



# TS-180S WARC Bands INSTALLATION GUIDE

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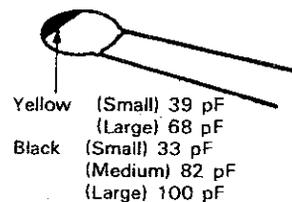
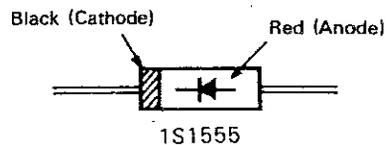
## I. INTRODUCTION

This kit adds the 30, 17, and 12 Meter bands to the TS-180S. Instructions are in a step-by-step form, to allow checkoff of each completed step within each section. Please look over this guide before plugging in your soldering iron. A certain amount of technical ability is required to install and align the additional circuits and components. If you feel it is beyond your skills, please seek help from a qualified individual.

## II. PARTS LIST

The following items should be contained in this package:

**\*NOTE:** \* designates a prealigned coil or assembly containing coils. DO NOT disturb alignment on these coils! They are Band Pass Filters and are not aligned for maximum signal, but for proper response across a limited frequency range. If mis-adjusted, they will require Factory realignment.



Ceramic Capacitor

Parts Name	Description	Quantity	Unit installed	Reference Number
VCO	Subassembly	1	PLL	
B.P.F. (A)	Subassembly	1	COIL PACK	AUX 1, 2
B.P.F. (B)	Subassembly	1	COIL PACK	AUX 3
B.P.F. (C)	Subassembly	1	PLL	
L.P.F. Block (A)	2 Coils	1	L.P.F.	
L.P.F. Block (B)	1 Coil	1	L.P.F.	
Diode	1S1555	11	PLL	D012.D014.D017.D022.D024.D025 D005.D006.D007.D008.D009
Resister	330Ω	1	PLL	R50
Ceramic Capacitor	39 PF RH (Yellow) 50V	2	COIL PACK	C202, 204
	68 PF RH (Yellow) 50V	2	COIL PACK	C102, 104
	7 PF SL 50V	2	COIL PACK	C201, 203
	82 PF SL 50V	2	COIL PACK	C101, 103
	33 PF CH (Black) 500V	1	L.P.F.	C409
	100 PF CH (Black) 500V	1	L.P.F.	C74
	82 PF CH (Black) 500V	1	L.P.F.	C408
Coil (Tuning)	L34-0914-05 (Pink)	2	COIL PACK	L101 (AUX-1), L102 (AUX-1)
Coil (Tuning)	L34-0915-05 (Violet)	2	COIL PACK	L102 (AUX-2), L202 (AUX-2)
Filter Coil	L34-0947-05	1	L.P.F.	L403
Lead	White	0.5m	L.P.F.	
Seal	10, 18, 24.5	2		
Hex. Wrench	W01-0404-05 (1.5 mm)	1		

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### III. TOOLS AND TEST EQUIPMENT REQUIREMENTS

#### TOOLS REQUIRED

45W (or less) soldering pencil  
60/40 rosin core solder  
tweezers  
long nose pliers  
Felt-tipped marker  
#2 Phillips screwdriver  
diagonal cutters  
wire stripper  
Wik-It or Soldovac  
Pen-knife or single-edged Razor

#### ADJUSTMENTS REQUIRED

ANT MIX and VCO coils must be aligned after installation, and ALC levels must be adjusted for the added bands. This will require the following test gear:

DC VTVM (2V)           SSG (Standard Signal Gen.) (30 MHz)  
RF VTVM (1V)         100W (min) dummy load  
Frequency counter     tuning tools  
(40 MHz)

### IV. DISASSEMBLY

**CAUTION:** Remove the power cord from the TS-180S BEFORE proceeding!

#### GENERAL

Remove the Top cover and unplug the speaker lead. Remove the bottom cover.

#### PLL REMOVAL (Top side)

1. Remove the PLL top shield by 4 screws.
2. Unplug 4 connectors.
3. Unplug the diode Matrix unit.
4. Unscrew the PLL from the chassis by 4 screws.
5. Unscrew the PLL PCB from the enclosure by 6 screws.
6. Set the PCB, hardware, and enclosure aside.

#### LOW PASS FILTER ASSEMBLY REMOVAL (Bottom side)

1. Rotate the Bandswitch to 29 MHz.
2. Using the supplied 1.5 mm Allen key, loosen the white flexible shaft coupling between the Coilpack and LPF unit, both setscrews.
3. Loosen the Bandswitch to Coilpack universal shaft coupling, rear setscrew only.
4. Rotate the Bandswitch to 14 MHz. DO NOT move the Bandswitch from this position until reassembly.
5. Loosen the second set of setscrews on the Coilpack to LPF unit shaft coupling.

6. Remove the tension spring across the LPF switch shaft (part G01-0809-04) and carefully set this part aside. (Failure to reinstall this spring may result in 10M oscillation problems.)
7. Slide the white shaft coupling into the LPF unit and tighten one setscrew to hold the coupling to the shaft.
8. Loosen the second setscrew on the Bandswitch to Coilpack shaft.
9. Note that there is a brass strip under the right rear screw holding the LPF unit to the chassis. Be sure to reinstall this as you first found it.
10. Remove 4 screws holding the LPF unit to the chassis.
11. Partially withdraw the LPF unit.
12. Note or mark the two coax leads BEFORE unplugging. Also unplug the 9 pin multiconnector.
13. Remove the LPF unit.
14. Remove 6 screws and flip the PCB out of the enclosure.
15. Set these items aside.

### COILPACK REMOVAL (Bottom side)

1. Rotate the Drive control to expose first one, then the other shaft coupling set screw on the white, flexible coupling. The variable capacitor plates should be closed when withdrawing this assembly.
2. Desolder the ground lead from the variable cap. to the XMIT VFO/FIX M switch.
3. Turn the radio over, top side up. Remove 2 screws holding the RF unit to the chassis.
4. Leave the cables plugged-in, and unplug the RF unit from the Coilpack.

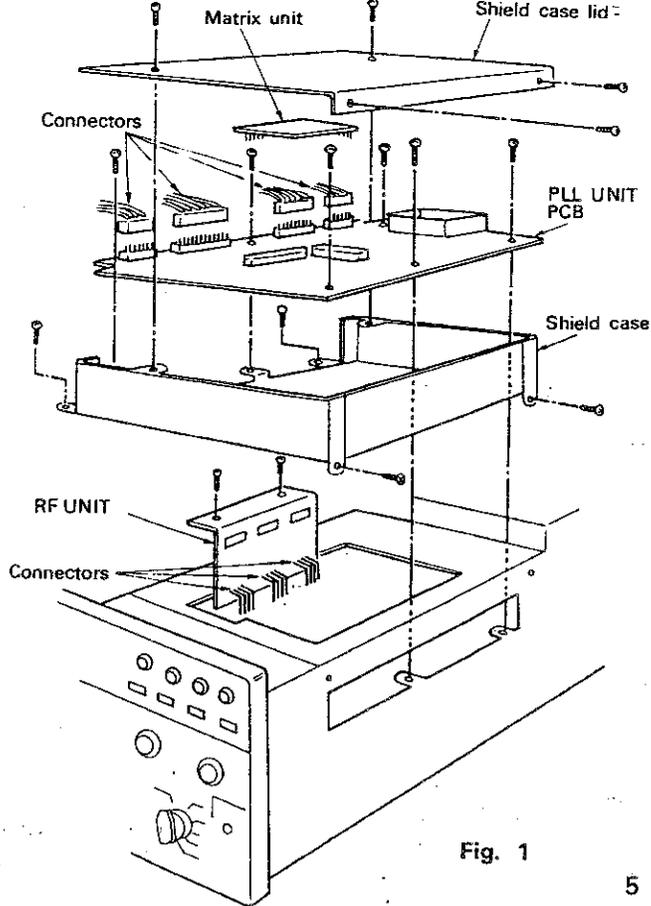


Fig. 1

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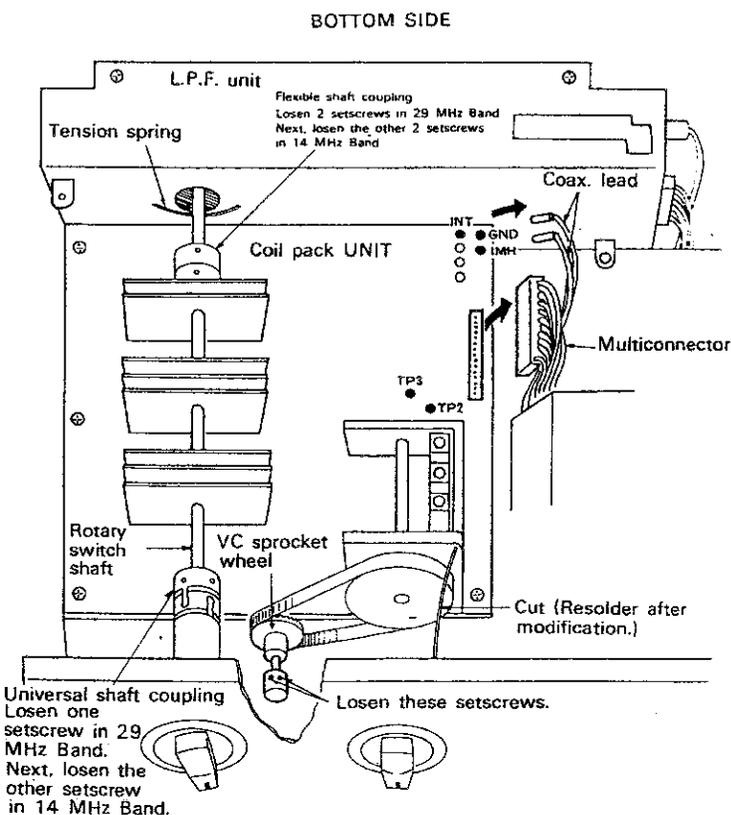


Fig. 2

5. Turn the radio over, bottom side up. Remove 5 screws securing the Coilpack — 3 self-tapping screws to the chassis, and 2 machine screws to standoffs.
6. Unplug the multiconnector and coax labeled INH and GND.
7. Shift the assembly to the rear to clear the shafts. Be sure not to loose the separate pieces of the universal-type shaft coupling. DO NOT move the Bandswitch until reassembly.

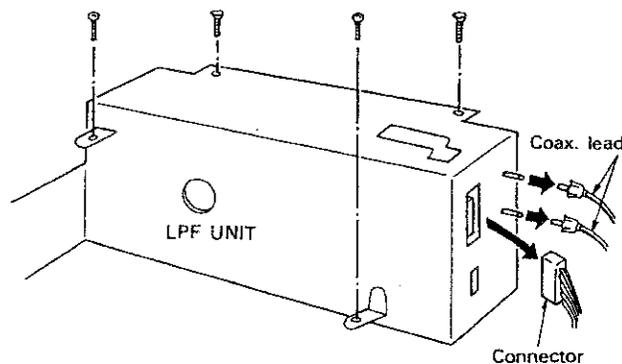


Fig. 3

## V. INSTALLATION

### PLL UNIT

- Using Wik-it, a Soldovac or similar, clear the following component positions of solder: D005, 6, 7, 8, 9, 12, 14, 17, 24, 25. (D005 and d, D006 and e, D007 and f, D008 and f.)
- Install diodes as illustrated in **Fig. 4** and **5**. D009 through D025 are positioned as D007, 008.

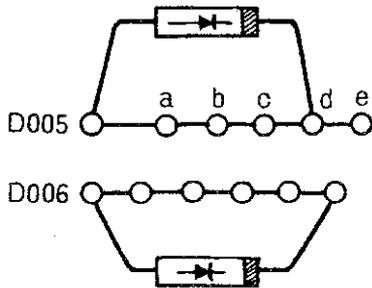


Fig. 4

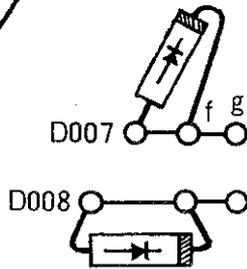


Fig. 5

- Clear START holes as shown for the VCO subassembly. As shown in **Fig. 6**, these are: C005, 011, D001, J01, L01, R002, 3, 4, 5, 6, 7, 8. Straighten the 8 leads from the PCB so they will "plug in" to the cleared positions on the PLL board.
- Solder the 8 leads, and clip the excess flush to the board. **Fig. 7**.

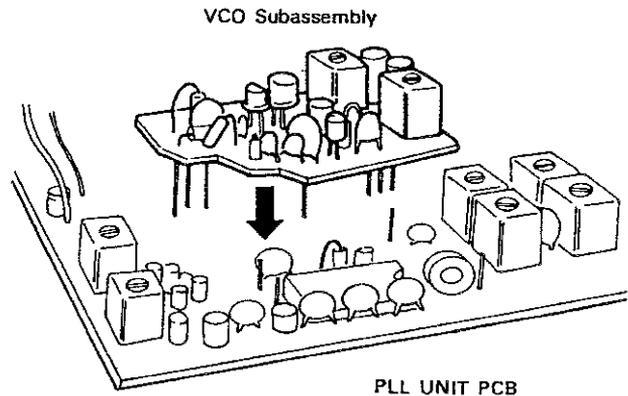


Fig. 7

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- Using the same method as outlined for the VCO subassembly, Clear the locations for: D21, 27, C66, 74, 90 (**Fig. 6**). A 330Ω 1/4W radial lead resistor is already mounted on the main board and must either be transferred to the foil side of the unit, or bent out of the way of the BPF subassembly.
- Straighten the leads from the BPF subassembly and install this unit to the board (**Fig. 8**). Clip excess leads flush to the board.

**NOTE\*:** DO NOT disturb BPF coil alignments. They are prealigned. Misalignment will require their return to the dealer or factory.

Parts installation is complete for this section.

BPF (C) Subassembly

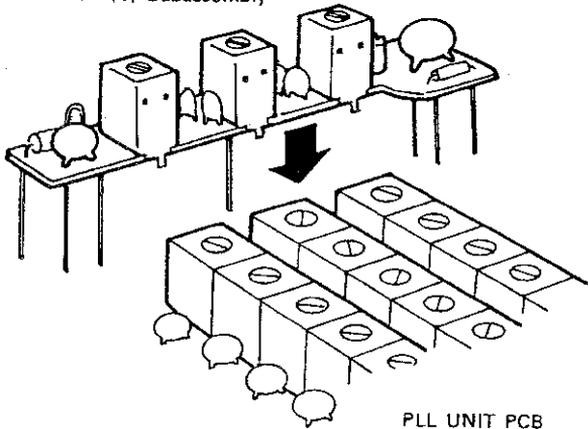


Fig. 8

### COILPACK UNIT

- Clear solder from component locations: L103, 203, 301, 302, C105, 107, 207, 208, 304. See **Fig. 9**.
- Desolder the coax and ground which is connected to J5 position on the Coilpack. Reconnect this to the BPF subassembly B. The small hole is center conductor, the large hole is for ground braid. See **Fig. 10**.

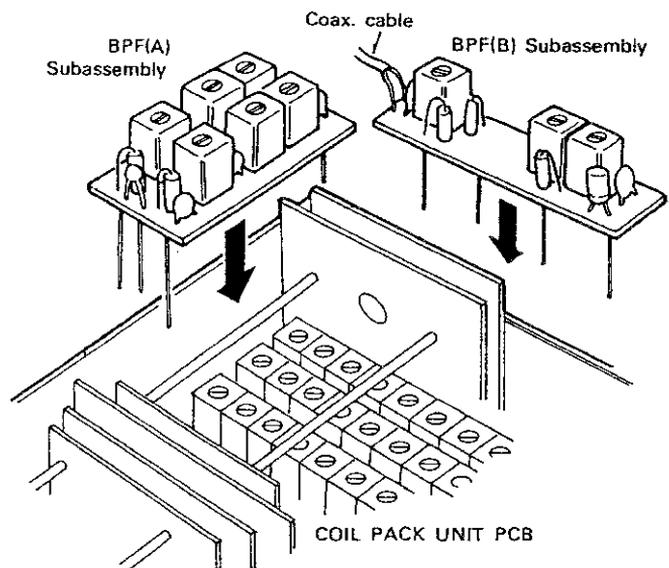


Fig. 10

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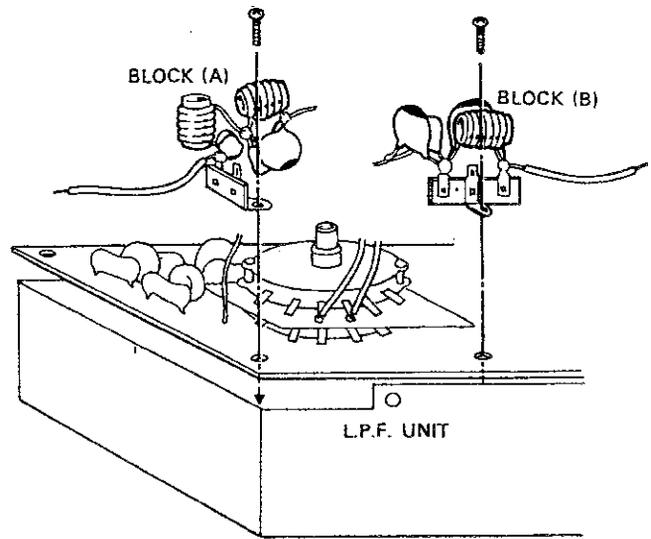
3. Install the A and B BPF subassemblies to the Coilpack. Clip leads flush to the bottom of the board.

**NOTE\*:**DO NOT adjust these BPF coils! They are already factory aligned.

4. Clear component locations and install: C102, 104, 68pf. C202, 204, 39pf. C101, 103, 82pf. C201, 203, 7pf. Clip excess leads flush to the bottom of the board. Parts installation is complete for this section.

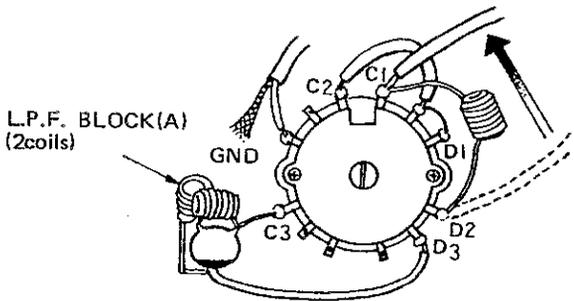
**LPF UNIT**

1. Using the supplied White wire, connect switch decks C<sub>2</sub> to D<sub>1</sub>.
2. Connect decks C<sub>1</sub> to D<sub>2</sub> with coil L34-0947-05. Position as illustrated, **Fig. 12**.
3. Desolder the Ground and move the Coax lead from D<sub>2</sub> to C<sub>1</sub>. Resolder the Ground braid near this switch tab.
4. Connect decks C<sub>3</sub> to D<sub>3</sub> with LPF subassembly A: White lead to D<sub>3</sub>, coil lead to C<sub>3</sub>. (**Fig. 12**)
5. Position LPF subassembly B as shown in **Fig. 13**. Connect the capacitor lead to the "B3" board location, and the White lead to board location "IO". (**Fig. 13**)
6. Be sure coils for both subassemblies are positioned as shown in **Fig. 11** Tape insulate the metal enclosure to prevent shorting of these new components to the case.
7. On the Foil side of the board, check C74. If it is a 150pf (151j), change it to a 100pf (101j). See **Fig. 14**.

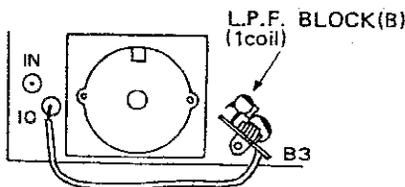


**Fig. 11**

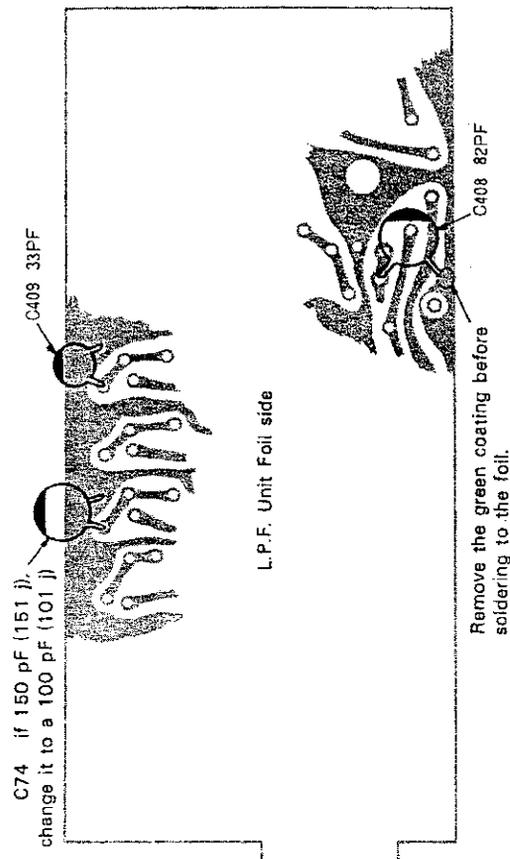
8. Install C409, 33pf, 500V (33j) as shown in **Fig. 14**.
9. Install C408, 82pf, 500V (82j) as shown in **Fig. 14**. Remove the green coating before soldering to the foil.
10. Using the supplied White lead, add 2 jumpers: A1 to B2, and A2 to B1. See **Fig. 15**. Parts installation is complete for this section.



**Fig. 12**



**Fig. 13**



**Fig. 14**

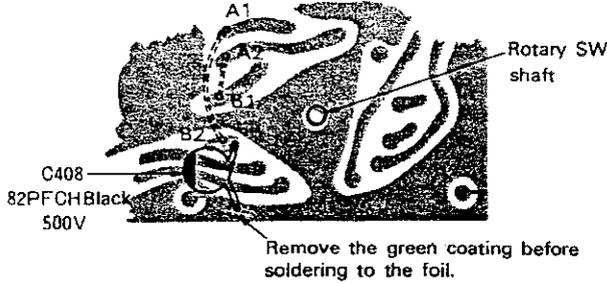


Fig. 15

## VI. REASSEMBLY

### COILPACK

1. Place the radio on its side, bottom facing you.
2. Jockey the Coilpack unit into position, sliding the 2 shafts into their couplings at the front of the radio.
3. Replace 3 self tapping and 2 machine screws holding the unit to the chassis.
4. Recable the multiconnector and coax lines.
5. Resolder the ground lead to the XMIT VFO FIX M pushswitch.
6. DO NOT tighten shaft coupling until the LPF unit is installed.
7. Reinstall the RF unit from the top and secure by 2 screws.

### PLL

1. Replace the PLL unit in its enclosure and replace 6 screws.

2. Reinstall the Matrix board.
3. Re cable connectors 55-58.
4. Reinstall the PLL to the chassis and secure by 4 screws.
5. The top cover will remain off until alignment is complete.

### LPF

1. Re cable the multiconnector and 2 coax lines. The long coax lead plugs in closest to the adjustments section, and the short coax lead plugs in farthest from the adjustments.
2. Replace the brass strip under the right rear screw and secure.
3. Replace the remaining 3 screws holding the LPF unit to the chassis.
4. Loosen the setscrew from the shaft coupling and slide the coupling forward on to the Coilpack bandswitch shaft. The shaft may be adjusted for proper front to back spacing.
5. Reinstall the spring across the bandswitch (part G01-0809-04).
6. Tighten ALL shaft coupling setscrews for the Bandswitch in 2 steps. First, tighten those already facing out. Then rotate the switch for the second set, front and rear of the Coilpack.
7. Tighten the Drive control shaft coupling setscrews. Be sure the Drive control can rotate through its range.
8. Afix the supplied legends at the Bandswitch: AUX 1 = 18 MHz, AUX 2 = 24.5 MHz, and WWW = 10 MHz. Installation of the modified units is complete.

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## VII. ALIGNMENT

### PLL

1. Connect DC power. Set the VFO to 0. Connect a DC VTVM to TP 3 and Ground. Connect a frequency counter to TP 1 and Ground.
2. Place the Bandswitch to 18 MHz and adjust T01 (PINK) for 2V DC. Counter reading should be 26.83 MHz.
3. Place the Bandswitch to 24.5 MHz and adjust T02 (VIOLET) for 2V DC. Counter reading should be 33.33 MHz.
4. Remove the counter lead from TP 1 and connect an RF VTVM. 0.6V +3dB/ -2dB is acceptable for these bands.
5. Check TP 1 frequencies across both bands against Table 1.

### COILPACK

1. Set controls as follows:  
Mode Switch to NOR  
Mic gain to 0 (minimum)  
Drive control at 12 o'clock
2. Connect the Signal generator to the TS-180S.  
**CAUTION:** DO NOT TRANSMIT with the SSG connected!
3. Place the Bandswitch to 18 MHz, VFO to 100, SSG to 18.1 MHz. Peak L101, L102 (AUX 1) (PINK).
4. Place the Bandswitch to 24.5 MHz, VFO to 450, SSG to 24.950 MHz. Peak L201, L202 (AUX 2) (VIOLET or BLACK) coils.  
**NOTE:** The board callout for L201 may read L102 in error, as previously noted in Fig. 9.
5. Disconnect the SSG and connect the dummy load.
6. Set controls as follows:  
Mode SW to CW W  
RF PWR control full Clockwise (max)  
Meter Sw to ALC  
Drive Control 12 o'clock
7. Place Bandswitch to 18 MHz, VFO to 100. Adjust VR 5 on the IF unit in TX for an Ic scale reading of 8A. (There is no exact mark for this point on the ALC scale. Meter Sw to ALC, but read the Ic scale).
8. Place the Bandswitch to 24.5 MHz, VFO to 450. Adjust VR 5 on the IF in TX for an 8A reading on the Ic scale, with the meter switch in ALC.
9. Place the Bandswitch to 10 MHz, VFO to 250. Adjust VR 11 on the IF unit for an 8A reading on the Ic scale. Adjustments are complete.

VFO Scale \ BAND	0	250	500
18 MHz (AUX-1)	26.83 MHz	27.08 MHz	27.33 MHz
24.5 MHz (AUX-2)	33.33 MHz	33.58 MHz	33.83 MHz

Table 1

### III. FINAL ASSEMBLY

1. Remove power from the radio.
  2. Reinstall the PLL top cover, 4 screws.
  3. Replace the Bottom cover, recable the speaker lead, and reinstall the top cover.
- The radio is now capable of operation on the original 6 Amateur bands, plus the 3 new (but as yet unauthorized) WARC bands. Protect your Amateur license! Do not transmit on unauthorized frequencies.

### IX. SPECIFICATIONS

Specifications for the added bands are:

#### Frequency Range

<b>30 m band</b>	10.1 — 10.15 MHz
<b>17 m band</b>	18.068 — 18.168 MHz
<b>12 m band</b>	24.890 — 24.990 MHz

#### TRANSMITTER SECTION

##### Input Power

TS-180S

**SSB**

160W

**FSK**

100W

**Harmonic Radiation**

Better than 40 dB down from the output signal

**Spurious Radiation**

Better than 50 dB down from the output signal

#### RECEIVER SECTION

**Receiver sensitivity**

0.25  $\mu$ V S + N/N 1 more

**Image Rejection**

Image frequency better than 60 dB down from the signal

**IF rejection**

IF frequency is 80 dB down from the output signal

P7, item 1, add D022.

P8, change R50 to R43, 220Ω.

P12, item 8, change VR11 to VR7.

Fig 6. Change C43 to C011.

Between T11, T12, dot

is C74.

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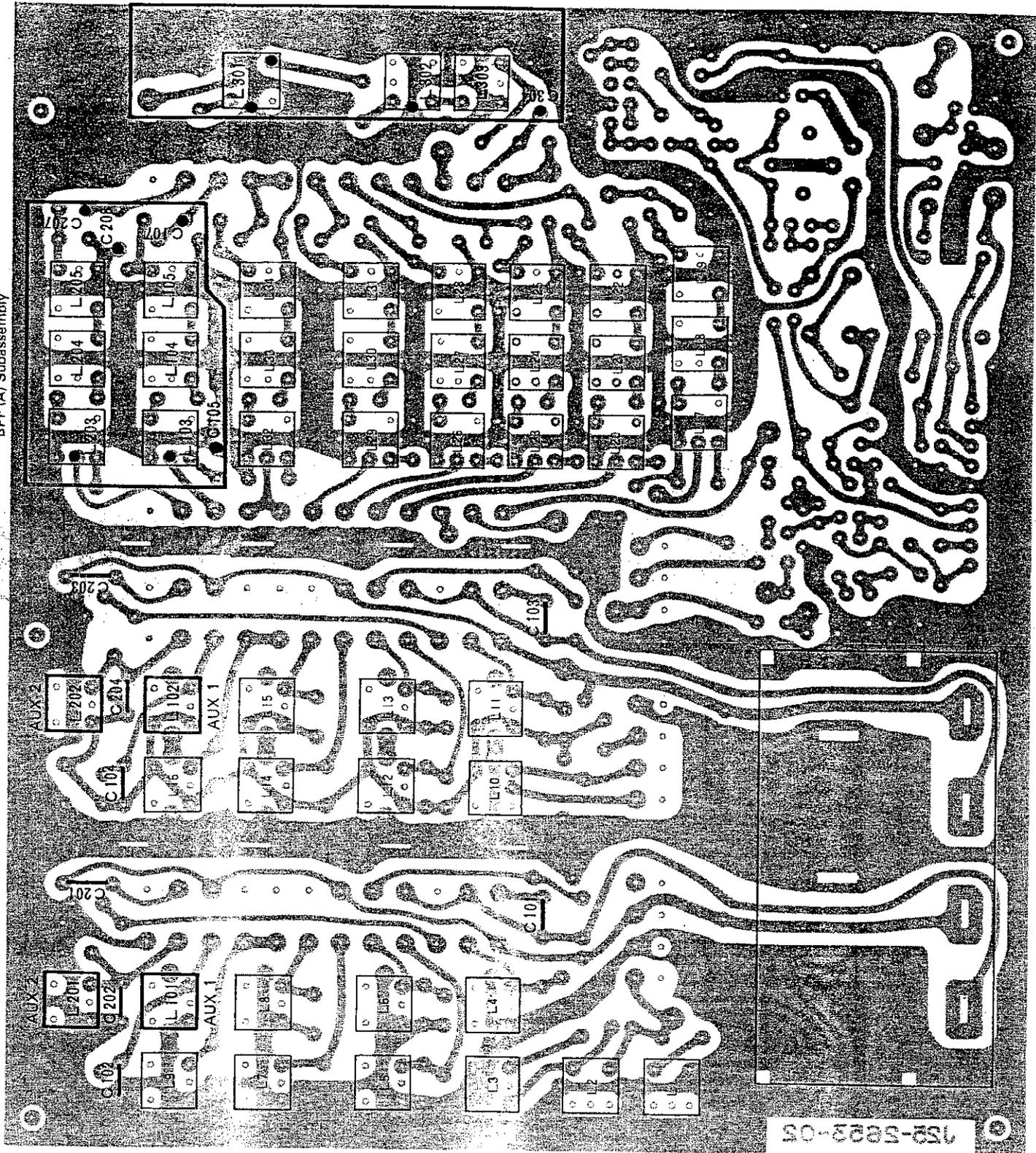
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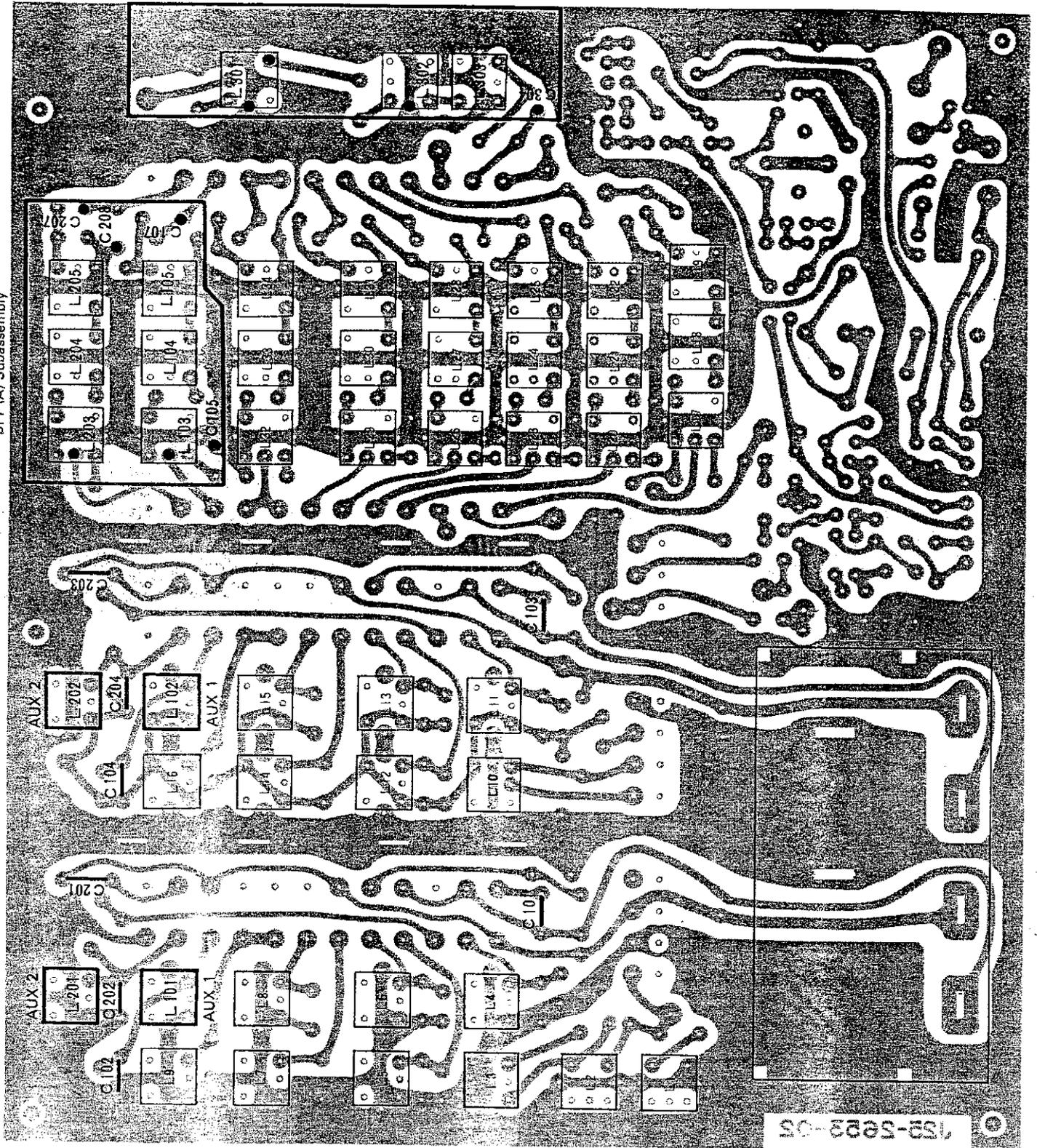






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Fig. 9 COILPACK UNIT PCB



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Fig. 9 COILPACK UNIT PCB