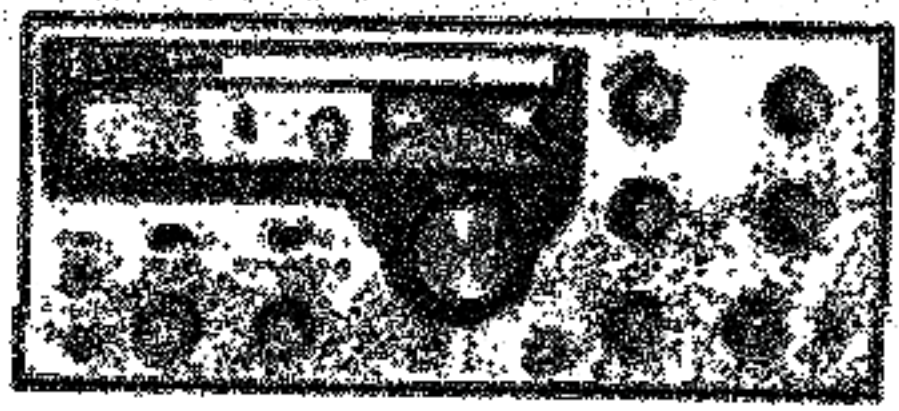
TEMPO ONE

SERVICE MANUAL



TEMPO RADIO CO.

TEMPO ONE SERVICE MANUAL

ALIGNMENT PROCEDURE FOR THE TEMPO ONE

1. "Operate" switch in calibrate.
2. VFO dial at 300 KC.
3. "Function" switch to "Tune".
4. Grid at 12 o'clock.
5. AF and RF Gain at a level which will allow you to listen and also enable you to hear a 100 KC calibrated tone.
6. Put PO-IC-ALC select switch in IC position.
7. Clarifier off.
8. Mic gain at 9 o'clock.
9. VFO Select at "Normal".
10. PTT-VOX in PTT position.

Band Alignment for Receiver

1. Band switch at 3.5. Align L7 and L12 for maximum "S" meter level or maximum calibrate signal.
2. Band switch to 7.0. Adjust TC-1 and TC-2 for maximum "S" meter reading or maximum calibrate signal. Also L8.
3. Band switch to 14.0. Adjust L10 and L15 for maximum "S" meter or maximum calibrate signal.
4. Band switch to 21.0. Adjust L9 and L14 and L6 for maximum "S" meter or calibrate signal.
5. *Bandswitch at 28.5. Adjust L3, L8 and L13 for maximum "S" meter reading or maximum calibrate signal.
   *Note: If optional crystals were included in 28.0, 29.0 or 29.5, do not adjust coils, but align respective trimmers TC203, TC205 and TC208 for maximum calibrate signal.
   For this alignment, grid is set as follows:
   28.0 grid at 9 o'clock - adjust TC203
   29.0 grid at 2 o'clock - adjust TC205
   29.5 grid at 4 o'clock - adjust TC208
   These trimmers are located on the local oscillator board.

Transmitter alignment for the Tempo One. All settings are the same except for the "Operate" switch.

1. "Operate" switch on Operate (no more than 10 seconds while tuning the transmitter.)
2. Peak all bands for maximum output on a 50 ohm dummy load or by observing the "S" meter.
3. 3.5 peak on dummy load for maximum output by peaking L7 and L12.
4. 7.0 peak for maximum output with TC1, TC2 and L8.
5. 14.0 peak for maximum output L10, L15.
6. 21.0 peak for maximum output L6, L9 and L14.
7. 28.5 peak for maximum output L3, L8 and L13.

Peak 28.0, 29.0 and 29.5 by peaking trimmers TC203, TC205 and TC208 in their respective grid positions.

TEMPO ONE INFORMATION

CHANGING THE BAND COVERAGE

The Tempo One is supplied for use on amateur bands. However, in cases where the unit is willing to operate outside of the standard frequency ranges, he can substitute an adjacent, special range by changing the appropriate high frequency crystal.

The substitution is easiest on the 10 meter band because there are 4 frequency ranges. On the Tempo One two of these ranges do not have the crystal supplied with the unit. For special frequencies of 1 MHz or less up or down from the amateur bands, such as MARS frequencies or others, you can achieve coverage by replacing the high frequency crystal with another crystal higher or lower in frequency.

The only exception to this rule on the Tempo One is the 160 meter range below 3.5 MHz. This range is too low for the tuned circuits of the equipment. You should remember however that the further away from the amateur bands you get the more out of resonance you become. To reduce this reduces the sensitivity of the receiver and in transmit the power output of the transmitter is reduced. Also be careful if you are too far from the standard circuit, you will begin to burn out components.

For the Tempo One the crystals are as follows:

X201 for 7.0 MHz is [illegible] MHz standard crystal
X202 for [illegible] MHz is [illegible] MHz standard crystal
X203 for [illegible] MHz is [illegible] MHz standard crystal
X204 for [illegible] MHz is [illegible] MHz standard crystal
X205 for [illegible] MHz is [illegible] MHz standard crystal
X206 for [illegible] MHz is [illegible] MHz standard crystal

For 3.5 and 14 MHz you have to change frequency crystal, but this would change the frequency range of more than one band. For example 80, 15, and 10 are tuned together. If you increase the frequency coverage on 80 you will also increase the frequency coverage on 15 and 10. And in the same way 40 and 20 are tuned together. If you change the crystal to change one band you will change the other. For this reason we do not recommend changing your frequency coverage on 80 or 20 meters.

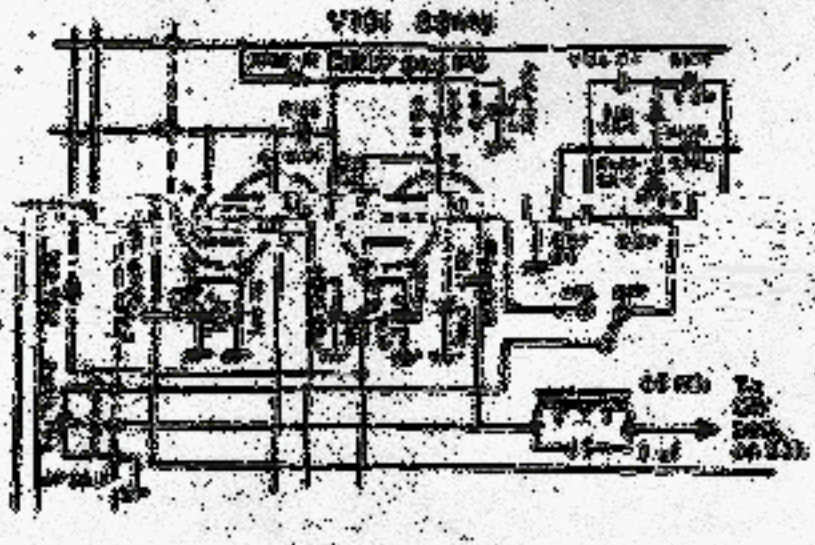
Crystal Specifications HC-6U.

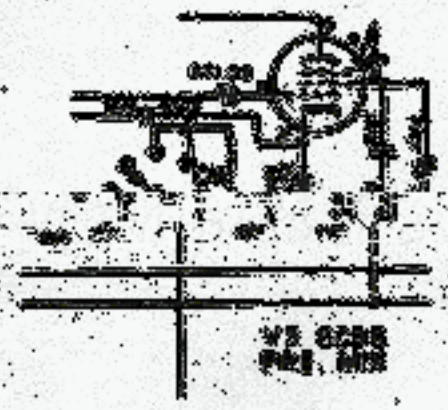
FIXED FREQUENCY TEMPO OPERATION WITH EXTERNAL VFO

3.5 - 4.0 MHz	Fx = [illegible] - Fo	([illegible])
7.0 - 7.5 MHz	Fx = Fo - [illegible]	([illegible])
14.0 - 14.5 MHz	Fx = Fo - [illegible]	([illegible])
21.0 - 21.5 MHz	Fx = [illegible] - Fo	([illegible])
[illegible] - [illegible] MHz	Fx = [illegible] - Fo	([illegible])
[illegible] - [illegible] MHz	Fx = [illegible] - Fo	([illegible])
[illegible]	[illegible]	[illegible]

A HIGH "Q" BANDPASS AUDIO CW FILTER FOR THE TEMPO ONE

You can easily make a very simple high "Q" band-pass audio filter for extra sharp CW reception of the Tempo One. A parallel resonant 600 Hz filter, consisting of one 68 mh coil and one 1 uf capacitor (at least 25 V, mylar type), is connected from the center terminal of VR3 (the AF Gain Control) to ground. The ground connection is used to select the filter in and out. The switching can be done conveniently using the back wafer of the function switch (SW1) or manually by adding a SPST switch to the front panel of the transceiver.





TEMPO ONE DIAL ADJUSTMENTS

If adjustment of the Tempo One dial should become necessary, there are six possible conditions to be considered. A brief description of each and its remedy is outlined below.

First remove the Tempo from its cabinet.

CONDITION ONE: A dial will not turn even though the frequency changes when the VFO tuning knob is turned.
PROBLEM: The set screws in the knobs are loose.
REMEDY: Tighten the set screws.

CONDITION TWO: The VFO capacitor moves when the knob is turned, as the frequency changes, but the 50 KHz [illegible] dial and the 1 MHz [illegible] the [illegible].
PROBLEM: The [illegible] the VFO knob is [illegible] or its [illegible] is [illegible] the 1 MHz [illegible] dial.
REMEDY: [illegible] the [illegible] or release the brake.

CONDITION THREE: The 1 MHz [illegible] the 50 KHz [illegible] and the VFO capacitor [illegible] turn.
PROBLEM: The set screws on the planetary drive have slipped.
REMEDY: (a) Tighten the set screws.
(b) Check the gears to be sure they are turning freely.
(c) Check the synchronization between the 1 MHz dial and the 50 KHz dial. If it is incorrect, proceed directly to the VFO DIAL SYNCHRONIZATION PROCEDURE.
NOTE: [illegible] the 1 MHz dial synchronization [illegible] on the 1 MHz dial [illegible] to the [illegible] of the VFO shaft and that the 50 KHz dial is [illegible] in the [illegible]. If [illegible], proceed directly to the VFO DIAL SYNCHRONIZATION PROCEDURE. [illegible] the set screws on the planetary drive.

CONDITION FOUR: [illegible] except the 50 KHz [illegible].
REMEDY: Perform steps 1 through 11 of the VFO SYNCHRONIZATION PROCEDURE.

CONDITION FIVE: [illegible] except the VFO capacitor so that the frequency does not change [illegible].
PROBLEM: The set screws [illegible] the VFO gear are loose.
REMEDY: [illegible] the VFO gear and tighten the set screws on the shaft.

CONDITION SIX: There is [illegible] between the 1 MHz dial and the VFO knob.
PROBLEM: The set screws that hold the [illegible] against the 1 MHz dial are too loose.
REMEDY: (a) Remove the VFO knob.
(b) Remove the [illegible] VFO [illegible].
(c) Remove the [illegible] the VFO shaft.
(d) Remove the [illegible] from the [illegible] of the front panel. [illegible] the [illegible] and "S" meter panel. Do not remove the screw that holds the pilot lamps.
(e) [illegible] the main front panel [illegible] for the [illegible] by the rotary switch.
(f) The [illegible] against the 1 MHz dial should now be exposed.
(g) Gently tighten the screws that hold these [illegible]. If these screws are too tight it will be difficult to operate the VFO.
(h) Replace the panel, screws and knobs.

VFO DIAL SYNCHRONIZATION PROCEDURE

(1) Make sure that at least one set screw on the planetary drive is tight. At this point do not be concerned where the 1 MHz dial is set.
(2) [illegible] the 50 KHz dial to the [illegible] until it becomes tight and will not move on its [illegible]. [illegible] the 50 KHz dial [illegible] the [illegible].
(3) [illegible] the [illegible] and apply the power to the set. Turn on the calibrator.
(4) Turn the frequency knob [illegible] until the 50 KHz dial indicates zero. [illegible]
(5) If the 50 KHz dial [illegible] the VFO knob until the [illegible].
(6) [illegible] the [illegible] on the 1 MHz dial. Turn the VFO knob clockwise approximately 50 KHz [illegible] on the 1 MHz dial until the calibrator signal is heard and zero beat the signal.
(7) [illegible] the [illegible] with your right thumb, loosen the 50 KHz dial.
(8) [illegible] the VFO knob [illegible] the next few steps.
(9) The 50 KHz dial should be [illegible] to the point where [illegible] of the [illegible] is [illegible]. It may be necessary to [illegible] to [illegible] the [illegible].
(10) [illegible] the 50 KHz dial to the right until you find the [illegible] and the dial [illegible] in the right hand window. [illegible] that the VFO is still zero beat.

1 MHZ DIAL SYNCHRONIZATION

(11) [illegible] the calibrator [illegible]. [illegible] the VFO knob [illegible] it [illegible] beyond the [illegible]. [illegible] the calibrator [illegible].
(12) [illegible]. Loosen the set screws on the planetary drive. [illegible] the 1 MHz dial [illegible] of the 50 KHz dial and the VFO capacitor.
(13) Set the 1 MHz dial to [illegible].
(14) Tighten the set screws on the planetary drive.

SERVICE NOTES - Kenwood and Tempo Equipment

TS-[illegible] matching final tubes. We have found it is not wise to replace only 1 of the final tubes. We suggest that you use RCA 6LQ6's. After installing two new tubes, adjust resting current in either upper or lower sideband mode for 40 ma. Leave set keyed without drive (modulation) for at least 15 minutes before proceeding. This will allow tubes to match themselves. Then proceed to neutralize.

PS-[illegible] Presently over-fused in our opinion. Using a 10 amp. fuse and we feel a 6 amp. fuse is better. If you have access to any PS-[illegible] power supplies at the time of the sale, we suggest you install a 6 amp. fuse and instruct your customer to use 6 amp. fuses.

Tempo One - Recent deliveries have come through with a different antenna relay. Originally the antenna relay was a [illegible] relay (P/N [illegible]). Recent shipments of Tempo One transceivers use a [illegible] relay (P/N [illegible]). Should you get a request from your customer for an antenna relay, please determine which relay they need.

MODIFICATION FOR IMPROVED PRODUCT DETECTOR FOR THE TEMPO ONE

PURPOSE: To improve the linear characteristics of the product detector in the Tempo One, providing smoother voice reproduction.

PROCEDURE:

(1) Unsolder and remove R129 and replace it with a 220 K ohm resistor.

(2) Unsolder and remove L106 and replace it with a 270 ohm resistor.

(3) Unsolder and remove R132 and replace it with a 10 K ohm resistor.

(4) Connect a 330 K ohm resistor between V102, pin 3, and the junction of R126, R127, and R128. The modification is then complete.

COMPONENTS REQUIRED:

1 220 K ohm carbon resistor, ½ watt, 10%
1 270 ohm carbon resistor, ½ watt, 10%
1 10 K ohm carbon resistor, ½ watt, 10%
1 330 K ohm carbon resistor, ½ watt, 10%

SCHEMATIC:

10 METER BAND CRYSTAL INSTALLATION FOR TEMPO ONE TRANSCEIVERS.

1. Insert band switch at 28.5. Install 42.5 MHz crystal in the X28S position of Circuit Board 60 2001.
2. Remove the VFO plug at the rear of the Tempo One, and with a VTVM RF probe or wideband oscilloscope, measure the RF injection voltage at Pin 2 of V3. Tune the TC 202 for maximum RF VOLTAGE. The reading will usually be 3 volts.
3. Put the VFO plug into the VFO jack on the back of the Tempo One. Tune the VFO oscillator to 200 (plate dial calib. with your VFO frequency at 5.200 MHz, tune L3. Measure the intermediate frequency at Pin 9 of V1 with a frequency counter. The frequency should be 42.5-5.200 which equals 37.300 MHz.
4. In the transmit mode, the frequency of 37.300 MHz mixes with the crystal carrier oscillator at 8.0025 MHz or 8.0025. Your transmitter should oscillate at 28.300 MHz. (37.300 MHz - 9.00 MHz = 28.300 MHz.)
5. Tune the Xmtr grid-dip to 28.300 MHz. Connect this to your Tempo One antenna. Tune grid, L5 and L3, for maximum load.
6. Operate Tempo One in a density test. Fine tune L15, L2, and L5 until an output of 150 watts is reached.

DO THE SAME PROCEDURE WITH ALL 10 METER CRYSTAL INSTALLATIONS.

AUDIO ROLL OFF MODIFICATION FOR THE TEMPO ONE

PURPOSE: To limit the high frequency response of the last audio stage in the Tempo One in order to improve the quality of the sound of a weakened radio signal.

PROCEDURE:

(1) On the printed circuit board, break the path of the copper between V101 pin 3 and the junction of R102 and C102 by cutting the copper with a knife in two places and scraping off the copper between.

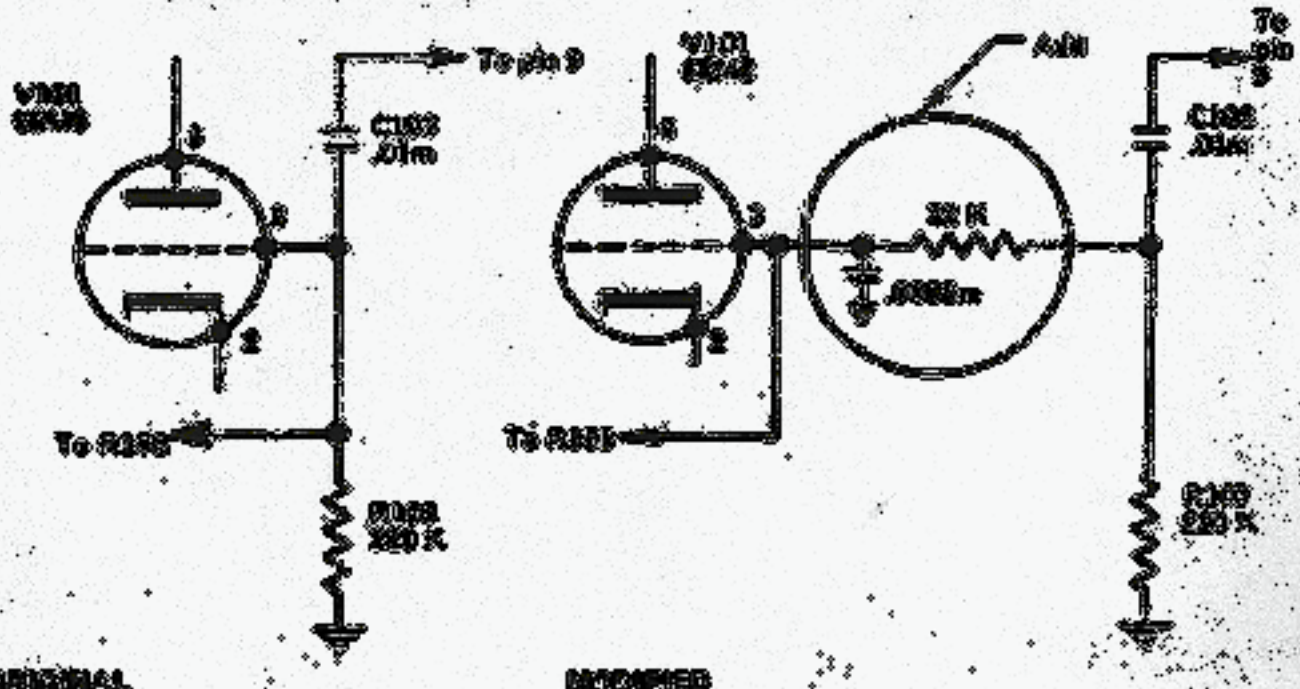
(2) Solder the 22 K ohm, ½ watt resistor between V101 pin 3 and the junction of R102 and C102.

(3) Solder the .0022 mf capacitor between V101 pin 3 and any convenient ground connection. The modification is now complete.

COMPONENTS REQUIRED:

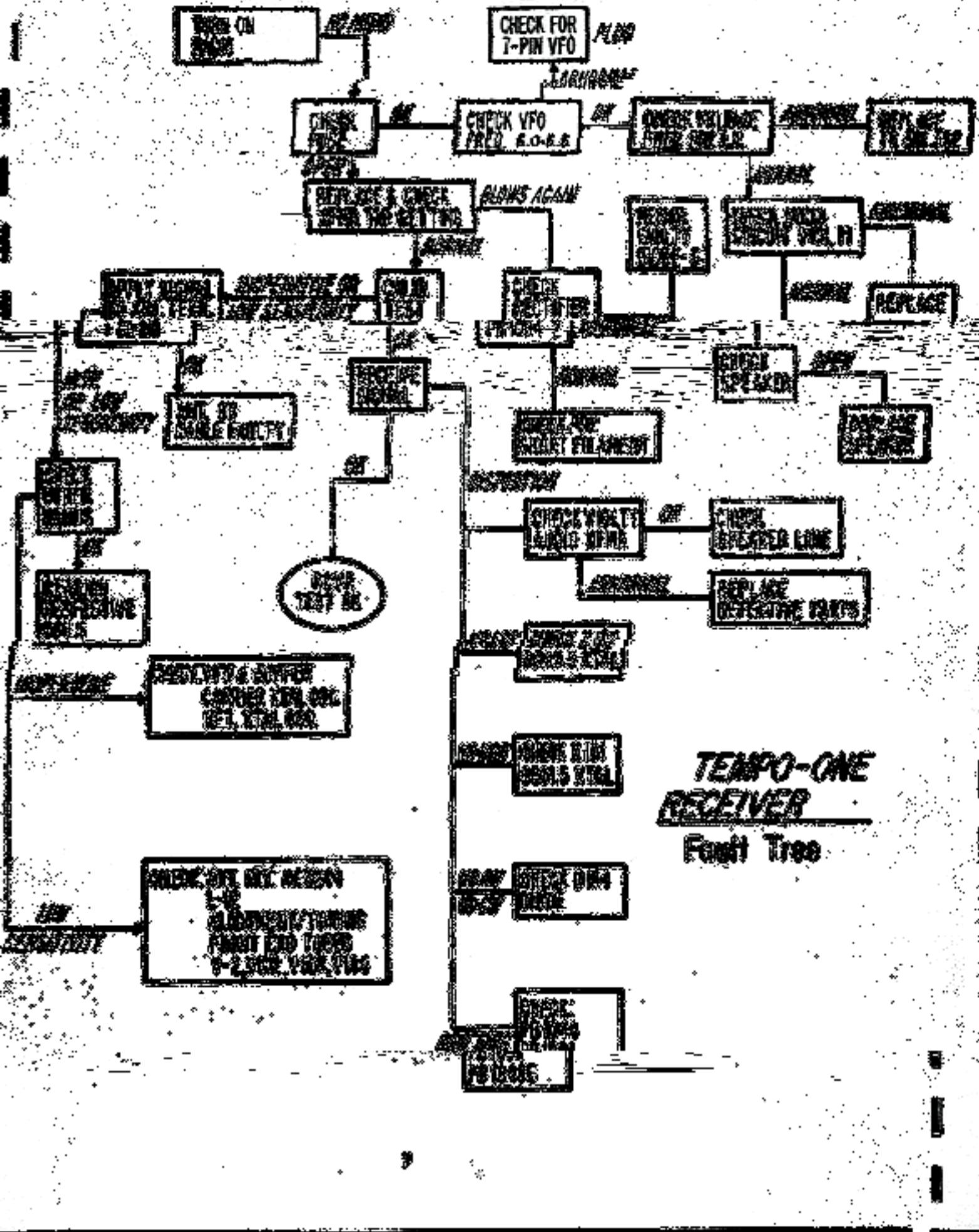
1 22 K ohm, ½ watt, carbon resistor, 10%
1 .0022 mf disc ceramic capacitor.

SCHEMATIC:



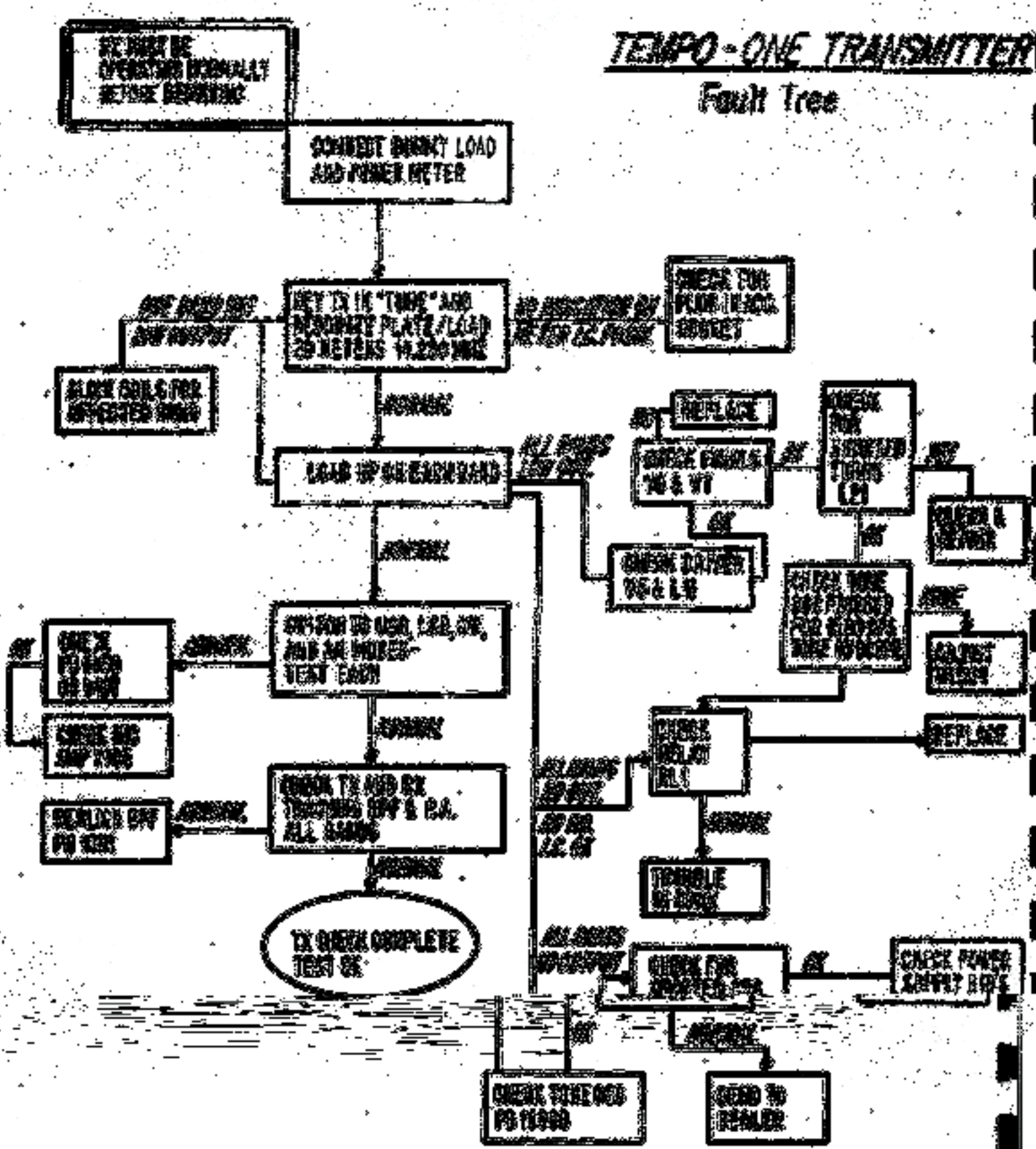
ORIGINAL MODIFIED

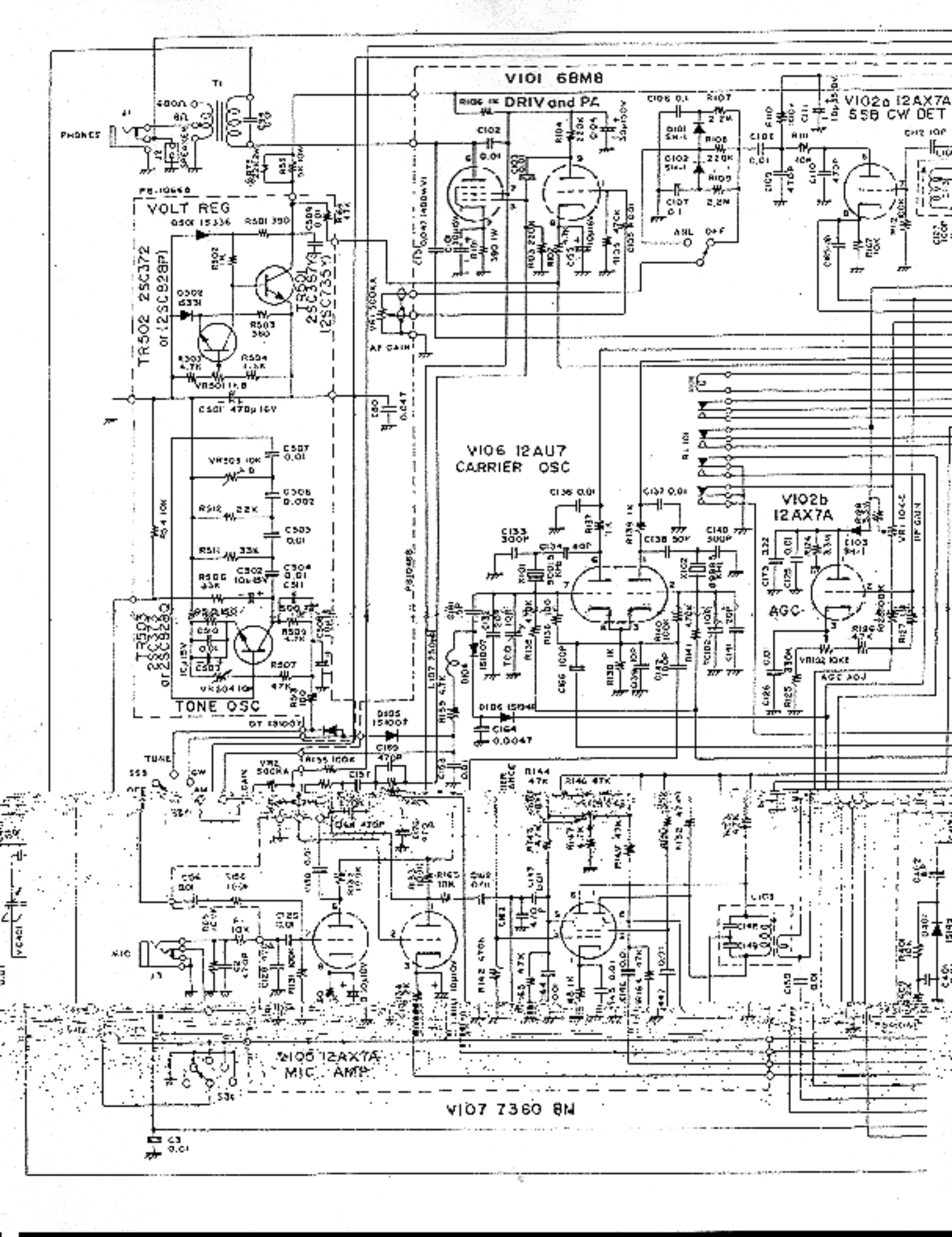
Roll off Modification for the Tempo One


CHECK FOR 7-PIN VFO
CHECK VFO
TEMPO-ONE
RECEIVER
Fault Tree

TEMPO - ONE TRANSMITTER

Fault Tree




V101 6BM8
DRIV and PA
V102a 12AX7A
SSB CW DET
VOLT REG
TR502 2SC372
or 12SC828(P)
TR501
2SC735(Y)
12SC735(Y)
AF GAIN
V106 12AU7
CARRIER OSC
V102b
12AX7A
AGC
TONE OSC
TUNE
SSB
CW
AM
V105 12AX7A
MIC AMP
V107 7360 8N
PHONES

V103 6BZ6
2nd IF AMP

V104 6BA6
1st IF AMP

L102

C122 100P

L103

9MHz
XTAL FILTER
XF101

L104

R78
220

P9

J9

R123
1K

C1009
0.047

0.047 50WV

R122
1K

HETERODYNE
OSC

L202

TR201 2SC372

PB-1041

RL-2

RX EXT

NOR

TX EXT

S8a

S8b

S1a

S1b

S2

S3a

S3b

VR8

3M 9
CARRIER

GPF

PB-1044

TR402 2SC372

TR401 2SC372

VFO OSC

VFO BUFF

TR801 2SC372Y

BUFF (2SC828R)

PB-1093

V1 6U8 REC MIX

V2 6BZ6 REC RF AMP

V8 6AV6 VO

R78 *220

P9

J9

R123 1K

C1009 0.047

C1011 0.047 50WV

R18 1.5M

C13 0.001

R20 470K

C15 0.01

C12 10P

R19 100K

C14 1K

R22 470K

C16 100P

20μH

L1

C78 0.01

R24 15K

C17 10P

20μH

L2

R36 33K

C18 0.001

C19 0.001

R26 470K

C20 100P

VR4 500K VOX GAIN

C1008 .01

R2 100K

C4 0.001

R3 2.2K

C5 0.01

R62 10K

VR3 100K ANTITRIP

RL-2

S8d

S8b

RX EXT

NOR

TX EXT

C11 20P

C44 10P

R43 2.2K

R28 1K

S4

S1c

S1d

S1e

S1f

L3 C23 50P

C92 60P

L4

C91 60P

C90 100P

L5 C89 100P

C22 50P

C1003 2-13P

L6

C27 0.01

R29 1.5K

R32 1K

L7

L8

C28 60P

L9

L10

C31 100P

C30 350P

R73 10K

C32 200P

TC1

C33 2000P

VC1 PRESELECTOR

R27 2.2K

C29 22μ 16CWV

V5 12BY7A DRIVER

C49 100P

L16

R70 56 1/2W

L24

R71 56

C43 470P

R41 5K

0.01

47K

100K

470

0.01

0.01

100K

10K

R47 47K

R63 22

BPF

R79 18K 3W

PB-1044

L601

C602

C604

40P

R603 22K

C601 350P

C603 350P

C605 170P

R602 1K

S3h

R130

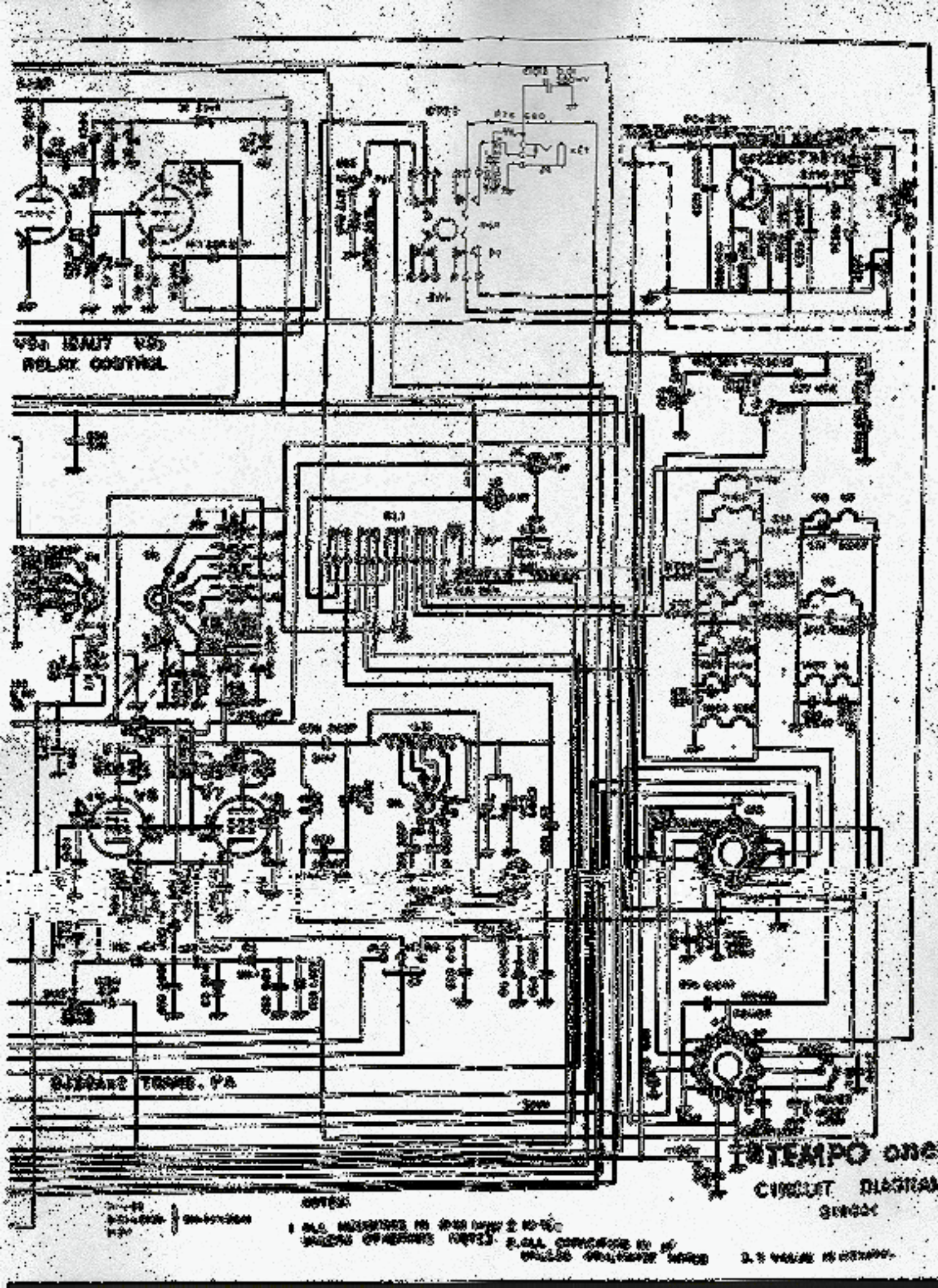
V3 6CB6 PRE MIX

V4 6EJ7 TRANS MIX

C25 0.01

'2Y

28P)


RELAY CONTROL
TEMPO one
CIRCUIT DIAGRAM