

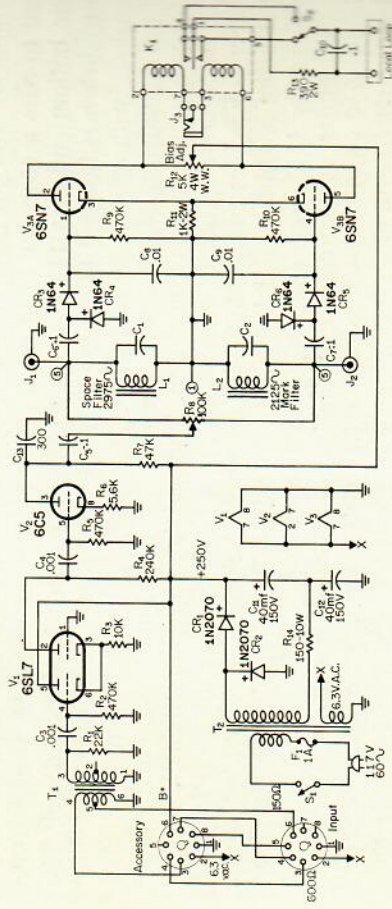
toroid coils and the polar relay, which might be easily obtained if you have friends at the local telephone company. If you had to buy *everything*, at the usual radio parts store prices, the parts would cost you only about \$33.

The Circuit

Figure 3.3a2 shows the complete schematic diagram of the Twin City TU. Octal based tubes were used as they are more likely to be found in the junk box. If you wish, you can substitute miniature tubes; a 12AX7 for the 6SL7, a 6C4 for the 6C5, and a 12AU7 for the 6SN7. In addition, 1N54's or 1N69's may be substituted for the 1N64 diodes. An octal socket at the rear of the chassis is provided for the input connections. 150 ohm or 600 ohm input impedances are available. The "accessory" socket on the top of the chassis is there for the possible future addition of a band-pass input filter or an a.f.s.k. oscillator. (The empty socket on the top of the chassis, visible in the photo, is another socket for the future addition of another tube for autostart.)

The circuit, as you can see, is not complicated. The first tube, a 6SL7 triode, is connected as a cathode coupled limiter. With the input transformer used, complete limiting takes place at about -4 dbm, or 0.5 volts r.m.s. input across 600 ohms. If we rate the TU at 100 mw input (+20 dbm) and operate it with that amount of input we have a range of limiting of about 24 db. The 6C5 is an audio amplifier used to bring up the limited audio to a suitable value for the discriminator. The channel filters are made plug-in for convenience. Normally the *mark* filter is tuned to 2125 cycles and the *space* filter is tuned to 2975 cycles. Each tuned circuit is isolated from the input by part of the 250K ohm pot which is adjusted to provide equal d.c. voltages across each associated 470K ohm discriminator load resistor. It will be noticed that a pair of diodes are used in each side of the circuit. These are connected in a voltage doubler arrangement in order to supply a relatively large d.c. voltage to swing each grid of the 6SN7 d.c. amplifier. The polar relay is connected in the plate circuit of the 6SN7, with positive high voltage fed to the arm of a 5000 ohm wire-wound pot. This permits balancing of the plate currents of the two triodes in order to balance the polar relay. Jack J₃ permits plugging in a zero center meter to check this balance. The contacts of the polar relay are connected to the local loop terminals through an R-C filter consisting of just one resistor and one capacitor. Switch S₂ is a reversing switch, a very handy device when someone is inadvertently sending upside down. Jacks J₁ and J₂ are used to connect an oscilloscope for use as a tuning indicator.

Plate and filament power for the TU are obtained from a Stancor PA-8421 transformer. This gives 6.3 volts at 2 amps for the heater circuit and 125 volts a.c. at 50 ma for the two Texas Instruments 1N2070 silicon rectifiers which are connected in a voltage doubling circuit to supply 250 volts d.c. for the plate circuits. 100 ma selenium rectifiers could be used in place of the silicon rectifiers, of course. It might be necessary though, to reduce the



Parts List

- C1—0.033 mf, approx., to resonate with L1 to 2975 cycles.
- C2—0.066 mf, approx., to resonate with L2 to 2125 cycles.
- C3, C4—0.001 mf, 500 v., disc ceramic.
- C5, C6, C7, C10—0.1 mf, 400 v., paper.
- C8, C9—0.01 mf, 500 v., disc ceramic.
- C11, C12—40 mf, 150 v., electrolytic.
- C13—300 mmf, 500 v., mica.
- CR1, CR2—1N2070, 400 p.i.v., silicon diode.
- CR3, CR4, CR5, CR6—1N64 or 1N69 diode.
- F1—1 ampere, 250 v., fuse.
- J1, J2—Auto radio antenna jacks, Motorola type.
- J3—Phone jack, closed circuit; with insulating washers.
- K1—255A polar relay.
- L1, L2—88 mhy toroid telephone loading coil.
- R1—22K, ½ watt.
- R2, R5, R9, R10—470K, ½ watt.
- R3—10K, ½ watt.
- R4—240K, ½ watt.
- R6—5.6K, ½ watt.
- R7—47K, ½ watt.
- R8—100K potentiometer, linear taper.
- R11—1K, 2 watt.
- R12—5K, 4 watt, potentiometer, wire-wound.
- R13—390, 2 watt.
- R14—150, 10 watt, wire-wound.
- S1—s.p.s.t. toggle switch.
- S2—s.p.d.t. toggle switch.
- T1—150/600 ohm to 19,000 ohm, surplus; cat. #GH-1202-2, Barry Electronics, 512 Broadway, New York 12, N. Y.
- T2—150 v. @ 50 ma, 6.3 v. @ 2 a., Stancor PA-8421.
- V1—6SL7 tube.
- V2—6C5 tube.
- V3—6SN7 tube.

Fig. 3.3a2—The Twin City TU schematic diagram.

The Channel Filters

The channel filters are made plug-in for several reasons. First of all this makes it real easy to change values of the padding capacitors while you are in the process of tuning up. This wouldn't be easy if the filters were buried under the chassis. Secondly, the plug-in feature makes it possible to almost instantaneously plug in another set for other tone frequencies or to copy different values of shift.