

ADDENDUM: GLB MODEL 400B CHANNELIZER

IMPORTANT: READ THIS BEFORE PROCEEDING WITH CONSTRUCTION

The most frequent problems with kits returned to the factory for repair are: POOR SOLDERING & FAILURE TO READ AND FOLLOW INSTRUCTIONS.

Most kit builders do not use enough heat on the sockets and the large ground traces of the boards.

SOLDERING:

We recommend a 40 watt iron with a 1/8 inch screwdriver tip. Use a good grade of Rosin core solder such as "Kester 44" or Ersin "Multicore". Use 1/32 inch diameter solder.

CHANGE PARTS LIST AS FOLLOWS:

Transistors: ~~2~~N3904 (9)
Add: 2N3903 or Red coded 2N3904 (6)
Resistors: ~~10~~K (19)
~~47~~K (5)
~~1.8~~K (0)
~~2.2~~K (4)

~~Page 1, step 3: Install 2N3903 Or red coded transistors in the following places- Q13, Q14, Q15 & Q16.~~

~~Page 2, step 15. R2, the 220 ohm resistor mounts horizontally.~~

~~R9 & R8 change to 2.2K.~~

~~Page 5, step 5: Install 2N3903 or red coded transistors in the following places- Q9 & Q10.~~

~~Page 5, step 7 - R41 & R42, change to 10K.~~

~~Page 6, step 11 - C33 should be .05 uf ceramic.~~

Change schematic and instructions.

When a 74H00 is included with the kit, it is used at Z11 on VCO.

Interfacing to your rig:

Before interfacing the Channelizer to your rig, check the transmit and receive injection at one of the test points or at one of the multiplier stages with the rig operating on crystals. With the Channelizer connected, the drive levels should be adjusted for the same injection levels as with crystals. Some adjustment of the interface components may be required.

IMPORTANT! BEFORE PROCEEDING READ THIS!

Check the parts against the parts list before doing anything else! If there are any shortages notify GLB immediately. Be sure you have checked every package and envelope before reporting a shortage. If a part appears damaged or otherwise defective send it back immediately for replacement.

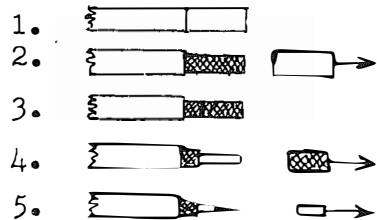
Checking the parts will also help you to familiarize yourself with them. From time to time reasonable substitutions may be made for the parts specified. Such differences are usually obvious and shouldn't present any difficulties. If you have trouble identifying a part it may become clear by the process of elimination when you are finished. Check off each part in the spaces provided on the parts list.

It can't be overemphasized that you follow the step-by-step instructions implicitly. The sequence of steps is designed to facilitate construction and to maximize the chances of "first-time" operational success.

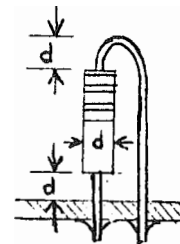
When the instructions call for soldering a part in place on a printed circuit board it is to be assumed that any excess lead length on the trace side of the board should be clipped off. Leave a stub of about 1/10 inch below the board when clipping the leads.

TEFLON COAX costs more, but it is easier to strip! Follow these simple steps:

1. Score outer jacket with knife.
2. Pull off outer jacket.
3. Tin braid and score with a knife.
4. Bend braid back and forth. It will break off and you can pull it off.
5. Score center conductor insulation and strip. Don't nick the conductor.

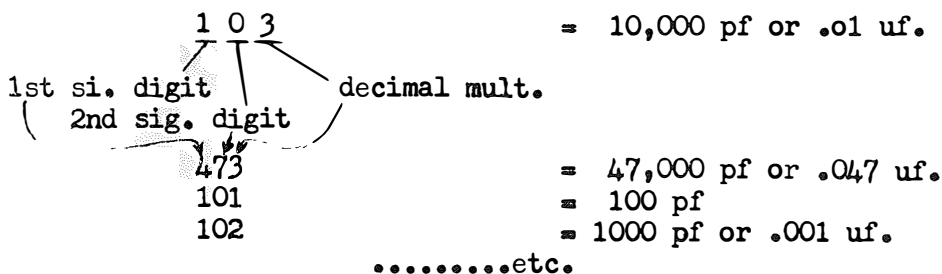


The sketch at the right shows how to mount vertically-oriented parts. Be sure to leave a little air space under the part and don't bend the lead too sharply at the top.



All ceramic and mylar capacitors should be mounted with the shortest possible leads, and the capacitor body against the top of the board as closely as possible.

Capacitors are identified in several ways. Some are marked with the value printed in uf, others in uuf, and still others are coded as follows:



MODEL 400B PARTS CHECK LIST

RESISTORS:

| Value | Qty |
|-----------------------------|-----------|
| 7.5 ohm 3 watt <i>1421</i> | 1 (✓) |
| 100 ohm <i>Br Br</i> | 2 (✓) |
| 180 ohm 1 watt <i>Br br</i> | 1 (✓) |
| 220 <i>Red Br</i> | 2 (✓) |
| 390 <i>Or Br</i> | 1 (✓) |
| 470 <i>Y V</i> | 2 (✓) |
| 680 <i>Br Br</i> | 2 (✓) |
| 1000 <i>Br Br</i> | 12 (✓) |
| 1.5K <i>Br Br</i> | 1 (✓) |
| 1.8K | 2 (✓) |
| 2.2K <i>Red Red</i> | 1 (✓) |
| 3.3K <i>Or Or</i> | 1 (✓) |
| 3.9K <i>Or Wh</i> | 1 (✓) |
| 4.7K <i>Y V</i> | 5 (✓) |
| 10K <i>Br Br</i> | 19-17 (✓) |
| 47K <i>Y V</i> | 5-7 (✓) |

CAPACITORS:

| | |
|-------------------|--------|
| 39 pf N1500 | 3 (✓) |
| 50 pf N5600 | 2 (✓) |
| 100 pf | 3 (✓) |
| 150 pf | 3 (✓) |
| 150 pf N750 | 2 (✓) |
| 180 pf | 1 (✓) |
| 470 pf | 3 (✓) |
| 1000 pf (.001 uf) | 19 (✓) |
| 33 pf | 1 (✓) |
| .1 mylar | 1 (✓) |
| 2.2 uf tantalum | 1 (✓) |
| .01 uf | 5 (✓) |
| .047 or .05 uf | 7 (✓) |
| 1 uf tantalum | 1 (✓) |
| 22 uf tantalum | 1 (✓) |
| 22 uf aluminum | 4 (✓) |
| 500 uf aluminum | 1 (✓) |
| Trimmer cap. 3-30 | 1 (✓) |
| Feedthru caps. | 2 (✓) |

DIODES:

| | |
|----------------------|--------|
| small signal | 25 (✓) |
| 1N753A zener (6.2 V) | 1 (✓) |
| MV2209 varactor | 1 (✓) |

TRANSISTORS:

| | |
|-------------------------|----------|
| 2N3904 <i>2N3904 36</i> | 9-15 (✓) |
| 2N5296 | 1 (✓) |
| MPF 122 or FT0601 | 1 (✓) |

INTEGRATED CIRCUITS:

| | |
|---------------|-------|
| 8281 or 74177 | 3 (✓) |
| 8280 or 74176 | 3 (✓) |
| 7473 | 2 (✓) |
| 74H00 or 7400 | 2 (✓) |
| 4044 | 1 (✓) |

COILS:

| | |
|-------------------------------|-------|
| Slug-tuned (+ slugs) | 3 (✓) |
| 3.3 uh molded <i>DR 00000</i> | 2 (✓) |
| 47 uh molded <i>Y V</i> | 1 (✓) |

SWITCHES:

| | |
|--------------------------|-------|
| 4-position rotary | 2 (✓) |
| BCD (10 position rotary) | 4 (✓) |
| toggle, SPDT | 2 (✓) |

HARDWARE:

| | |
|--------------------|--------|
| 3/8" nuts | 6 (✓) |
| 3/8" lockwashers | 6 (✓) |
| 3/8" spacers, 4-40 | 6 (✓) |
| #4-40 screws | 13 (✓) |
| #4 lockwashers | 13 (✓) |
| #4-40 nuts | 1 (✓) |
| #6-32 screws | 4 (✓) |
| Rubber feet | 4 (✓) |
| Main chassis | 1 (✓) |
| Cover (black) | 1 (✓) |
| VCO cover | 1 (✓) |

CRYSTALS:

| | |
|-----------------|-------|
| Frequency | Qty |
| 25.000 mhz | 1 (✓) |
| Offset (custom) | 1 (✓) |

CIRCUIT BOARDS:

| | |
|------|-------|
| Main | 1 (✓) |
| VCO | 1 (✓) |

WIRE & CABLE:

| | |
|------------------|---------|
| Coaxial RG 178/U | 13" () |
| Hook-up: | |
| Brown or Black | 37" () |
| Red or Orange | 44" () |
| Yellow or Green | 28" () |
| White or Gray | 70" () |

MISCELLANEOUS:

| | |
|--------------------------------|--------|
| Knobs | 6 (✓) |
| Heat sink strip | 1 (✓) |
| IC sockets | 11 (✓) |
| Phono jacks | 2 (✓) |
| Terminal strip | 1 (✓) |
| Rear panel label | 1 (✓) |
| Instruction & Assembly booklet | 1 () |
| IC pins-strip of 3 | () |

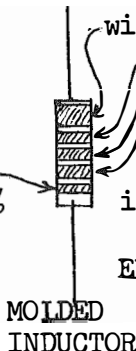
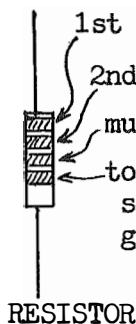
OUTPUT FILTER:

| | |
|----------------|-------|
| Mounting plate | 1 (✓) |
| Inductor* | 1 () |
| Capacitors* | 2 () |

*Values depend upon output frequency required.

RESISTOR COLOR CODE:

- 1 brown
- 2 red
- 3 orange
- 4 yellow
- 5 green
- 6 blue
- 7 violet
- 8 gray
- 9 white
- 0 black

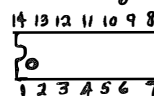


EXAMPLE:
3.3 uh = orange-gold-orange



Molded tantalum capacitor. Color stripe or "+" sign indicates positive.

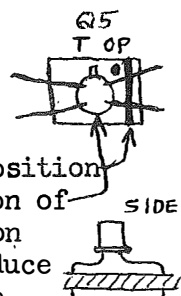
Aluminum and tantalum types are both polarized electrolytic capacitors.



Top view of IC with pin numbers.

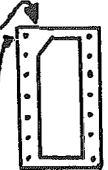
- (2) 1. Place the main board pictorial in front of you for easy reference. The view is from the parts side of the board. Note that the pictorial has been divided into four sections, A, B, C and D. After the transistors and IC (integrated circuit) sockets have been installed, the remainder of the components will be installed section by section starting with section A.
- (✓) 2. Install and solder the following 2N3904 transistors, being careful to position them correctly. Note that adjacent to the center lead there is a trace on one side of the transistor, and next to the end leads traces appear on the other side. Bend the leads to these traces and solder them. Trim the leads on the transistor to $\frac{1}{4}$ " from the transistor body. Push the leads thru the board until $\frac{1}{8}$ " projects out on the trace side. Then bend the leads and solder.

- (✓) 3. (✓) Q1
 (✓) Q6
 (✓) Q15 See ch. →
 (✓) Q3
- (✓) Q16
 (✓) Q13 2N3904 or R04
 (✓) Q14
- (✓) Q12
 (✓) Q4
 (✓) Q17



- (✓) 4. Install and solder Q5. If your kit contains an MPF 122 note the position of the bar or dot. If your kit contains an FTO601 note the position of the tab and spread the leads to meet the holes in the board, two on each side of the tab. Press the transistor toward the board to reduce the lead lengths but not so hard as to short the leads to the case.

- (✓) 5. Examine one of the IC sockets closely. Note that a diagonal section is molded into one corner of the hollow area between pins (viewing the socket from the top, the side where the IC is inserted). This corner of the socket is identified as the position of pin 1 of the IC. When inserting the sockets always position them so that pin 1 of the socket corresponds to the circled hole in the corresponding hole pattern on the circuit board.



- (✓) 6. When installing the sockets, solder only two pins, one on each row, at first. Then reheat each solder joint while pressing the socket against the board to make sure the socket is fully seated. Once properly positioned, solder the remaining pins.

- (✓) 7. Install IC sockets in the following locations:
 (✓) Z2 (✓) Z3 (✓) Z5 (✓) Z4 (✓) Z10 (✓) Z1

- (✓) 8. The hole patterns for Z7, Z8 and Z9 each have a missing pin (pin 9). When installing the corresponding sockets in these positions bend pin 9 under the socket, out of the way.
 (✓) Z7 (✓) Z8 (✓) Z9

(Note: Steps 9 to 13 have been deleted)

FOR THE FOLLOWING STEPS REFER TO SECTION A OF THE MAIN BOARD PICTORIAL.

- (✓) 14. Install and solder D2. Note the position of the cathode. (6.2 V zener)

- () 15. Install and solder the following resistors, mounting them vertically. Don't install them with the body against the board. Leave a space equal to the diameter of the resistor body between the board and the resistor body. When mounting the resistors make sure that the body is over the right hole, because the tops of the resistors will later be used as test points.

| | |
|--|---|
| (<input checked="" type="checkbox"/>) R1 ¹⁰⁰ 180 ohm 1 watt | (<input checked="" type="checkbox"/>) R9 1.8K 2.2K |
| (<input checked="" type="checkbox"/>) R2 220 220 ohm ^{MTs} HOR12 | (<input checked="" type="checkbox"/>) R7 1K |
| (<input checked="" type="checkbox"/>) R10 1K | (<input checked="" type="checkbox"/>) R8 1.8K 2.2K |
| | (<input checked="" type="checkbox"/>) R20 470 ohm |

- () 16. Install and solder the following capacitors noting the polarity of the electrolytic types.

| |
|---|
| (<input checked="" type="checkbox"/>) C7 150 pf ceramic |
| (<input checked="" type="checkbox"/>) C5 470 pf ceramic |
| (<input checked="" type="checkbox"/>) C1 22 uf electrolytic |
| (<input checked="" type="checkbox"/>) C49 500 uf electrolytic |

- () 17. Install and solder a piece of resistor lead between the points labeled X1.

FOR THE FOLLOWING STEPS REFER TO SECTION B OF THE MAIN BOARD PICTORIAL.
COIL ORIENTATION DOESN'T MATTER - ANY TERMINAL POSITION WILL WORK.
The coils are all the same.

- () 18. Install and solder slug-tuned coil L1 as shown on the pictorial.
() 19. Install and solder slug-tuned coil L2 as shown on the pictorial.
() 20. Cut a strip of 3 IC pins. Bend up the center pin and install the strip in the holes provided for the crystal X2.

- () 21. Install and solder the following resistors vertically.

| | |
|---|---|
| (<input checked="" type="checkbox"/>) R18 220 ohm | (<input checked="" type="checkbox"/>) R50 10K |
| (<input checked="" type="checkbox"/>) R55 10K | (<input checked="" type="checkbox"/>) R13 4.7K |
| (<input checked="" type="checkbox"/>) R56 47K | (<input checked="" type="checkbox"/>) R12 4.7K |
| (<input checked="" type="checkbox"/>) R17 1K | (<input checked="" type="checkbox"/>) R11 470 ohm |
| (<input checked="" type="checkbox"/>) R52 10K | (<input checked="" type="checkbox"/>) R16 47K |
| (<input checked="" type="checkbox"/>) R58 10K | (<input checked="" type="checkbox"/>) R19 680 ohm |
| (<input checked="" type="checkbox"/>) R14 680 ohm | (<input checked="" type="checkbox"/>) R54 47K |

- () 22. Install and solder the following resistors horizontally.

| |
|--|
| (<input checked="" type="checkbox"/>) R15 1K |
| (<input checked="" type="checkbox"/>) R53 4.7K |
| (<input checked="" type="checkbox"/>) R51 1K |
| (<input checked="" type="checkbox"/>) R36 1K |

- () 23. Install and solder the following capacitors:

| | |
|--|---|
| (<input checked="" type="checkbox"/>) C2 .05 uf | (<input checked="" type="checkbox"/>) C54 .01 uf |
| (<input checked="" type="checkbox"/>) C53 470 pf ceramic | (<input checked="" type="checkbox"/>) C9 470 pf ceramic |
| (<input checked="" type="checkbox"/>) C52 50 pf ceramic ¹⁵⁶⁰⁰ | (<input checked="" type="checkbox"/>) C6 39 pf ceramic |
| (<input checked="" type="checkbox"/>) C11 39 pf ceramic | (<input checked="" type="checkbox"/>) C47 .001 uf ceramic ¹⁸ |
| (<input checked="" type="checkbox"/>) C10 .001 uf ceramic ¹⁹ | (<input checked="" type="checkbox"/>) C12 .01 uf |
| (<input checked="" type="checkbox"/>) C13 100 pf ceramic | (<input checked="" type="checkbox"/>) C59 .001 uf ceramic ¹⁷ |
| (<input checked="" type="checkbox"/>) C8 50 pf ceramic ¹⁵⁶⁰⁰ | (<input checked="" type="checkbox"/>) C57 .001 uf ceramic ¹⁶ |

- () 24. Install and solder the following vertically mounted inductors in the same manner as was done in mounting the vertical resistors:

| |
|---|
| (<input checked="" type="checkbox"/>) L4 3.3 uh |
| (<input checked="" type="checkbox"/>) L6 3.3 uh |

- () 25. Install and solder the following vertically mounted diodes. The cathode or band end has the long lead to the circuit board.

(~~✓~~) D3
 (~~✓~~) D4
 (~~✓~~) D5

FOR THE FOLLOWING STEPS REFER TO SECTION C OF THE MAIN BOARD PICTORIAL.

- () 26. Install and solder the following vertically mounted resistors:

(~~✓~~) R21 10K Br Bl Or
 (~~✓~~) R25 1.5K Br Or Rd
 (~~✓~~) R24 1K Br Bl Rd
 (~~✓~~) R23 2.2K Rd Rd Rd
 (~~✓~~) R28 10K
 (~~✓~~) R26 10K
 (~~✓~~) R32 10K
 (~~✓~~) R30 10K
 (~~✓~~) R34 10K

- () 27. Install and solder the following horizontally mounted resistors:

(~~✓~~) R22 1K
 (~~✓~~) R29 10K
 (~~✓~~) R27 10K
 (~~✓~~) R33 10K
 (~~✓~~) R31 10K

- () 28. Install and solder the following capacitors:

(~~✓~~) C14 100 pf ceramic 101
 (~~✓~~) C15 .01 uf 103
 (~~✓~~) C16 150 pf ceramic 151
 (~~✓~~) C17 .05 uf 503
 (~~✓~~) C18 100 pf ceramic 102
 (~~✓~~) C23 .001 uf ceramic 102
 (~~✓~~) C21 .001 uf ceramic 101
 (~~✓~~) C27 .001 uf ceramic 102
 (~~✓~~) C25 .001 uf ceramic 102
 (~~✓~~) C19 150 pf ceramic
 (~~✓~~) C28 .001 uf ceramic 101
 (~~✓~~) C24 .001 uf ceramic 101
 (~~✓~~) C26 .001 uf ceramic 101
 (~~✓~~) C20 .001 uf ceramic 101
 (~~✓~~) C22 .001 uf ceramic 101

- (~~✓~~) 29. Install and solder C60, 39 pf ceramic

FOR THE FOLLOWING STEPS REFER TO SECTION D OF THE MAIN BOARD PICTORIAL

- () 30. Install and solder the following vertically mounted resistors:

(~~✓~~) R6 4.7K Y ROR Rd
 (~~✓~~) R5 3.9K OR WHI Rd
 (~~✓~~) R60 100 ohm Br Bl Br
 (~~✓~~) R59 390 ohm Or Wh Br

- (~~✓~~) 31. Install and solder R35, 10K in a horizontal position.

- () 32. Install and solder the following capacitors, noting the polarity of the tantalum electrolytic:

(~~✓~~) C3 2.2 uf tantalum
 (~~✓~~) C4 .05 uf
 (~~✓~~) C29 .001 uf ceramic 6

- (~~✓~~) 33. Install and solder a short piece of white or gray hook-up wire between the holes marked X2 in section D.

- (~~✓~~) 34. Install and solder a short piece of white or gray hook-up wire between the holes marked X3 in section D.

- (~~✓~~) 35. Install and solder a short piece of white or gray hook-up wire between the holes marked X4 in section D.

- (~~✓~~) 36. Cut the leads to a 180 pf ceramic capacitor to $\frac{1}{4}$ ". Solder it on the trace side of the board between the base lead (center) of Q15 and to the nearest ground area. (C58)

- (14) 36a. Cut the leads to a 33 pf ceramic capacitor to $\frac{1}{4}$ ". Solder it to the trace side of the board between Z1 pin 2 and Z1 pin 5.
- (14) 37. Install and solder C51, .05 uf.
- (14) 38. In area A, mount and solder R3 in a vertical position.
R3 is a $7\frac{1}{2}$ ohm, 3 watt power resistor.
- (14) 39. Clip the leads on the 25.000 mhz crystal to $\frac{1}{2}$ ". Solder it into position X1 in section B. Leave about $\frac{1}{4}$ " between the body of the crystal and the board.

(NOTE: Step 40 has been deleted)

At this point the main board assembly is complete except for Q2 and the IC's. These parts will be added in later steps.

- (14) 41. Inspect the board carefully for good contact and solder bridges between traces. It is much more difficult to find them later by trouble-shooting methods than now.

Proceed to the VCO assembly instructions.

ASSEMBLY INSTRUCTIONS

- () 1. Place the VCO board pictorial in front of you for easy reference. The view is from the parts side of the board.
- () 2. Install IC sockets for Z11 and Z12, observing the position of pin 1 on the sockets as instructed for the main board.
- () Z11 () Z12

(Note: steps 3 and 4 have been deleted.)

- (✓) 5. Install and solder the following 2N3904 transistors, noting the positioning. There is a trace next to the center lead on one side and two traces next to the end leads on the other side. Cut the transistor leads to $\frac{1}{4}$ " from the transistor body. Push them thru the board until approximately $\frac{1}{8}$ " projects below the board. Bend the leads to the appropriate traces and solder them.

(✓) Q7 (✓) Q10 2N3903 or Redo4
 (✓) Q8 (✓) Q11
 (✓) Q9 2N3903 or Redo4

- (✓) 6. Install and solder the following horizontally mounted resistors:

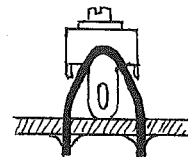
(✓) R44 100 ohm BRBLR (✓) R43 47K YPO
 (✓) R38 1K BRBLR (✓) R47 2.2K 12R02

- (✓) 7. Install and solder the following resistors, mounting them vertically. Don't install them with the body against the board. Leave a space equal to the diameter of the resistor body between the board and the resistor body. When mounting the resistors make sure that the body is over the right hole, because the tops of the resistors will later be used as test points.

(✓) R37 10K BRBLR (✓) R45 3.3K 00R
 (✓) R39 4.7K YPR (✓) R46 47K YPO
 (✓) R41 47K 10K (✓) R48 10K
 (✓) R42 47K 10K (✓) R49 1K BRBLR
 (✓) R57 1K

- (✓) 8. Using two discarded resistor leads bend and solder in two loops in the holes provided on the board for C37. Be sure the loops are high enough to reach the body of the trimmer. Position C37 between the loops so the adjusting screw side (end connected to the top plate) is towards Q11. Solder the loops to the trimmer with the trimmer lugs in contact with the surface of the board.

IN THE FOLLOWING STEP, THE COIL TERMINAL ORIENTATION DOESN'T MATTER.



- (✓) 9. Install and solder the slug-tuned coil L3.
- (✓) 10. Install and solder the varactor diode D6, noting its position in the pictorial.
- () 11. Install and solder the following capacitors being careful to connect the electrolytic types with the proper polarity.
- (✓) C30 .05 uf 500 (✓) C36 22 uf aluminum electrolytic
 (✓) C31 22 uf aluminum electrolytic (✓) C35 450 pf ceramic N750

Step 11, continued:

| | | | |
|---------|---------------------------------|---------|------------------------------|
| (✓) C45 | 22 uf aluminum electrolytic | (✓) C38 | 150 pf ceramic N750 |
| (✓) C34 | .1 uf mylar | (✓) C39 | .001 uf ³ |
| (✓) C33 | .05 uf mylar CERAMIC | (✓) C40 | .05 uf |
| (✓) C50 | .001 uf ceramic ⁵ | (✓) C41 | .001 uf ceramic ² |
| (✓) C43 | .001 uf ceramic ⁴ | (✓) C42 | 1 uf tantalum electrolytic |
| (✓) C61 | .01 uf ceramic | (✓) C48 | .01 uf |
| | | (✓) C44 | .001 uf ceramic ¹ |

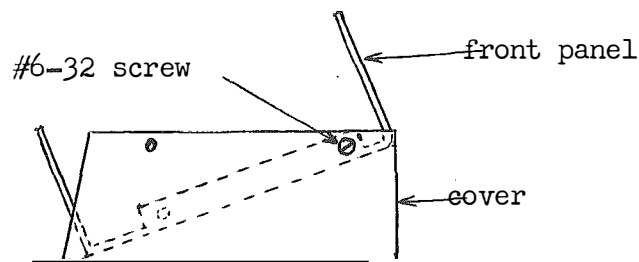
- (✓) 12. Install and solder inductor L5, 47 uh in a horizontal position.
- (✓) 13. Install and solder a resistor-lead jumper in the points X-X.
- (✓) 14. Solder a 1K resistor, R61 between pins 4 and 5 of Z11 and a nearby ground trace on the trace side of the board.
- (✓) 15. Install and solder C46, 22 uf tantalum capacitor.
- (✓) 15a. Solder a jumper of insulated (white or gray) wire between points Y-Y.
- (✓) 16. Referring to Table 1, page 6 of the instruction booklet, wire in the appropriate jumpers to program the unit for your transceiver. Note that the connections to E23 (R14) and E24 (R58) are to the main board and will have to be made after the boards are installed in position.
- (✓) 17. Install and solder diodes D1 and D7. Be sure to observe polarity.
 - (✓) D1
 - (✓) D7
- () 18. Inspect the board carefully for good contact and solder bridges between traces. It is much more difficult to find them later by trouble-shooting methods.

At this point the VCO board assembly is completed except for the IC's. These parts will be added in later steps.

Proceed to the MAIN CHASSIS WIRING instructions.

MAIN CHASSIS WIRING

- () 1. Locate the chassis and cover. Place the cover upside down on a non-scratch surface and place the chassis inside and attach with two #6-32 screws as shown below.

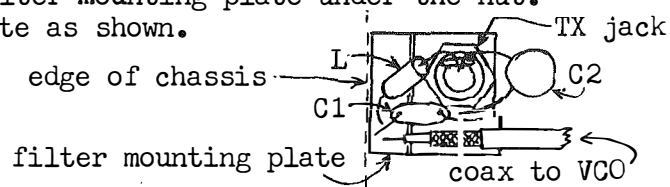


REFER TO THE SWITCH ASSEMBLY PICTORIAL FOR THE FOLLOWING STEPS:

- (✓) 2. To make wiring of the switches easier, install the switches temporarily from the front of the chassis, with the shafts directed inward.
- (✓) 3. Locate the two 4-position switches and install them in the holes labeled "10 KHZ". Position the switches as shown in the switch assembly pictorial. Hand tighten the nuts.
- (✓) 4. Locate the four 10-position BCD switches and install them in the remaining holes as shown in the pictorial. Hand tighten the nuts.
- () 5. Cut a $2\frac{1}{2}$ " and a $3\frac{1}{4}$ " length of white-or-gray hookup wire and strip both ends of each to $\frac{1}{4}$ ".
- () 6. Insert one end of one of a $2\frac{1}{2}$ " wire thru the common lugs of S1. (The common lugs are identified by the letter "C" on the switch assembly pictorial) DO NOT solder. Insert the other end thru the common lugs of S2.
- () 7. Insert the $3\frac{1}{4}$ " wire thru the lugs of S2 and solder.
- () 8. Insert the remaining wire end thru the common lug of S3. DO NOT solder.
- () 9. Cut two more white-or-gray wires to $2\frac{1}{2}$ ", stripping one end of each to $\frac{1}{4}$ ", the other end of each to $1/8$ ".
- () 10. Insert one $\frac{1}{4}$ " stripped end thru the common lugs of S1 and solder. Similarly insert the other $\frac{1}{4}$ " stripped end into the common lug of S3 and solder.
- () 11. Using the same procedure for the bottom row of switches, connect the common lugs of S4, S5 and S6 together. Use the following lengths of white-or-gray hookup wire: S4C to S5C - $2\frac{1}{2}$ "; S5C to S6C - 3"; S4-(later to S7) - $3\frac{1}{2}$ "; S6-(later to S8) - $1\frac{1}{4}$ ".

- () 12. Push the wires back against the panel to make room for additional wiring. Orient the four loose wires to the sides for later connection.
- () 13. Clip the leads on two diodes to $\frac{1}{2}$ ". Solder the anode leads to the points shown on S4 and S3 for D10 and D23 respectively. Orient the diodes as shown.
- () 14. Orient the diode terminal strip as shown (copper facing you). Slip the leads of D10 and D25 thru the appropriate holes, bending the leads as necessary to bring the terminal strip to the proper position. (Note the side view below) There may be extra terminals on the strip. Choose the best points to use and disregard the extras. Solder D10 and D23 to hold the strip in position.
- () 15. Slip both leads of D7 into the appropriate terminals as shown. Solder the anode end only. Similarly, install D8, soldering the switch end only. When both cathode leads are in place, solder them to E16. (Clip off the excess lead lengths as you proceed.)
- () 16. Working in pairs, using the above procedure install the remaining diodes. D9 and D26 are picked up last, since their mates are already in.
- | | | | | |
|---------|---------|---------|---------|---------|
| () D11 | () D15 | () D19 | () D25 | () D9 |
| () D12 | () D16 | () D20 | () D26 | |
| () D13 | () D17 | () D21 | | () D24 |
| () D14 | () D18 | () D22 | | |
- () 17. Inspect all diode leads for shorts or near-shorts. Bend the leads to provide maximum clearance all around.
- () 18. Remove the switch nuts and carefully remove the wired switches from the front of the panel. Refer to the center figure below the switch assembly pictorial for the switch-mounting hardware. Reinstall the switch assembly from the rear of the panel with the 4-position switches mounted in the holes marked MHZ.
- () 19. Locate the two toggle switches and the two phono jacks. Remove the flat washers from the phono jacks for use with the toggle switches. Mount the toggle switches to the panel as shown. Set the phono jacks aside for the moment.
- () 20. Connect the end of the White or gray wire from the common lug of S1 to the lower lug of S7.
- () 21. Connect the end of the white or gray wire from the common lug of S4 to the upper lug of S7.
- () 22. Connect the end of the white or gray wire from the common lug of S3 to the lower lug of S8.
- () 23. Connect the end of the white or gray wire from the common lug of S6 to the upper lug of S8.
- () 24. Mount the upper phono jack in the third hole from the top of the rear panel. Place the ground lug under the nut on the inside of the chassis, and orient it away from the edge of the chassis.

- () 25. Find the filter mounting plate. Mount the remaining phono jack in the bottom hole with the filter mounting plate under the nut. Orient the filter mounting plate as shown.



- () 26. Locate the two feed-thru capacitors. Install the remaining ground lug on the feed-thru to be used for the PTT lead (top hole) on the outside of the panel. The feed-thru is inserted from the rear, or outside of the chassis. Position the ground lug as shown in the figure for rear panel connections.

FOR THE FOLLOWING STEPS REFER TO THE MAIN BOARD PICTORIAL

ON ALL MEASURED LEADS STRIP 1/8" OF INSULATION FROM EACH END UNLESS OTHERWISE NOTED.

- () 27. Connect one end of a 6 1/8" brown or black wire to E13.
 () 28. Connect one end of a 7 1/4" red or orange wire to E14.
 () 29. Connect one end of a 6 1/8" yellow or green wire to E15.
 () 30. Connect one end of a 7 1/4" white or gray wire to E16.
 () 31. Group these 4 wires and tape them in one or two places for later connection to the switch assembly.
 () 32. Connect one end of a 6 1/2" brown or black wire to E17.
 () 33. Connect one end of a 7" red or orange wire to E18.
 () 34. Connect one end of a 6 1/2" yellow or green wire to E19.
 () 35. Connect one end of a 7 1/4" white or gray wire to E20.
 () 36. Tape the above 4 wires together.
 () 37. Connect one end of a 6 1/2" brown or black wire to E21.
 () 38. Connect one end of a 6 1/2" red or orange wire to E22.
 () 39. Tape the above 2 wires together.
 () 40. Connect one end of a 9 1/2" brown or black wire to E10.
 () 41. Connect one end of a 7 1/2" white or gray wire to E8.
 () 42. Connect one end of an 8" white or gray wire to E9.
 () 43. Connect one end of a 4" brown or black wire to E6.
 () 44. Connect one end of a 4 1/2" red or orange wire to E5.
 () 45. Connect one end of a 6 5/8" yellow or green wire to E4.
 () 46. Connect one end of an 8" red or orange wire to E3.
 () 47. Connect one end of an 8" yellow or green wire to E2.
 () 48. Connect one end of a 10 1/2" red or orange wire to E1.

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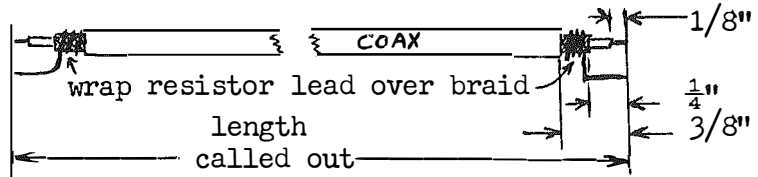
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7

Inch scale for measuring wire

- () 49. Prepare the following lengths of coax cable as shown below. NOTE: See stripping instructions on assembly section cover sheet.

- () 3 inch
- () 3½ inch
- () 5 inch

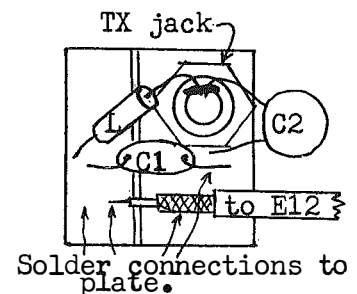


- () 50. Connect the center conductor from one end of the 5" length of coax to E7. Connect the shield wire to the adjacent hole.
- () 51. Refer to the VCO pictorial and connect the center conductor from one end of the 3½" length of coax to E12. Connect the shield wire to the adjacent hole.
- () 52. Refer to the VCO pictorial and connect the center conductor from one end of the 3" length of coax to E11. Connect the shield wire to the adjacent hole.
- () 53. Install four spacers in the holes provided on the bottom of the chassis using four 4-40 screws and lock washers.
- () 54. Locate the aluminum heat sink strip and Q2 (2N5296). Attach the heat sink strip to Q2 using a 4-40 screw and nut.
- () 55. Referring to the main board pictorial, section A, install and solder Q2 in the holes marked "BQ2". The side of the transistor with the tab faces Z4.
- () 56. Position the main board vertically, with the crystal sockets up and the component side of the board against the rear panel.
- () 57. Pull the 3 taped bundles of wires and the gray or white wire to E9 and the brown or black wire to E10 out underneath the board edge, towards the front panel.
- () 58. Tape the main board in this position while wiring it to the switches in the succeeding steps.

WHILE PERFORMING THE FOLLOWING STEPS REFER TO THE SWITCH ASSEMBLY PICTORIAL AND TO THE MAIN BOARD PICTORIAL.

- () 59. Connect the white or gray wire from E9 to the center lug on switch S8.
- () 60. Connect the brown or black wire from E10 to the center lug of switch S7.
- () 61. Connect the red or orange wire from E14 on the main board to E14 on the diode mounting strip.
- () 62. Connect the yellow or green wire from E15 on the main board to E15 on the diode strip.
- () 63. Connect the brown or black wire from E13 on the main board to E13 on the diode strip.
- () 64. Connect the white or gray wire from E16 on the main board to E16 on the diode strip.
- () 65. Connect the red or orange wire from E18 on the main board to E18 on the diode strip.

- () 66. Connect the yellow or green wire from E19 on the main board to E19 on the diode strip.
- () 67. Connect the brown or black wire from E17 on the main board to E17 on the diode strip.
- () 68. Connect the white or gray wire from E20 on the main board to E20 on the diode strip.
- () 69. Connect the brown or black wire from E21 on the main board to E21 on the diode strip.
- () 70. Connect the red or orange wire from E22 on the main board to E22 on the diode strip.
- () 71. Pull off the tape holding the main board and lower the board to its final position over the spacers. Fasten it with 4-40 screws and lockwashers. Take care not to cross-thread the screws. If necessary, loosen the spacers from the chassis slightly to line them up properly.
- () 73. Position the VCO board near the back of the chassis so that the two IC's are next to the chassis connectors. Refer to the VCO and main board pictorials for the next steps.
- () 74. Connect the yellow or green wire from E2 on the main board to E2 on the VCO board.
- () 75. Connect the red or orange wire from E3 on the main board to E3 on the VCO board.
- () 76. Connect the yellow or green wire from E4 on the main board to E4 on the VCO board.
- () 77. Connect the red or orange wire from E5 on the main board to E5 on the VCO board.
- () 78. Connect the brown or black wire from E6 on the main board to E6 on the VCO board. NOTE: If the unit is to be used for high-side injection to the receiver, leave this wire off of E6 on the main board. See the High-side injection modification sheet.
- () 79. Connect the center conductor of the coax from E7 on the main board to E7 on the VCO board. Connect the shield wire to the adjacent hole.
- () 80. Attach the VCO board to the back of the chassis using four 4-40 screws and lockwashers, and two spacers. Leave the VCO cover off for the time being.
- () 81. Connect the center conductor of the coax from E12 to the copper area on the filter mounting plate to the left of the jack. Tin the ground area below the jack and solder the shield directly to this ground area.
- () 82. The table of values shown in fig. 4 of the instruction booklet gives values for a low-pass output filter to be installed for various frequencies. Connect the parts as shown at the right, using the appropriate values. If no filter is used or if a frequency multiplier is to be used for the transmitter, replace the choke with a short jumper instead.



- () 83. Connect the center conductor of the coax from E11 to the upper phono jack (receiver output). Connect the shield wire to the ground lug, keeping this lead as short as possible.
- () 84. Connect the red or orange wire from E1 on the main board to the lower feed-thru capacitor.
- () 85. Temporarily remove the two screws at the right of the (looking at the front panel) unit holding the main board spacers to the chassis. The three wires going to E1, E2 and E3 are to be routed toward the panel, then around the panel edge of the main board. They then run under the main board straight back toward the VCO board. With the two screws removed the main board can be lifted slightly, allowing the wires to be pushed into position. Replace the screws when finished.
- () 86. Connect the white or gray wire from E8 on the main board to the upper feed-thru capacitor.
- () 87. Using a pair of pliers make sure that all of the panel rotary switches are at their extreme counterclockwise positions.
- () 88. Install the knobs on the MHZ switches with the number 4 over the black dot. Leave a very slight space between the knob and the panel.
- () 89. Install the remaining knobs in the same way with the number \emptyset over the black dot.
- () 90. Turn the chassis upside-down. With a ruler draw light pencil lines from front to rear of the chassis, $3/4$ " from each side. Then draw light lines parallel to the front and rear panels, $3/4$ " in.
- () 91. Using the lines as guides, remove the rubber feet from their backing one at a time and press them firmly into place at the four line intersections.

THE INITIAL ASSEMBLY OF THE CHANNELIZER IS NOW COMPLETE. THE FINAL STEPS OF ASSEMBLY WILL BE MADE DURING AND AFTER THE CHECKOUT AND ALIGNMENT PROCEDURES. THE FOLLOWING STEPS ARE FOR THE INITIAL CHECK-OUT.

- () 92. Connect three test wires to the rear of the CHANNELIZER as follows:
 - () A ground lead to the lug on the PTT feedthru.
 - () A B+ lead to the second-from-top feedthru capacitor.
 - () A push-to-talk lead to the top feedthru capacitor.
- () 93. A 12-volt DC power supply is needed for testing. It may either be a battery or a well-filtered AC-operated power supply capable of delivering 400 milliamperes. The voltage under load should be between 11 and 15 volts.
- () 93. Connect the test wires as follows:
 - () The ground lead to the negative lead of the supply.
 - () The bottom feed-thru capacitor lead to the positive lead.
 - () The top feed-thru capacitor lead temporarily to chassis ground.
- () 94. For testing, use a good volt-ohmmeter with a sensitivity of 20,000 ohms per volt or more. In the following steps the negative probe is grounded to the chassis.

- () 95. Turn on the power supply.
- () 96. Check the voltage at the top of R1 (main board) for $6.3 \pm .25$ volts. If this voltage is appreciably in error, shut off the supply and check the wiring around R1, D2, Q1 and Q2.
- () 97. Observe between 4.75 and 5.25 volts at the top of R38 (VCO board)
- () 98. Observe between 4.75 and 5.25 volts at the top of R11 (main board)
- () 99. At the top of R44 (VCO board) observe a voltage at most the value of the power supply voltage used and at lowest 1 volt below it.

IF ANY OF THE ABOVE VOLTAGES ARE OUTSIDE OF THE INDICATED LIMITS, SHUT OFF THE SUPPLY AND RECHECK THE PARTS VALUES, POSITIONS AND WIRING IN THE APPROPRIATE PORTIONS OF THE CIRCUIT. IN PARTICULAR LOOK FOR SOLDER SPLASHES BETWEEN TRACES BENEATH THE BOARDS OR SHORTS BETWEEN IC PINS. Check the polarity of the electrolytic capacitors C1, C30, C31 and C49.

NOTE: If the 5 volt readings are too high, connect a 22 to 100 ohm resistor across the meter leads and repeat the 5 volt measurements. If this test produces voltages within the indicated limits it is safe to proceed.

- () 100. Plug in the integrated circuits. Make sure that they are correctly oriented with the outlines on the board. It is important that the IC pins not be deformed. Once they are bent it is difficult to restore them to shape for reliable contact. The following procedure is recommended:
 - a. Using a pair of long-nosed pliers bend the pins if necessary to make them perpendicular to the top surface of the IC and parallel to each other.
 - b. Set the IC lightly in place on the jacks and check that all pins are aligned to the mating jacks properly.
 - c. Placing a finger at the top of each end of the IC, press down gently while wobbling the IC slightly end-to-end until it is seated all the way down.
- () 101. Turn on the power and repeat measurements made in steps 97 and 98.
- () 102. Measure the voltage between the B+ (12 volt input) line and the heat sink of Q2. It should be between 2.7 and 3.5 volts. If too high, too much current is being drawn. Shut off power and recheck the IC's for position or shorts.

IN THE FOLLOWING STEPS, COIL ADJUSTMENT IS CALLED FOR. NOTE THAT THE SLUGS HAVE BEEN SHIPPED SEPARATE FROM THE COIL FORMS. BEFORE ATTEMPTING AN ADJUSTMENT, FIND A SCREWDRIVER THAT FITS THE SLOT IN THE SLUG PROPERLY. A JEWELER'S OR OTHER SMALL SCREWDRIVER IS OK BECAUSE THE METAL WON'T AFFECT THE ADJUSTMENT SETTING MUCH. START THE SLUGS CAREFULLY AND SCREW THEM IN JUST FAR ENOUGH SO THEY WON'T FALL OUT. WHEN MAKING THE ADJUSTMENTS DON'T DRIVE THE SLUGS ALL THE WAY TO THE BOTTOM OF THE FORM. PROPER SLUG POSITION IS ABOVE THE CENTER OF THE COIL WINDING. IN CASE OF TROUBLE DON'T RUN THE SLUGS UP AND DOWN NEEDLESSLY. FIND THE TROUBLE AND THEN MAKE THE FINAL ADJUSTMENTS.

IF THE VOLTAGES ARE CORRECT, PROCEED TO THE ALIGNMENT PROCEDURES OUTLINED ON PAGES 8 AND 9 OF THE INSTRUCTION BOOKLET. BE SURE TO PLUG IN THE OFFSET CRYSTAL BEFORE ALIGNING THE VCO IN THE RECEIVE MODE. THE TRANSMIT MODE ALIGNMENT MAY BE MADE WITHOUT THE OFFSET CRYSTAL. Failure of the VCO adjustment to vary the indicated voltages means that the loop is not locking and that something is wrong. The trouble could be almost anywhere in the circuits. Refer to the voltage chart (page 13 of the instruction booklet) and try to localize the trouble with its aid.

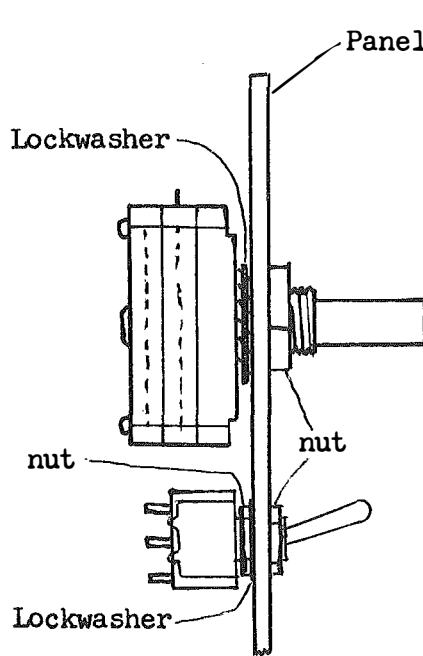
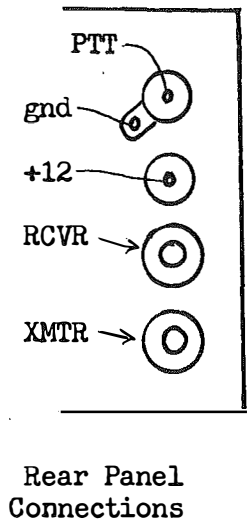
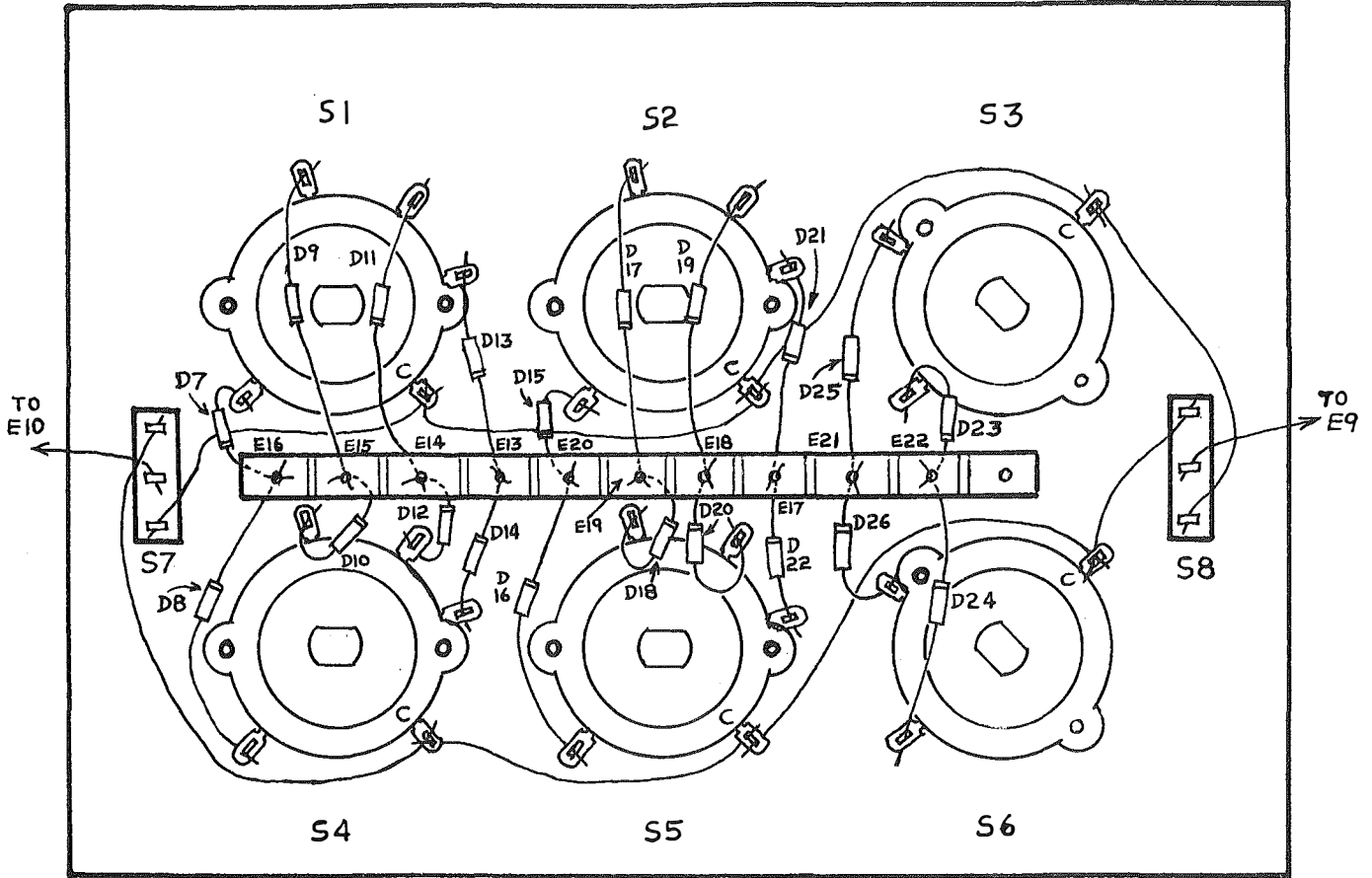
WHEN FINISHED WITH THE INITIAL ALIGNMENT, RETURN TO THE NEXT STEPS FOR COMPLETION OF THE UNIT.

FINAL ASSEMBLY

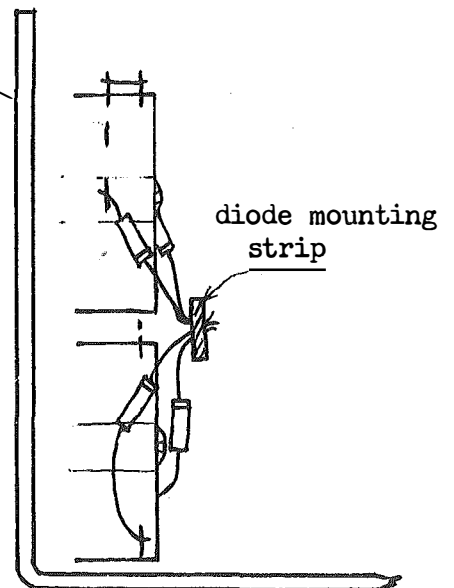
- () 103. It is suggested that the offset crystal be soldered into its mounting jacks. It can still be replaced from the top of the board with a soldering iron, but it won't fall out from shock or vibration. Be careful not to burn insulation on nearby wiring.
- () 104. Using a silicone rubber compound such as Dow RTV or what is sold as "bathtub caulk", fill the voids between the parts surrounding L3 and C37 so that they can't vibrate. Be sure to include C35, C38, C40, D6, C36 and C46.
- () 105. Mount the VCO cover with #4-40 lockwashers and screws, making sure that the holes are above L3 and C37 so that they can be adjusted with the cover on.
- () 106. Repeat the VCO alignment (page 8 of instructions, step 1 or 2).
- () 107. Remove the backing from the rear panel label and press it in place on the rear panel next to the feedthru capacitors and connectors.
- () 108. Check the diode wiring on the panel switches for shorts and near shorts. In particular make sure that none of the diode leads can contact the switch shafts as they rotate to different positions. Check the coax ground connections to make sure they aren't too close to other connections.
- () 109. Fasten the cover to the chassis with four 6-32 screws. Tighten the screws sufficiently to penetrate the anodizing and make ground contact at all four points.

THE CHANNELIZER IS NOW COMPLETE AND READY FOR INSTALLATION.

Switch Assembly Pictorial



Switch Mounting Details



Side view showing relative positions of diode mounting strip and diodes behind switches.