

# TMC SPECIFICATION

NO. S 1348

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SHEET

OF

TITLE:

KIT416

DC LOOP MODIFICATION

GPR-110

## NOTE

THE PURPOSE OF THE MODIFICATIONS PROVIDED BY KIT416 IS TO IMPROVE THE STABILITY OF THE DC LOOP CONTROLLING THE HIGH FREQUENCY OSCILLATOR (Z304).

BEFORE PERFORMING ANY MODIFICATIONS IT MUST BE DETERMINED THAT THE RECEIVER IS OPERATIONAL WITHOUT ANY SERIOUS MALFUNCTIONS. THEN AND ONLY THEN WILL THE INSTALLATION OF KIT416 BRING ABOUT DESIRED RESULTS.

# TMC SPECIFICATION

NO. S 1348

REV:																			
COMPILED:	CHECKED:	APPD:	SHEET	1	OF	7													
TITLE:																			

I. EQUIPMENT AFFECTED:

General Purpose Receiver Model GPR-110

II. PURPOSE:

To provide stability of control loop

III. MATERIAL REQUIRED:

Table 1 lists the material supplied with the Kit. Table 2 lists the standard tools necessary to accomplish this modification. (The tools listed in Table 2 are not supplied).

IV. ITEMS TO BE RETURNED:

After the modification has been completed, the following items must be returned to The Technical Materiel Corporation, 700 Fenimore Road, Mamaroneck, New York 10543

1. PC677/A4951 Memory Assembly
2. PC678/A4952 3-12MHz Generator Assembly
3. PC682/A4956 Comparator Assembly
4. PC679/A4953 Phase Detector Assembly
5. PC696/A4971 Single HF Oscillator Assembly
6. PC680/A4954 Multiplier Bandpass Assembly

TABLE 1

<u>Item</u>	<u>Quantity</u>	<u>TMC P/N</u>	<u>Description</u>
1	1	CA1804-3	Cable, Jumper (3 inches long)
2	1	CA1804-2	Cable, Coax (9 inches long)
3	1	CA1804-1	Cable, Jumper (with conn term) (10 inches long)
4	1	CA1804-4	Cable, Jumper (2 inches long)
5	1	PC738/A5633	Memory Assembly
6	1	PC740/A5635	7MHz Generator Assembly
7	1	PC741/A5636	Comparator Assembly
8	1	PC739/A5634	Phase Detector Assembly
9	1	PC737/A5632	HF Oscillator Assembly
10	1	CK2122	Schematic Diagram, Memory
11	1	CK2124	Schematic Diagram, 7MHz Generator
12	1	CK2125	Schematic Diagram, Comparator
13	1	CK2123	Schematic Diagram, Phase Detector
14	1	CK2102	Schematic Diagram, HF Oscillator
15	1	A5633	Assembly Drawing, Memory
16	1	A5635	Assembly Drawing, 7MHz Generator
17	1	A5636	Assembly Drawing, Comparator
18	1	A5634	Assembly Drawing, Phase Detector
19	1	A5632	Assembly Drawing, HF Oscillator

REV:																			
COMPILED:		CHECKED:		APPD:		SHEET	2	OF	7										
TITLE:																			

TABLE 2

1. Screwdrivers, phillips, assorted
2. Soldering iron and solder
3. Knife
4. Pliers, diagonal cutting
5. Pliers, longnose
6. Jumper, clip lead

V. PROCEDURE:A. Preparation

1. Refer to Service Manual for General Purpose Receiver Model GPR-110.
2. Remove receiver from rack or enclosure and remove top cover, right side plate, and HF oscillator cover (save all hardware).

B. Z302 Single Oscillator Replacement

1. Unsolder all wires connected to Single HF Oscillator Assembly (PC696/A4971).
2. Remove the two mounting screws holding the oscillator assembly (save all hardware) and remove the oscillator assembly from the receiver.
3. Unsolder and remove the 10 MHy choke from E1 (error control line). This line is no longer used.
4. Install the new single oscillator assembly (PC737/A5632) using the hardware previously removed. Oscillator assembly is mounted with XTAL toward front of unit.
5. Connect and solder B+ coil (1 MHy) to E1.
6. Connect and solder coax from Mixer IF Output (Z305) to E3. Connect shield to E5 (ground). Do not solder.
7. Connect and solder coax line from Sample IF Mixer (Z303) to E4. Connect shield to E5 (ground). Solder both shields to E5 (ground).

NOTE

All oscillator assembly boards are factory tested and adjusted. Steps 8 thru 13 are performed in order to insure that the modification has been performed correctly and also to ideally match each oscillator to the unit in which it is installed.

8. Connect receiver to power source.
9. Set AC power switch to ON.
10. Depress WIDE pushbutton.
11. Monitor E3 of oscillator assembly with RF voltmeter and adjust C5, C7, and C11 trimmers on the oscillator assembly for a maximum indication on meter (approx. 400 millivolts

REV: \_\_\_\_\_

COMPILED: \_\_\_\_\_

CHECKED: \_\_\_\_\_

APPD: \_\_\_\_\_

SHEET 3 OF 7

TITLE: \_\_\_\_\_

12. Depress STBY pushbutton.
13. Set AC power switch to OFF and remove RF voltmeter and power source from unit.

The Single Oscillator replacement is now completed.

C. Digital Mother Board Modification

1. Remove the following assemblies from unit.
  - a. Z102, PC681/A4955 Counter Assembly
  - b. Z103, PC684/A4958 MHz Display/Divider Assembly
  - c. Z104, PC682/A4956 Comparator Assembly
  - d. Z105, PC677/A4951 Memory Assembly
  - e. Z106, PC678/A4952 3-12MHz Generator Assembly
  - f. Z107, PC679/A4953 Sample Divider/Phase Detector Assy
  - g. Z108, PC680/A4954 Multiplier Bandpass Assembly
2. Remove coax jumpers as shown in Figure 1A.
3. Add jumpers (items 1 and 2) as shown in Figure 1B.

The mother board modification is now complete.

D. Z102 Counter Assembly PC681/A4955

1. On Z102 assembly solder item 3 (wire end) to pin 8 of Z14 (74L90).
2. Insert the "modified" counter assembly into Z102 slot. Place the free end of item 3 close to the mother board, as it will be used later.

NOTE

Care should be taken any time board is removed so that wire is not broken.

E. Z103 MHz Display/Divider Assembly PC684/A4958

1. On Z103 assembly open land going from Z2 (74L73) pin 13, to pin 5 of output connector finger (about one half inch from pin 5).
2. Add jumper item 4 from Z5 (74L90) pin 8, to pin 5 of output connector finger (on board).
3. Extend the "modified" MHz Display/Divider Assembly into Z103 slot and ground terminal P, using a clip lead jumper.

F. Z104 Comparator Assembly PC741/A5636

1. Insert new comparator assembly PC741/A5636, into Z104 slot.
2. Plug the end of item 3 into pin mounted on new comparator bd.

NOTE

Care should be taken any time board is removed so that wire is not broken.

# TMC SPECIFICATION

NO. S 1348

REV:

COMPILED:

CHECKED:

APPD:

SHEET 4 OF 7

TITLE:

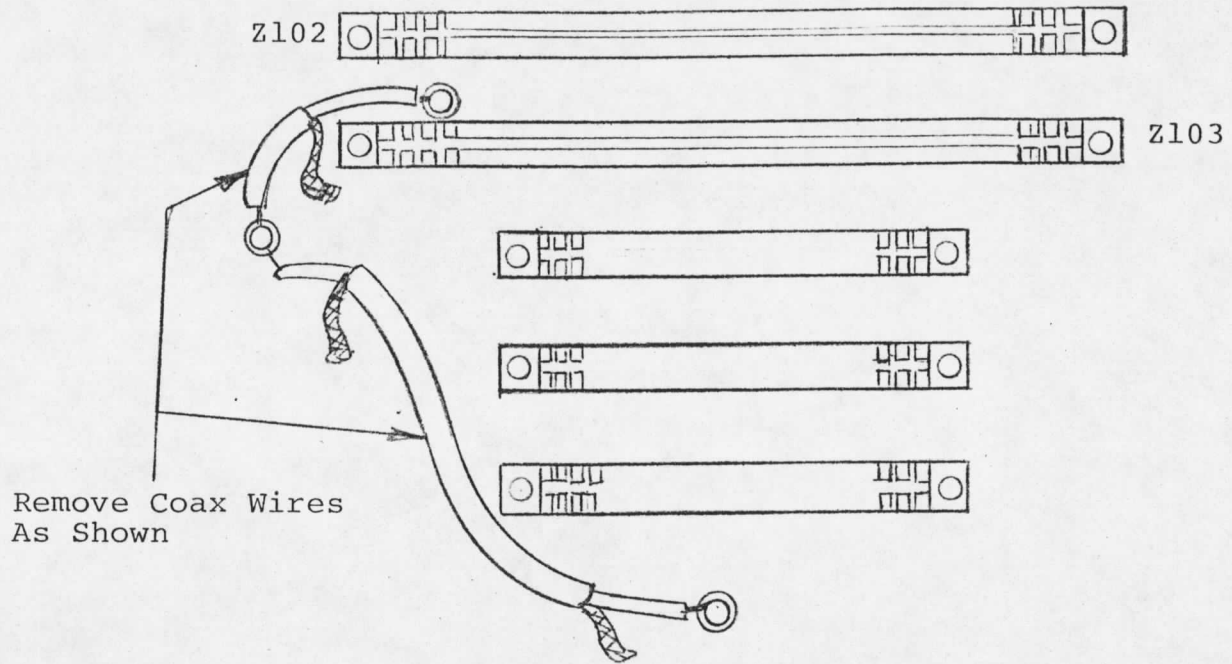


Figure 1A

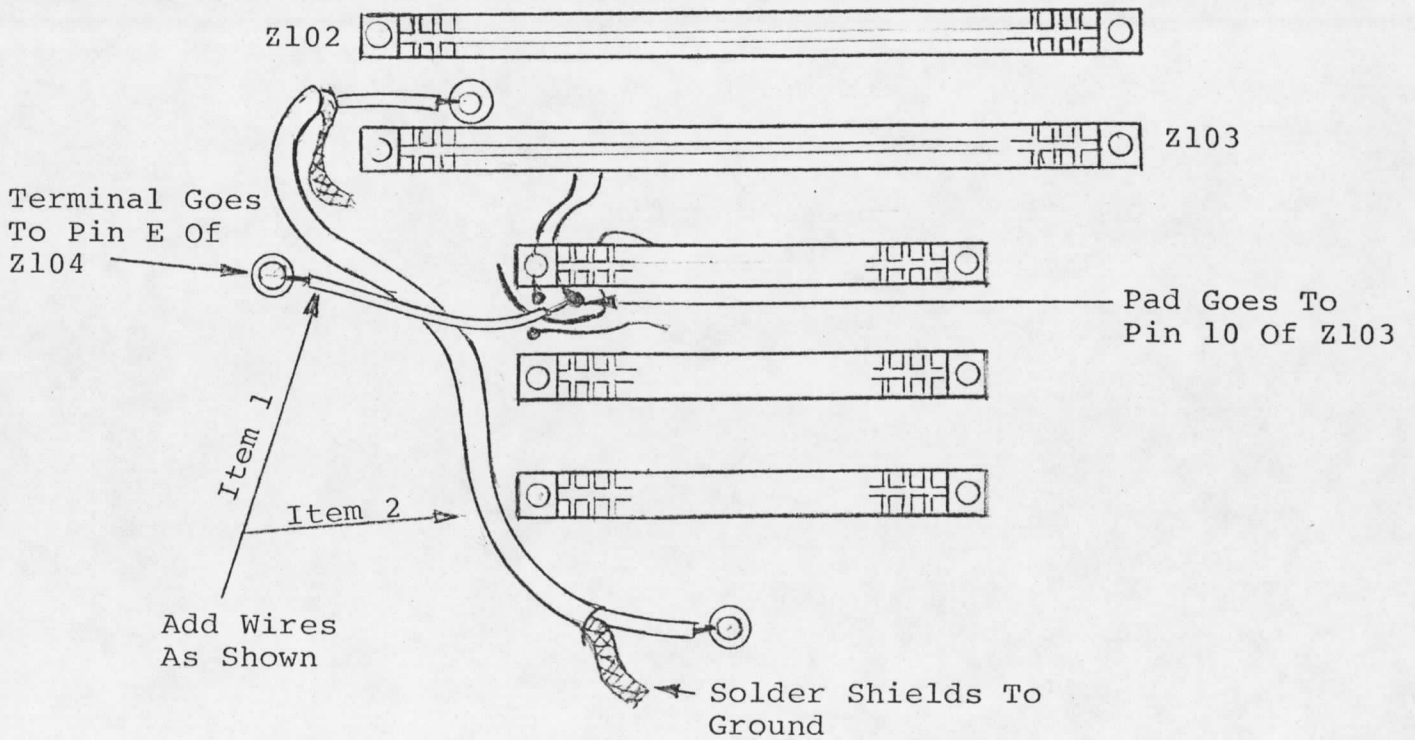


Figure 1B

# TMC SPECIFICATION

NO. S 1348

REV:

COMPILED:

CHECKED:

APPD:

SHEET

5

OF

7

TITLE:

## G. Z106 7MHz Generator Assembly PC740/A5635

1. Insert new 7MHz assembly PC740/A5635 into Z106 slot.

## H. Z105 Memory Assembly PC738/A5633

1. Extend new Memory Assembly PC738/A5633 into Z105 slot.
2. Monitor terminal 10 of Z105 with a dc voltmeter.
3. Connect receiver to power source.
4. Set AC power to ON.
5. Depress WIDE pushbutton.
6. Adjust R24 (variable pot on Z105 assembly) for a level of +3.5 vdc at terminal 10 of Z105.
7. Depress STBY pushbutton.
8. Remove ground connection from terminal P of Z103.
9. Remove MHz display assembly and extender card from unit, and insert MHz display assembly into Z103.

## I. Z107 Sample Divider Assembly PC739/A5634

1. Extend new Sample Divider Assembly PC739/A5634 into Z107 slot.
2. Monitor terminal 3 of Z107 with a frequency counter.

### NOTE

Continue to monitor terminal 10 of Z105 with the DC voltmeter.

3. Depress the WIDE pushbutton.
4. Set the MHz control to 00 MHz and observe the following:
  - a. Frequency at terminal 3 of Z107 must be 333,333 Hz.
  - b. Voltage at terminal 10 of Z105 should be approximately +4 vdc.
  - c. If voltage at terminal 10 of Z105 is greater than +4 vdc, adjust L3 in Z304 (Dual Oscillator Assembly) for an increase in frequency which will result in a lower DC sync voltage at terminal 10 of Z105.
  - d. If the voltage at terminal 10 of Z105 is less than +4 vdc, adjust L3 in Z304 (Dual Oscillator Assembly) for a decrease in frequency which will result in a higher DC sync voltage at terminal 10 of Z105.

### NOTE

If adjustment of L3 does not bring about the desired results, it may be necessary to physically adjust the windings on L3 either closer or further apart as the case may be.

5. Set the MHz switch to 12 MHz and observe the following:
  - a. Frequency at terminal 3 of Z107 must be 333,333 Hz.
  - b. Voltage at terminal 10 of Z105 should be approximately +20 vdc.

REV:

COMPILED:

CHECKED:

APPD:

SHEET 6 OF 7

TITLE:

NOTE

There may be a wide variation of voltage metered at this point due to different curves of each oscillator. The main thing to keep in mind is that the tuning range from 00 MHz to 12 MHz is set for reliable operation. In practice, this range has been between +4 vdc and +20 vdc.

6. Set the MHz switch to 13 MHz and repeat steps I.4.a. through I.4.d. The only exception to the above steps is that if any adjustment is necessary, L6 in Z304 is the proper coil to adjust.
7. Set the MHz switch to 29 MHz and repeat steps I.5.a. and I.5.b.
8. Remove the dc voltmeter from terminal 10 of Z105. Set the MHz switch to 00 MHz and observe a frequency of 333,333 Hz at terminal 3 of Z107.
9. Step the MHz switch one (1) position at a time, each time observing 333,333 Hz at terminal 3 of Z107.
10. In dealing with a closed loop system, many factors will affect the overall operation. The following check list may be helpful if any trouble is encountered. Care must be taken in performing any of these changes as system operation will be affected.
  - a. If frequencies do not sync on the high end of the band, check the following:
    1. Dual oscillator (Z304) frequency is set too low causing the memory to provide a voltage much greater than +20 vdc. To correct on low band (00 MHz to 12 MHz), set the MHz switch to 12 MHz and adjust L3 in the dual oscillator assembly Z304 for a higher frequency. To correct on high band (13 MHz to 29 MHz), set the MHz switch to 29 MHz and adjust L6 in the dual oscillator assembly Z304 for a higher frequency.
    2. Memory preset voltage is too high. To correct, refer to section H and adjust R24 on memory assembly (Z105) for a lower dc level. Do not set below +3 vdc.
    3. Output of Single HF Oscillator (Z302) is too low, causing the output of Sample IF Mixer (Z303) to be too low. To correct, lower value of R12 on single oscillator assembly (Z302). Output of Dual HF Oscillator (Z304) will also affect the output of the Sample IF Mixer.

# TMC SPECIFICATION

NO. S 1348

REV:

COMPILED:

CHECKED:

APPD:

SHEET 7 OF 7

TITLE:

- b. If frequencies do not sync on the low end of the band, check the following:
1. Dual oscillator (Z304) frequency is set too low causing the memory (Z105) to provide a voltage much lower than +3 vdc. To correct on low band (00 MHz to 12 MHz), set the MHz switch to 00 MHz and adjust L3 in the dual oscillator assembly (Z304) for a lower frequency. To correct on high band (13 MHz to 29 MHz), set the MHz switch to 13 MHz and adjust L6 in the dual oscillator assembly (Z304) for a lower frequency.
  2. Memory preset voltage is too low. To correct, refer to section H and adjust R24 on the memory assembly (Z105) for a higher dc level, approximately +4 vdc.
  3. Output of Single HF Oscillator (Z302) is too high, causing the output of the Sample IF Mixer to be too high. This results in a distortion of the signal output. A tuning error may occur. To correct, increase value of R12 on Single Oscillator Assembly. Output of Dual HF Oscillator will also affect the Sample IF Mixer

This completes the final loop modification.

## J. Final Check-out

1. Depress the STBY pushbutton, remove Z105 and Z107 assemblies and their extenders from the unit and install Z105 and Z107 assemblies into their proper slot in the unit.
2. Z108 slot is left vacant. No card is necessary.
3. Retune Difference Amplifier Assembly Z306 (refer to GPR-110 service manual).
4. Replace covers, and side plate and re-install unit.