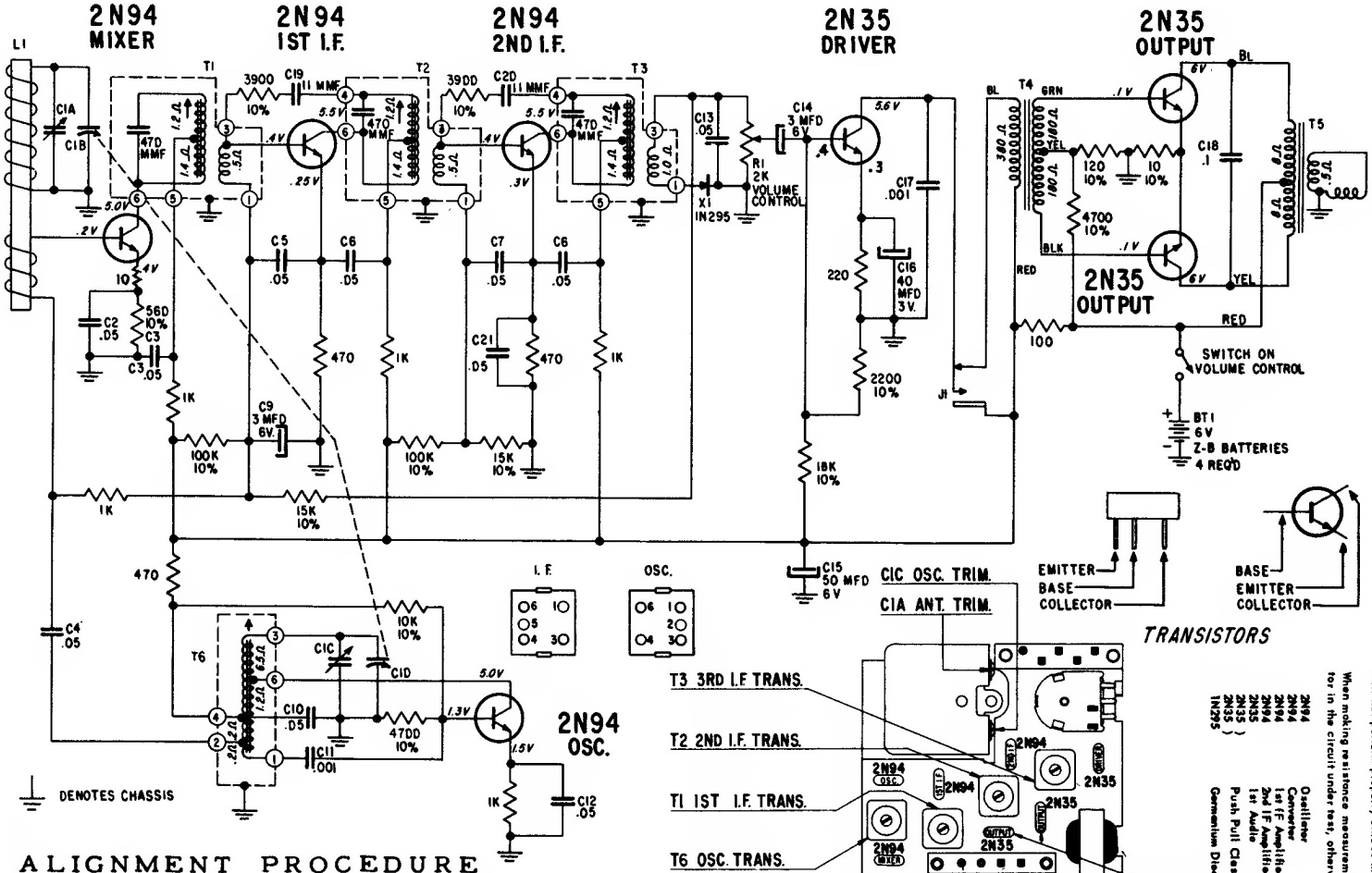
ZENITH RADIO CORPORATION

MODEL ROYAL 500 CHASSIS 7XT40



The "Royal 500" Seven Transistor Portable using Chassis 7XT40 is a conventional superheterodyne. One 2N94 is a mixer and another 2N94 is an oscillator to produce the 455 K.C. intermediate frequency. The first and second intermediate frequency amplifiers are relatively conventional, however, as in tubes when using a triode, it is necessary to neutralize them. On both the first and second I.F. we use a 3900 ohm resistor plus a 11 mmf capacitor for neutralization. The IN295 Germanium Diode is used as a diode detector and the A.V.C. voltage source.

Through the use of a high impedance earphone of approximately 2000 ohms one can obtain audio directly from 2N35 driver, thus a considerable saving can be effected in batteries since this creates a situation of practically no current drain by the push-pull 2N35's which are operated Class B. It is most imperative, in the event one of the push-pull 2N35's in the final should fail, that both transistors be replaced since they are installed as matched pairs and chances are they will not perform properly unless matched.

When making resistance measurements it is most important to remove the transistor in the circuit under test, otherwise readings obtained will be incorrect.

2N94	Oscillator
2N94	Converter
2N94	1st I.F. Amplifier
2N94	2nd I.F. Amplifier
2N35	1st Audio
2N35 }	Push Pull Class "B" Audio Output Matched Pair
2N35 }	
IN295	Germanium Diode Detector and A.V.C.

ALL RESISTORS 1/3 WATT, CARBON ±20% UNLESS OTHERWISE SPECIFIED.

ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.

ALL CONDENSERS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

D.C. VOLTAGES SHOWN ARE MEASURED WITH NO SIGNAL USING A A.C.-D.C. OR VACUUM TUBE VOLTMETER.

ALIGNMENT PROCEDURE

Operation	Input Signal Frequency	Connect Inner Conductor From Oscillator To	Connect Outer Shield Conductor From Oscillator To	Set Dial At	Trimmers	Purpose
1	455 KC	ONE TURN LOOSELY COUPLED TO WAVEMAGNET	Chassis	600 KC	Adj. T1, T2, T3 for maximum output.	For I.F. Alignment
2	1620 KC		—	Gang wide open	C1C	Set oscillator to dial scale
3	1260 KC		—	1260 KC	C1A	Align loop antenna
4	535 KC		—	Gang closed	Adjust slug in T6	Set oscillator to dial scale
5	REPEAT STEPS 2, 3 AND 4					

CHASSIS 7XT40 CIRCUIT #1
CHASSIS 7XT40 CIRCUIT #2
CHASSIS 7XT40Z
CHASSIS 7XT40Z1

MODEL "ROYAL 500" ALL TRANSISTOR RADIO

The "Royal 500" seven transistor portable has been produced with four basic chassis. This expedient was necessary to enable us to produce sufficient quantities by using transistors from many sources. All chassis have the chassis number stamped on them as well as a color identifying code on the battery compartment just above the battery installation instruction label. They are as follows:

Chassis 7XT40 - (Black) code dot
Chassis 7XT40 - (Maroon) code dot
Chassis 7XT40Z - (Red) code dot
Chassis 7XT40Z1 - (Green) code dot

The two 7XT40 chassis are very similar with the exception of the different coding on transistors. The transistors in these two chassis are manufactured by Sylvania.

The 7XT40Z uses transistors manufactured by Raytheon Mfg. Co.

The 7XT40Z1 uses transistors manufactured by Texas Instruments Inc.

In addition to this, each receiver has its individual transistor layout label and the color of the printing on these labels as well as the chassis number on these labels conforms respectively to the color dot and chassis number.

You will note that the initial 7XT40 circuit diagram illustrates an external earphone connection at the output of the driver transistor. This is also true of all the other chassis manufactured up to serial no. 33240. These chassis use an earphone part no. 39-20 which has an impedance of 2,000 ohms. Later on in receivers manufactured after serial number 33240, the earphone jack will be removed from the driver circuit and placed in the speaker voice coil circuit. A new earphone with an impedance of 15 ohms, part no. 39-22, will be required for this circuit.

ENGINEERING MODIFICATIONS

Since transistor circuitry is new and improvements are continually being discovered, Circuit 1 is for the original 7XT40 Chassis. The engineering staff has found ways to improve the AGC system as well as other portions of the circuitry. Therefore, the following engineering changes are design improvements on the original 7XT40 (See Circuit 2, 7XT40).

1. Originally the bias bleeder on the first IF stage was 100K and 15 K plus a 2 K volume control from B + to ground. The AGC by-pass of 3 mfd was at the junction of the 100 K and 15 K which meant that there was 15 K in series with the AGC current. During production the amount of AGC was found to be insufficient. The bias bleeder was then changed to 100 K, 4700, 4700 and 5 K volume control. The AGC by-pass of 16 mfd was put between the two 4700 ohm resistors.

2. 4700 and 47 K in junction with C15 and C16 were 2200 and 18 K respectively. This change was made to stabilize collector current of the driver transistor and slightly increase its gain.

3. In the event you do not wish to modify the circuit as in item 1, it is suggested that when servicing sets which exhibit AGC and overload problems, the bias bleeder of the first IF stage be changed. The original circuit had a 100 K and 15 K. These values should be changed to 47 K and 4700 ohms respectively. This in effect supplies more AGC voltage to the mixer and first IF.

4. You will note that C5 and C6 in the revised 7XT40 diagram have been terminated at ground and of course then the 470 ohm resistor from the 1st IF emitter must be by-passed with C23 a .05 condenser. C7 and C8 are terminated at ground for production convenience.

The 7XT40Z has not had any modifications up to the present time.

The 7XT40Z1 -

1. The 2200 ohm bias resistor in the 121-17 second IF transistor was 4700 ohms. It has been changed to 2200 ohms to reduce tweet, by slightly lowering gain.

2. 1 K resistor in the emitter of the 121-16 mixer was 470 ohms. This change was made to reduce tweet and noise.

3. On the patent & transistor layout label for 7XT40Z1 (Green Printing) the mixer transistor was marked 121-6. This was a typographical error and it should be 121-16.

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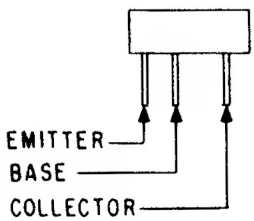

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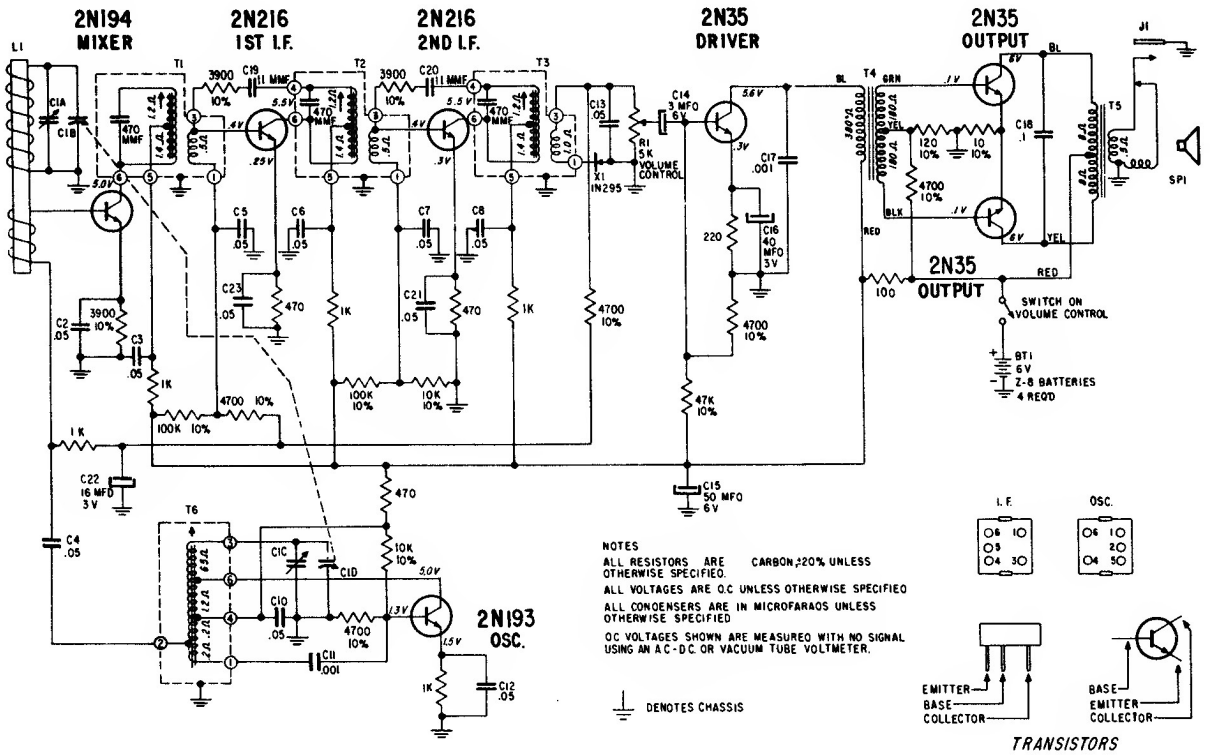
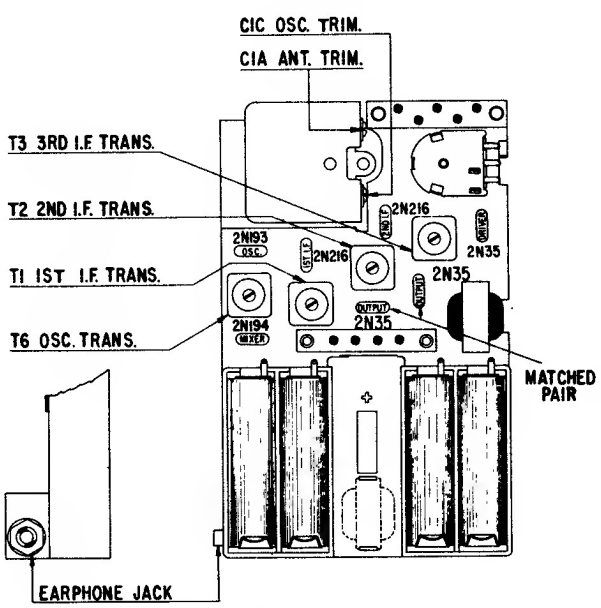
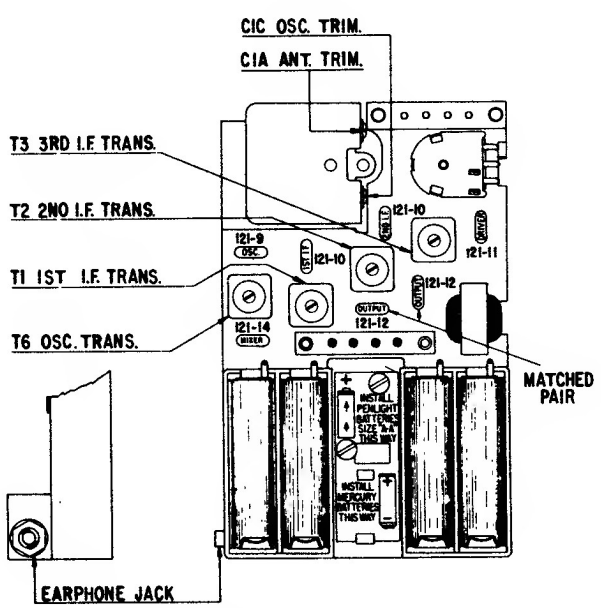


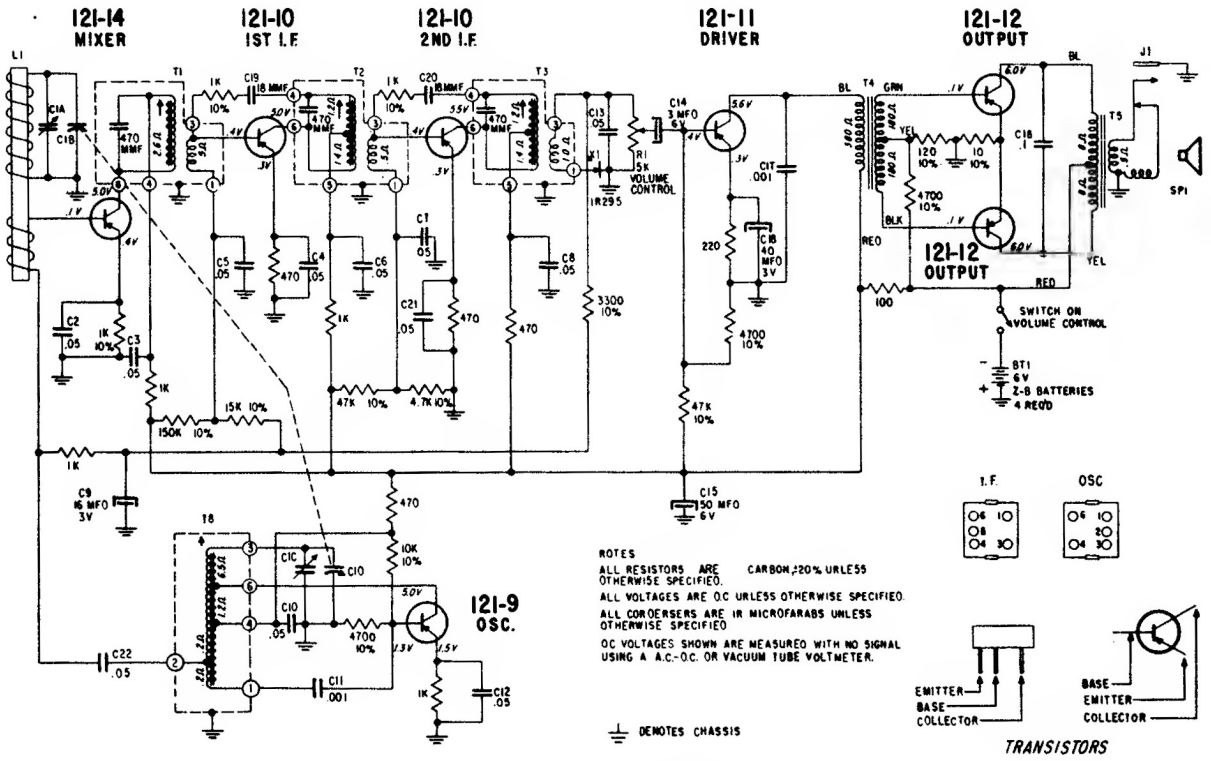
SCHEMATIC DIAGRAM FOR 7XT40 CIRCUIT #2



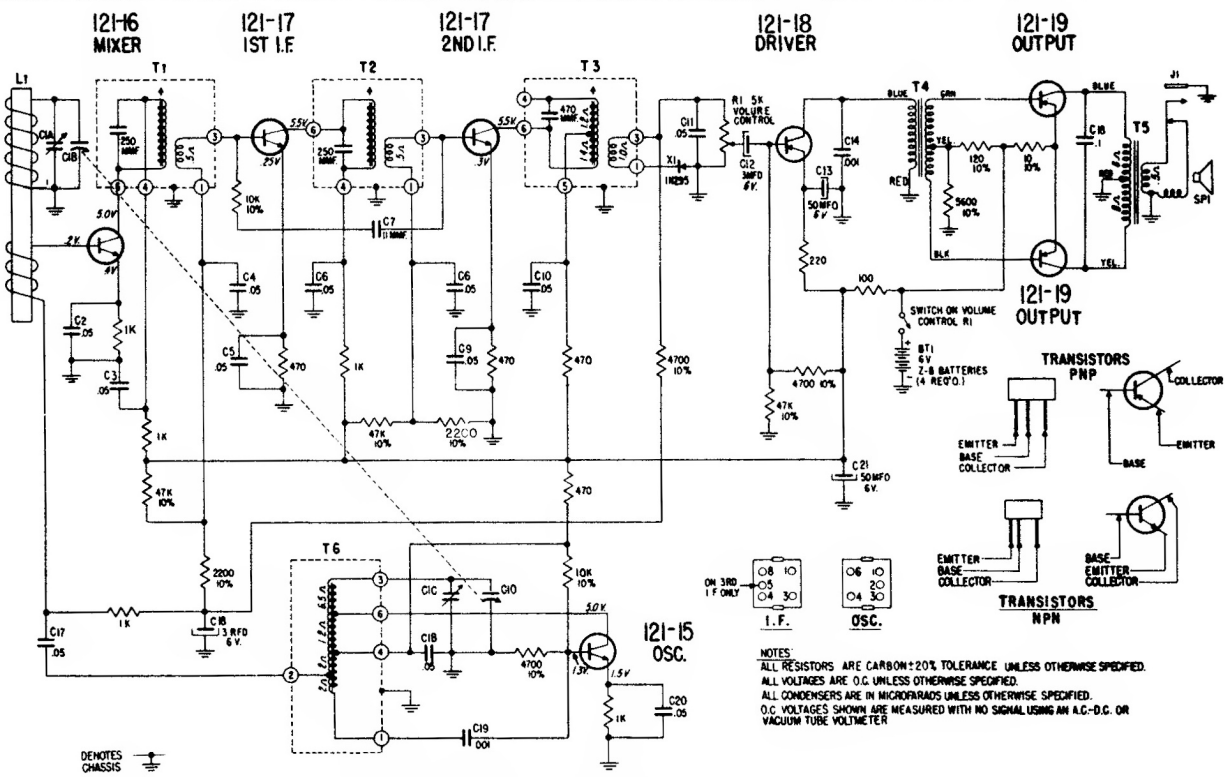
TRANSISTOR & TRIMMER LAYOUT FOR 7XT40 CIRCUIT #2



TRANSISTOR & TRIMMER LAYOUT FOR 7XT40Z

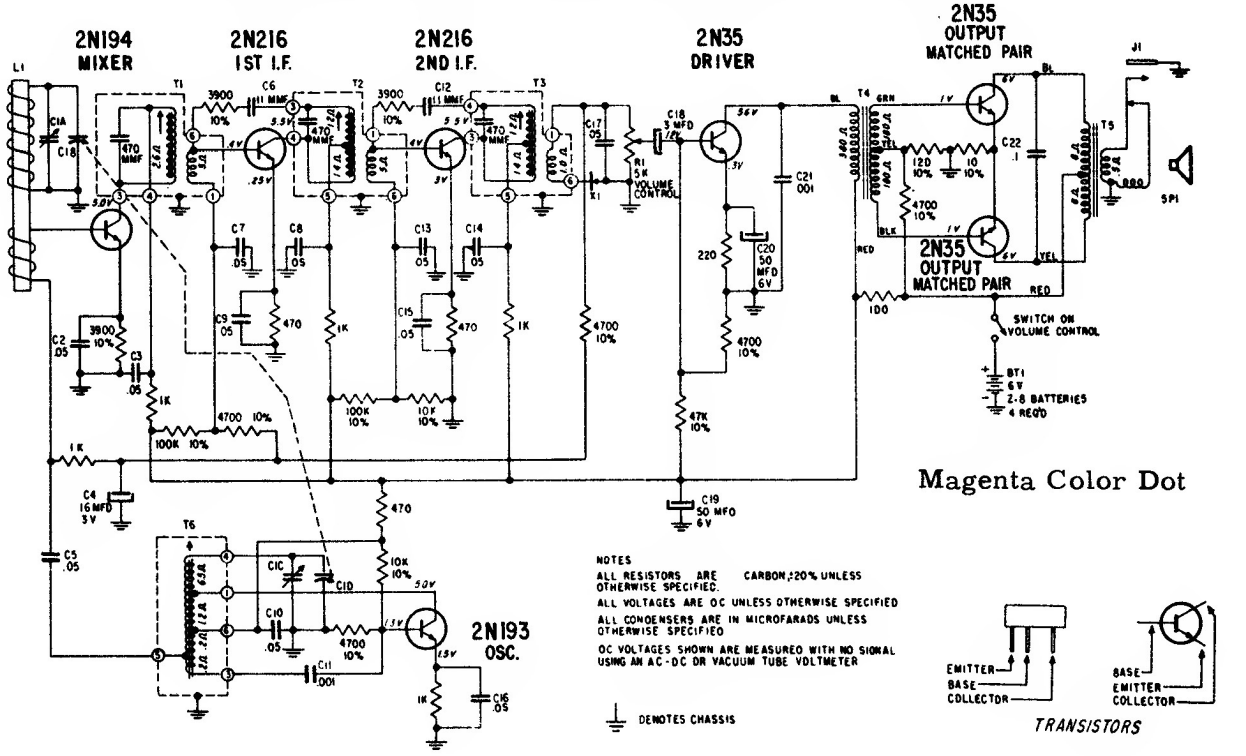


SCHEMATIC DIAGRAM FOR 7XT40Z



SCHEMATIC DIAGRAM FOR 7XT40Z1

SCHEMATIC DIAGRAM FOR 7ZT40



SCHEMATIC DIAGRAM FOR 7ZT40Z1