be Transmitter.

On pages 4-7 and 4-9 (NOTE), add the following:
(Measured @ +13.8Vdc power supply out).

On page 4-20 SYMPTOM: Clock Failure, PROCEDURE (2), the second sentence should read: It should approximate a sinewave oscillating between ground and 8 volts.

On pages 5-2, 5-4, 5-8 and 5-10 (Circuit Board Component Layouts), delete references to notes 4 and 5, and add the following notes:

NOTES:

1. HEXAGON SYMBOL INDICATES ATTACHMENT PINS FOR INTERCONNECT FLEXIBLE CIRCUIT. THE "1" PREFIX IDENTIFIES POINTS ON THAT CIRCUIT.

2. CONCENTRIC CIRCLES ON MODULE PINS INDICATE GUIDE PIN.

3. * INDICATES PART MOUNTED ON SOLDER SIDE OF BOARD.

On page 5-3 (Figure 5-2 VHF Receiver Schematic Diagram), add a jumper (JU500 for carrier squelch models only) from pin 4 (U122) to interconnect point I2.

On page 5-9 (Figure 5-8 UHF Receiver Schematic Diagram), add a jumper (JU500 for carrier squelch models only) from pin 4 (U122) to interconnect point I2.

On page 5-5 (Figure 5-4 VHF Receiver Schematic Diagram), jumper JU9 is used for carrier squelch models only.

On page 5-6 (Parts Lists), make the following changes:

- a. HLD4011B Power Amplifier (136-150.8MHz = L)
HLD4012A Power Amplifier (150.8-174MHz = H)

<u>REF SYM.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
C808	changed to	2180171A45	CAPACITOR, Fixed: 30pF±5%;500V (H) 200pF±5%;250V (H only)
C841	changed to	2184366F12	
L814	changed to	2482723H28	COIL: 290mH (L only)
R812	changed to	0600125A32	RESISTOR, Fixed:Ω 200±5%; 1/2W (H)

NO.
1
(Cont'd)

b. PLD6230A VHF P.A. Hardware Kit, change as follows:

1. CR802 to read: Q803
2. Q803 to read : CR801

NO.
1
(Cont'd)

c. Add the following parts lists:

HLD4061A Power Transistor

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
Q801 Q802	4800869860 4884411L03	TRANSISTOR: NPN;Type M9860 NPN;Type M1103

NO.
1
(Cont'd)

HLD4063A Power Transistor

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
Q801 Q802	4800869860 4884411L04	NPN;Type M9860 NPN;Type M1104

d. All references to TLN5240A should be changed to read: PCN6010A.

On page 5-11 (Figure 5-10 UHF Transmitter Schematic Diagram), jumper JU9 is used for carrier squelch models only.

NO.
2
On pages 5-6 and 5-12 (TLN5240A RF Power Control Board), PCN6010A replaces TLN5240A.

NO.
3
On pages 5-6 and 5-12 (PCN6010A RF Power Control Board), make the following changes to the parts list.

<u>REF SYM.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
C12	added	2382783B16	CAPACITOR, Fixed: 2.2 μ F \pm 10%;15V tant. (For location, see component overlay)
R12,101	not used	---	---
R19	added	0600124C31	RESISTOR, Fixed: Ω 180 \pm 10%;1/4W (For location, see component overlay)
RT100	not used	---	THERMISTOR: ---
---	added	8405598K01	NONREFERENCED: Circuit Board

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NO.

4

On page 5-8 (Figure 5-7 Circuit Board Component Layout), delete all feedthrough capacitors.
 On page 5-12, add the following parts list:

PTE6004A Transistor Driver

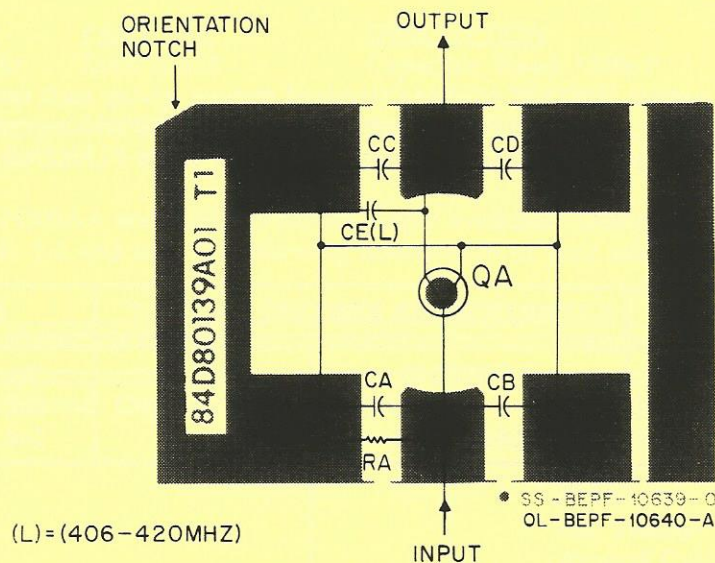
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	0180701T78	Transistor Mode 14W; includes the following: CAPACITOR, Fixed: 30pF±5%; 250V
C810,811	2184366F04	30pF±5%; 50V
C812	2184736E33	TRANSISTOR: NPN; Type M1136 Transistor Mode 50W; includes the following: CAPACITOR, Fixed:
Q803	4884411L36	30pF±5%; 250V
	0180701T77	45pF±5%; 250V
C819 thru 821	2184366F04	TRANSISTOR: NPN; Type M1129
C822	2184366F06	NONREFERENCED: Circuit Board
Q804	4884411L29	
	8480139A01	

NO.

4

(Cont'd)

On page 5-12, replace overlay BEPF-10640 with the following:



QA	CA	CB	CC	CD	RA	CE (L)
Q803	C810	C811	N. U.	C812	R801	NOT USED
Q804	C819	C820	C821	C822	NOT USED	C861

NO.

5 On page 5-14 (PLN6175A Main Control Board (Coded)) parts list, make the following changes:

<u>REF SYM.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
C18	changed to	2182610C05	CAPACITOR, Fixed: 57pF±5%; N150
C19, 37	changed to	2182187B08	220pF±20%; 20V
C21	deleted	---	---
C48	added	2182187B07	470pF±20%; 500V
CR63, 64	added	4883654H01	DIODE: Silicon
CR62	added	4884616A01	Hot Carrier
L1	added	2482549D03	COIL, RF: Unless Stated 1μH
Q14	changed to	4800869643	TRANSISTOR: PNP; Type M9643
R54, 56	deleted	---	RESISTOR, Fixed:Ω ---
R55	changed to	0600124A69	6.8k ±5%; 1/4W
R57	changed to	0600124B22	1.0 Meg. ±5%; 1/4W
---	deleted	4284731H01	Clip, Fuse

NO.

6 On page 5-16(PLN6263A Main Control Board (Clear) parts list), make the following changes:

<u>REF SYM.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
C48	added	2182187B07	CAPACITOR, Fixed: 470pF±10%; 500V (located from pin 6 (U41) to ground)

NO.

7 On page 1-2, option H947AA is now a standard feature, giving each unit the capability of 120 or 240 volt operation. The PLN6167A Power Supply (230V) kit no longer exists as a result. The parts in this kit are listed below and have been added to the PLN6296B Top Panel Kit.

PLN6167A Power Supply (230V)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	0300007196	Scr. Mch.4-40 x 1/8 Slabin
	4084241G03	Stl. (2 reqd.) Sw. Slide Circuit Bd. Mtg.

NO.
8

On page 5-18 PPN6001A Power Supply (120V) parts list, replace with the following:

PPN6001B Power Supply (120/240V)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	0107708A76 0300009669	Varistor Assembly Scr, Mch, 8-32 x 3/8 Slftt. Stl. (4 reqd.)
	1000000515 2505934T01 4210217A02	18 Sol. Tnd. (6 reqd.) Power Supply, 12V Strap Tie .091 x 3.62 Nyl. Wht. (3 reqd.)

NO.
9

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NO.
10

REF SYM.	ACTION	PART NO.	DESCRIPTION
C2	changed to	2383210A24	Capacitor, Fixed: 1000 μ F -10 +150%; 20V
R4	changed to	0600124B61	Resistor, Fixed: 4.7 Ω

NO.
11

Options H305AA and H305AB are no longer available. Delete the reference to these options from Table 1-1 and add the following information to your manual.

TABLE 1-1. PORTABLE REPEATER OPTIONS

OPTION	DESCRIPTION	BAND	ADD	DELETE
H305ACSP	External Duplexer	VHF	PKN6096A RF Cable, Ext. Duplexer PLN1165A Ext. Switch- Around Cable	PKD6030A RF Cable, Repeat PFD6030A Duplexer, VHF
H305ADSP	External Duplexer	UHF	PKN6096A RF Cable, Ext. Duplexer PLN1165A Ext. Switch- Around Cable	PKE6000A RF Cable, Repeat PFE6000A Duplexer, UHF

SPECIFICATIONS

CURRENT RATING	K1	0.5 Amperes, maximum
	K2	0.5 Amperes, maximum
VOLTAGE RATING:	K1	50 Volts, maximum
	K2	50 Volts, maximum
TEMPERATURE RANGE:		-30°C to +60°C

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

DESCRIPTION

1. INTRODUCTION

The H305ACSP and H305ADSP External Duplexer Operations for the Portable Repeater are factory modifications to the standard model that provide two dry contact closures via a four-pin connector mounted on the back panel. The closures can be used to provide control of an external switch-around relay bank. In addition, both options add separate transmit and receive antenna connectors to the back panel.

If an external switch-around relay bank is used, special care must be taken when selecting the relays. The shortest rf path of the switch-around bank must have a minimum isolation at least equal to the duplexer being employed.

2. OPERATION

Operation of an external duplexer will depend on the configuration of the switch-around relay bank. Figure 3-4 in the Portable Repeater Instruction Manual (68P81021C95) illustrates a typical configuration.

The two internal relays (K1 and K2) that provide the contact closures at the back panel are controlled by the frequency select switch, the programming diodes in the XMIT Switch-Around and RCV Switch-Around matrices on the main control board, and the keyed +9V line from the transmitter. Relay K1 is used to control the transmit relays, and relay K2 controls the receive relays in the external relay bank.

THEORY OF OPERATION

1. INTRODUCTION

The following circuit description assumes that the external switch-around relay bank is configured as shown in Figure 3-4 of the Portable Repeater instruction manual. Some modifications may be required if a different setup is employed in the switch-around relay bank.

2. CIRCUIT DESCRIPTION

Refer to Schematic Diagram 63A81040C81.

Both relays (K1 and K2) are used as "dry closures" to activate an external relay unit. Either of the relays can be activated by applying +9Vdc and the corresponding ground. When relay K1 is energized (pins 1 and 2 of J10), the transmitter is switched around the duplexer and the radio can transmit on any frequency. When relay K2 is energized (pins 3 and 4 of J10), the receiver is switched around the duplexer and the radio can receive on any frequency. There is no case when both relays are energized simultaneously.

MAINTENANCE

1. INTRODUCTION

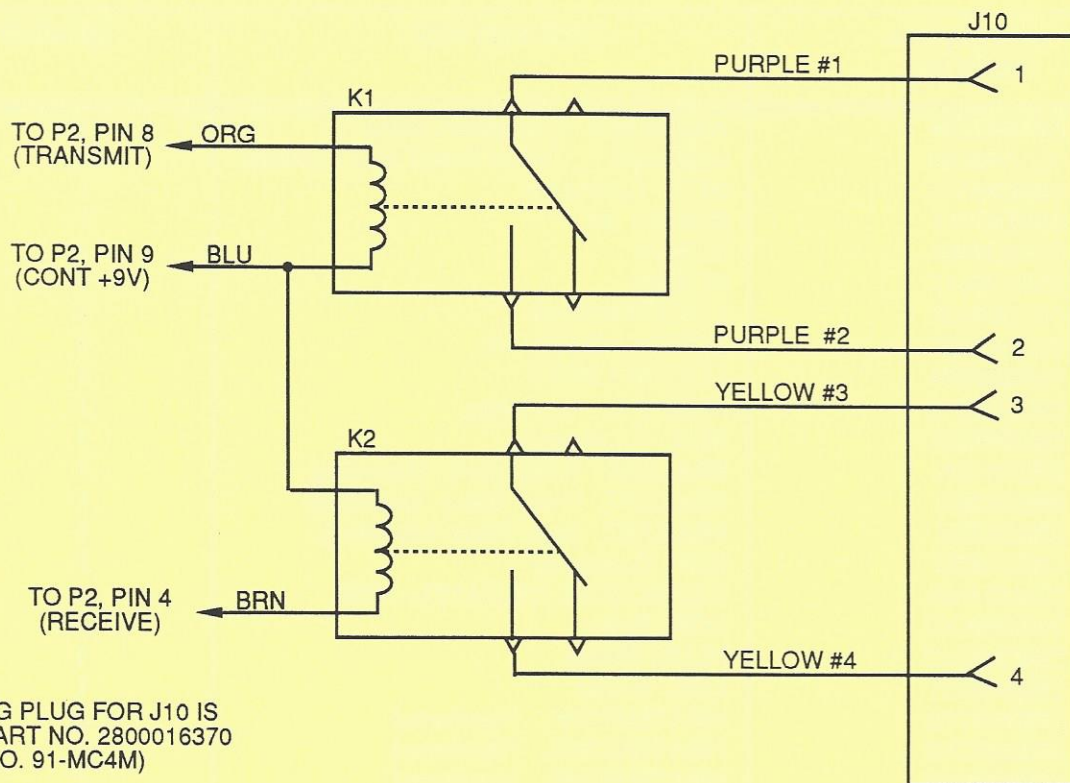
The information contained in this section of the manual supplements the troubleshooting procedures contained in the maintenance section of the Portable Repeater instruction manual (68P81021C95), and is limited to problems associated with the H305ACSP and H305ADSP Options.

2. TROUBLESHOOTING

SYMPTOM: External relay bank not switching
PROCEDURE:

- a. Verify that both K1 and K2 are closing, when +9Vdc and ground are applied.
- b. Make sure that there is no continuity (open circuit) between pins 1 and 2 of J20 or pins 3 and 4 of J10, when no voltage is applied to the relays.
- c. Verify that no more than 50V or 0.5A is applied to either of the two relays.
- d. Check the printed circuit board in back of the four-pin connector (J10) for a short between any of the pins.
- e. Check the external relay bank for proper operation.

SCHEMATIC DIAGRAM



NOTE: MATING PLUG FOR J10 IS
MOTOROLA PART NO. 2800016370
(AMPHENOL NO. 91-MC4M)

MAEPF-40C81-0

PKN6096A RF Cable, Duplexer

MOTOROLA PART NO.	DESCRIPTION	QUANTITY
0500129621	EYELET; .152 x .156	2
0982442E01	RECEPTACLE, Chassis	2
0987318C09	RECEPTACLE, Right Angle	3
1500483599	HOOD, Receptacle	2
1505334J03	CUP, Connector	1
3083794C01	CABLE, Coax; WHT	64"
3700135566	TUBING, 1/4"; BLK	1.5"
3782603D06	SLEEVE, #6	2
3782603D14	SLEEVE, #14	2
3782603D16	SLEEVE, #16	2

PKN1165A External Switch-Around Control

MOTOROLA PART NO.	DESCRIPTION	QUANTITY
TLN4639A	REED ASSEMBLY	2
PLN7037A	SWITCH-AROUND ASSEMBLY	1

PKN7037A Switch-Around Assembly

MOTOROLA PART NO.	DESCRIPTION	QUANTITY
0105951E44	ASSEMBLY, Connector; 4-pin	1
0105959D66	ASSEMBLY, Circuit Board and Chokes	1
0283896G01	NUT, Connector	1
0300007154	SCREW; #8	1
0300136989	SCREW	2
0300139012	SCREW	9
0400002628	LOCKWASHER	2
0400007657	LOCKWASHER; #8	2
0400007699	LOCKWASHER	1
0482418B15	WASHER, Insulating	1
0482870E01	NUT, Captivating	1
0705311J01	BRACKET, Relay Bank Mounting	1
0705312J01	BRACKET, Front Relay Mounting	1
0705313J01	BRACKET, Back Relay Mounting	1
1505334J03	CUP, Connector	1
2184511B01	CAPACITOR; 100 μ F \pm 10%; N750	4
2405349D02	COIL, Relay	2
2882365D02	PLUG Phono	4
2900005321	LUG, Solder	1
3782603D01	HEATSHRINK, Numbered	2
3782603D02	HEATSHRINK, Numbered	2
3782603D03	HEATSHRINK, Numbered	2
3782603D04	HEATSHRINK, Numbered	2
4205338J04	RETAINER; 1/4-Turn	2