

Kit Assembly and Instruction Manual  
for T-KIT Module Board Kit  
Model No. 1551

## Speech Processor

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***IMPORTANT: Please read Warranty Terms  
and entire manual text  
BEFORE starting kit assembly.***

*... A quality electronics kit project from*

**T-KIT**

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# T-KIT 1551 Speech Processor KIT PARTS LIST

Please check and organize all parts before starting construction.  
See T-KIT Warranty if you suspect any parts are missing.

Quantity	Description and Value	Schematic	Part No.
<b>Fixed Resistors</b>			
The 3 color bands denote resistance value. The 4th band (gold) denotes 5% tolerance.			
5	<input type="checkbox"/> 1K (brown-black-red)	R3,9,11,13,14	30333
8	<input type="checkbox"/> 10K (brown-black-orange)	R5,8,10,12 16,17,18,20	30296
2	<input type="checkbox"/> 15K (brown-green-orange)	R4,R15	30297
1	<input type="checkbox"/> 47K (yellow-violet-orange)	R1	30300
1	<input type="checkbox"/> 330K (orange-orange-yellow)	R2	30302
3	<input type="checkbox"/> 1 megohm (brown-black-green)	R6,R7,R21	30360
<b>Fixed Capacitors</b>			
2	<input type="checkbox"/> .01 uF (marked 103)	C1,C8	23260
1	<input type="checkbox"/> .1 uF (marked 104)	C2	23261
8	<input type="checkbox"/> 1 uF electrolytic	C3-7,9,10,12	23264
1	<input type="checkbox"/> 4.7 uF electrolytic	C13	23310
1	<input type="checkbox"/> 33 uF electrolytic	C11	23308
1	<input type="checkbox"/> 100 uF electrolytic	C14	23189
<b>Semiconductor Devices: Transistor, Diodes, Integrated Circuits:</b>			
1	<input type="checkbox"/> NPN transistor type MPS6514	Q1	25054
3	<input type="checkbox"/> 1N4148 silicon rectifier diode	D1,D2,D3	28001
2	<input type="checkbox"/> LM358 dual op-amp 8 pin DIP IC	U1,U2	25117
<b>Other Components, Hardware:</b>			
1	<input type="checkbox"/> Circuit Board for Model 1551		93103-2A
1	<input type="checkbox"/> 10K potentiometer	R19	30267
1	<input type="checkbox"/> 10K miniature trimmer	R22	30263
1	<input type="checkbox"/> Model 1551 Kit Instruction Manual		74329

### REQUIRED, NOT SUPPLIED:

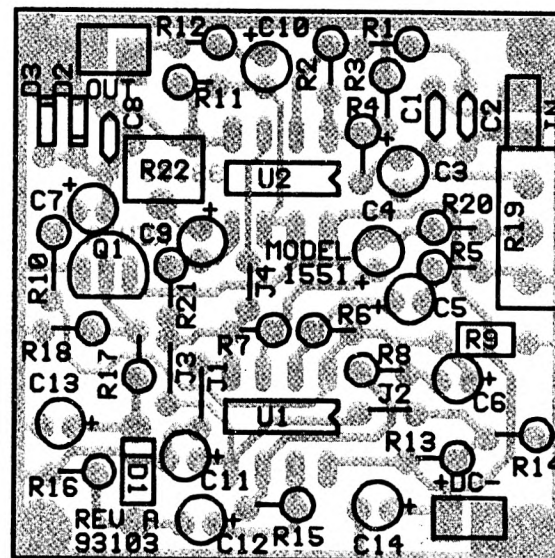
- Battery or regulated, well-filtered 12-15 Volts DC
- metal enclosure (or other RF shielding) for speech processor circuit board
- chassis microphone connector
- microphone connector to transmitter/transceiver
- shielded audio cable

### MINIMUM TOOLS AND TEST EQUIPMENT:

- 15 to 35 watt soldering iron
- diagonal cutters or wire "nippers"
- needle-nose pliers
- adjustable wire stripping tool
- small screwdriver (to adjust R22)
- VTVM or DVM

# T-KIT Model 1551 Speech Processor X-RAY View of Circuit Board

**NOTE:** Your T-KIT circuit board is quality glass epoxy, etched, cleaned and screen-printed in the TEN-TEC plant to the high standards required by our transceiver assembly lines and modernized wave-soldering system.



## Installing Parts on the Circuit Board:

When we say "INSTALL" a part, we mean:

- Choose correct part value
- Insert in correct PC Board location
- Insert *correctly*, if there is a right way and wrong way such as for diodes, IC's, electrolytic capacitors, transistors etc.
- Solder all wires or pins
- Trim or "nip" excess wire lengths

**USE ROSIN-CORE SOLDER ONLY,**  
of a type intended for electronic PC-board assembly.  
(Available at electronics distributors or Radio Shack stores.)  
**DO NOT use hardware store solder, paste or flux.**  
**Solder contains LEAD: wash hands before eating!**

## Circuit Board Assembly

While the parts may be soldered in any order convenient to you, the following steps provide many helpful details.

1. Install U1, LM358 dual op-amp, being sure to orient the notched or banded end of the IC with the notch outlined on the board. Solder all 8 pins, being careful not to form solder bridges across the pads.

2. Referring to Step 1, install U2, the other LM358 IC.

3. In this design, ALL resistors except R9 are installed vertically to save space. Simply follow the outlines on the board, standing the body of the resistor against the board in the circle area, looping the other wire through the hole at the end of the short line. Solder and trim both leads.

Install all resistors in any order convenient to you per No. 3:

4. R3, 1K (brown-black-red).

5. R9, also 1K. (normal style of installation)

6. R11, also 1K.

7. R13, also 1K.

8. R14, also 1K.

9. R5, 10K (brown-black-orange).

10. R8, also 10K.

11. R10, also 10K.

12. R12, also 10K.

13. R16, also 10K.

14. R17, also 10K.

15. R18, also 10K.

16. R20, also 10K.

17. R4, 15K (brown-green-orange).

18. R15, also 15K.

19. R1, 47K (yellow-violet-orange)

20. R2, 330K (orange-orange-yellow)

21. R6, 1 megohm (brown-black-green)

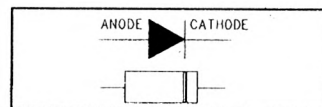
22. R7, also 1 megohm.

23. R21, also 1 megohm.

24. Install diode D1, type 1N4148, noting that its banded cathode end must match the schematic symbol on the board.

25. Install diode D2 per Step 24.

26. Install diode D3 per Step 24.



27. Install NPN transistor Q1, being sure to orient the flat side per the board outline.

28. Install C1, .01 uF (marked 103).

29. Install C8, also .01 uF.

30. Install C2, .1 uF (marked 104).

The circuit board layout requires installation of four jumper wires (J1-J4), which are made from scrap resistor or capacitor leads trimmed after soldering. Install the jumpers:

31. Jumper wire J1.

32. Jumper wire J2.

33. Jumper wire J3.

34. Jumper wire J4.

35. Install R22, the 10K trimmer potentiometer.

36. **Please read:** The circuit uses 10 polarized electrolytic capacitors. Each MUST be installed with correct polarity per the (+) signs screened on the board. The positive wire of the capacitors themselves is the longer one, and the negative side is identified clearly by the dark stripe on the capacitor body.

37. Install C3, 1 uF electrolytic per Step 36.

Referring to Step 36 as needed, install the remaining electrolytic capacitors, oriented for correct polarity:

38. C4, 1 uF

39. C5, 1 uF

40. C6, 1 uF

41. C7, 1 uF

42. C9, 1 uF

43. C10, 1 uF

44. C12, 1 uF

45. C13, 4.7 uF

46. C11, 33 uF

47. C14, 100 uF

48. Unless you plan to locate the R22 10K potentiometer Processor Gain control at a point away from the board, install R22 on the board now.

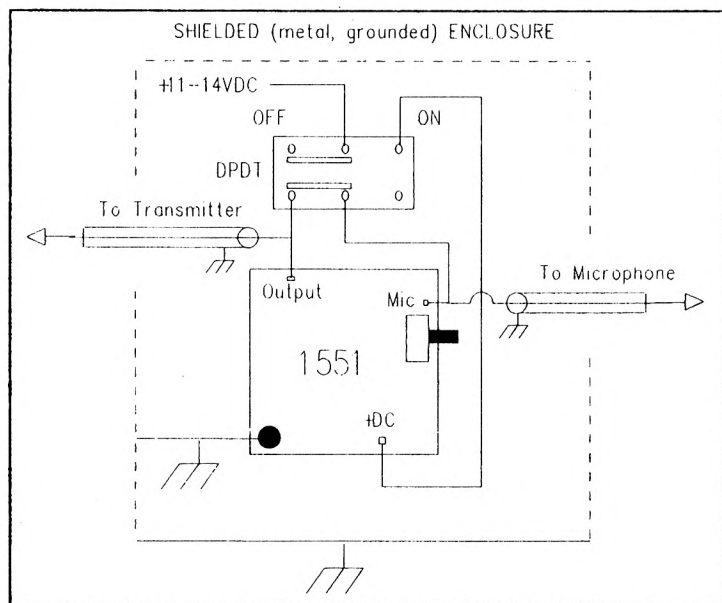
49. Double-check all previous steps before proceeding.

## Installation

The DC voltage supply must be free of AC hum. Shielded cable **MUST** be used for audio connections. Unless your transceiver has a provision for monitoring transmit audio (using headphones) while producing little or no RF output, it will be necessary to make a fairly complete installation before testing. This is because the unshielded circuit board is quite susceptible to stray RF, which is the cause of most speech processor problems.

Whether mounted inside a transceiver or in an external unit, the speech processor installation should have a provision for switching it in and out of the microphone line. A DPDT switch can be used for both DC on/off and processor in/out functions. For proper RF shielding, a metal enclosure and shielded cables must be used. This matter of RF shielding cannot be overstressed, because stray RF getting into this sensitive audio circuit is the primary cause of speech processor problems. It would be good practice to use .01  $\mu\text{F}$  bypass capacitors on any accessory lines (PTT, etc.) passing through the processor enclosure between the microphone and transceiver.

Use the following diagram as a guide for designing your actual installation:



## First Tests, Adjustments

Unless you have or know someone who has real transmit audio expertise, it may be difficult to get useful information about the effectiveness and proper adjustment of your speech processor through casual on-the-air queries. The best way to become familiar with the effect of speech processing on your signal is to set up a second receiver with headphones, use a dummy load and lowest RF power level, and . . . talk to yourself while switching the processor in and out and adjusting the control! If you are a newcomer or have only a casual interest in SSB operation, please DO get some tips from an experienced SSB operator about the do's and don'ts of speech processing.

Follow the transceiver manufacturer's instructions for adjustment of the microphone gain control for proper operation. Use of the processor circuit must not be permitted to exceed peak meter readings or LED indications specified for the equipment.

Trimmer R22 is adjusted so that the basic gain or talk power is at the same level with the processor in the microphone line as when it is not. More precisely, the peak levels of processed and unprocessed audio reaching the transmitter mike input should be the same.

### PROCESSOR ADJUSTMENT NOTES:

