

CQ REVIEWS:

The ICOM AH-2 HF Mobile Antenna System

BY LEW MCCOY*, W1ICP

The ICOM AH-2 is a complete digitally controlled, HF, all-band antenna system. If that sounds like a mouthful, it is! Basically, the AH-2 is an automatically tuned antenna system that covers 3.5 MHz through the 10 meter band (and with any antenna longer than 12 meters, it will cover 160 also).

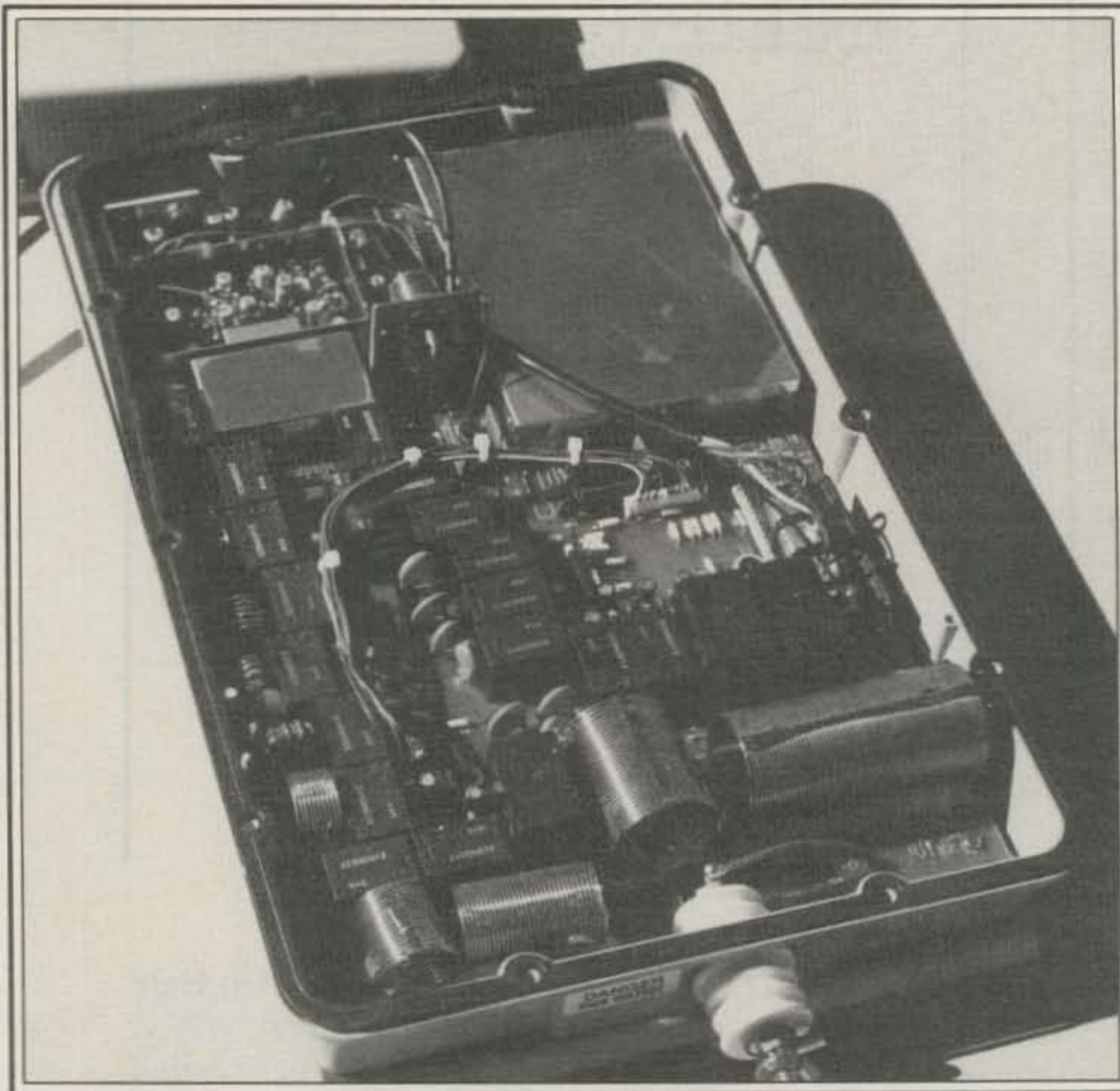
There are several pieces of equipment in the system, including an antenna, which is a 9 foot whip. The antenna system is designed to be used with either the ICOM 735, 745, or 751. The controller unit is attached to the transceiver used, and it in turn is connected via cables to the remotely mounted tuner unit (at the base, or end of the antenna). The tuner unit is completely weatherproofed and sealed.

As I found from my tests, the AH-2 has an extremely wide matching range. It is designed for the 9 foot whip, but I tested the system on a wide variety of antennas (including open-wire feed, balanced-fed dipole, but more on that in a moment). Before mounting it in a mobile setup, I first tested it in my home station so that I could try a variety of antennas.

The AH-2 has a controller unit that is connected to the transceiver. The controller unit is mounted to the side of the transceiver and connections are made from the radio. An RF cable from the controller is connected to the transceiver, along with four conductor cables.

Fig. 1 is a circuit diagram of the tuner unit, and as can be seen, it is a complex circuit except for the actual antenna matching portion. I have also included a block diagram of the controller, fig. 2, to provide more information. The actual tuner is essentially an extremely wide-range pi network. Here is basically how the system works.

When the "TUNE" button on the controller unit is pushed, the transmitter comes on (at very low power because the controller also controls the ALC line in the transceiver). This small amount of power



Here is the tuner with the weatherproof top removed.

is fed to the tuner unit, and both the forward and reflected voltages are analyzed via the rather extensive computer circuitry. Very rapidly, a series of small relays (21) are activated and deactivated, always seeking the greatest range or level of forward to reflected voltages. When the voltage ratio attains a level of 1.5 to 1 or less, the unit considers the circuit matched and shuts down. Now get this: This whole procedure is usually accomplished in 1 or 2 seconds! The secret of the system, to me at least, is that the ICOM engineers correctly realized that an SWR of 1.5 to 1, for all practical purposes, is just as good as 1 to 1, and believe me, it is. The 1.5 to 1 ratio is much,

much easier to obtain, and of course quicker.

The unit is designed to work into end-fed wires having a single output terminal. However, like many amateurs, I have an overwhelming curiosity about Transmatches and tuners, having built and described so many over the years. So, I decided to hook up the AH-2 to feed balanced lines (open-wire or Twinlead types of feeders). I hooked up a toroidal balancing transformer such as I have used in the Ultimate Transmatch and others to the single-ended AH-2 output and chassis ground, leaving me with balanced output on the other side of the transformer. Next, I connected open-wire feeders

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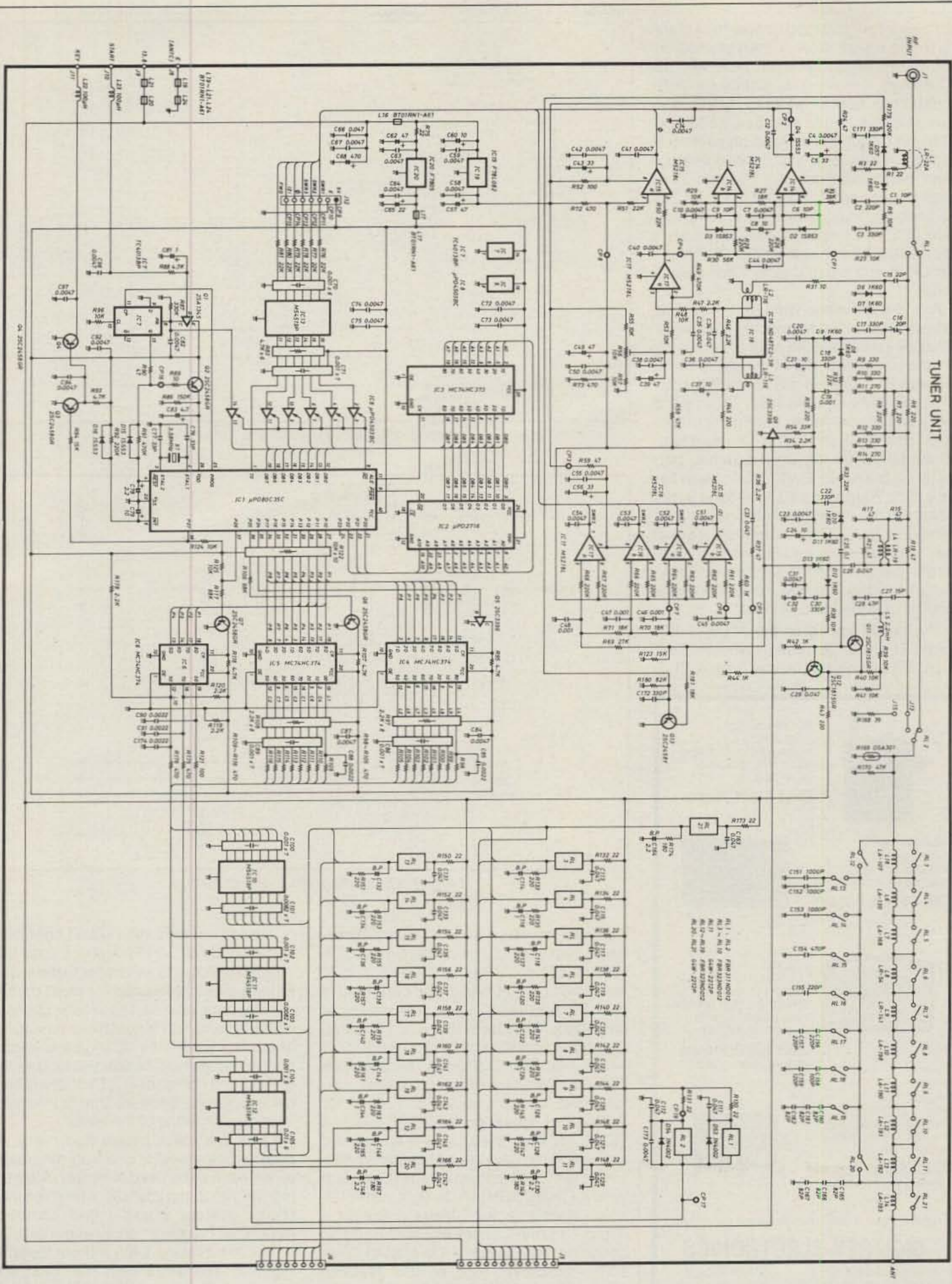


Fig. 1 - Circuit diagram of the AH-2 tuner unit.

from my large (150 foot) center-fed antenna to the transformer. I then started on 160 meters and progressed clear down to 10 meters, covering all bands (at both ends). I can say that without reservation the AH-2 matched to less than 1.5 to 1 on all these frequencies—and on each one as fast as you can say “one one-thousand, two one-thousand.” The manufacturer’s specs on tuning time are from 2 to 20 seconds maximum with an average time of 2 to 4 seconds. Also, the specs say that the tuner has over 250,000 possible L-C combinations (and I am sure it does).

A 9 foot stainless whip and mounting system is provided for mobile, marine, or RV work. I mounted the whip on top of my 21 foot trailer and tested the setup on 80 through 10. The whip has no loading coils and is simply a straight whip. This means that it would be a rather inefficient antenna on 80 and 40, and that is the way it tested out (although the whip matched perfectly via the AH-2). Performance was excellent on 20 through 10 where the 9 foot length was more realistic for those bands. In the ICOM instruction manual they mention using end-fed wires for better performance on the low bands. Everything I tried in the way of random-wire lengths matched and worked.

The power rating of the AH-2 is 120 watts. There is no reason why the unit could not be used with other types of 120

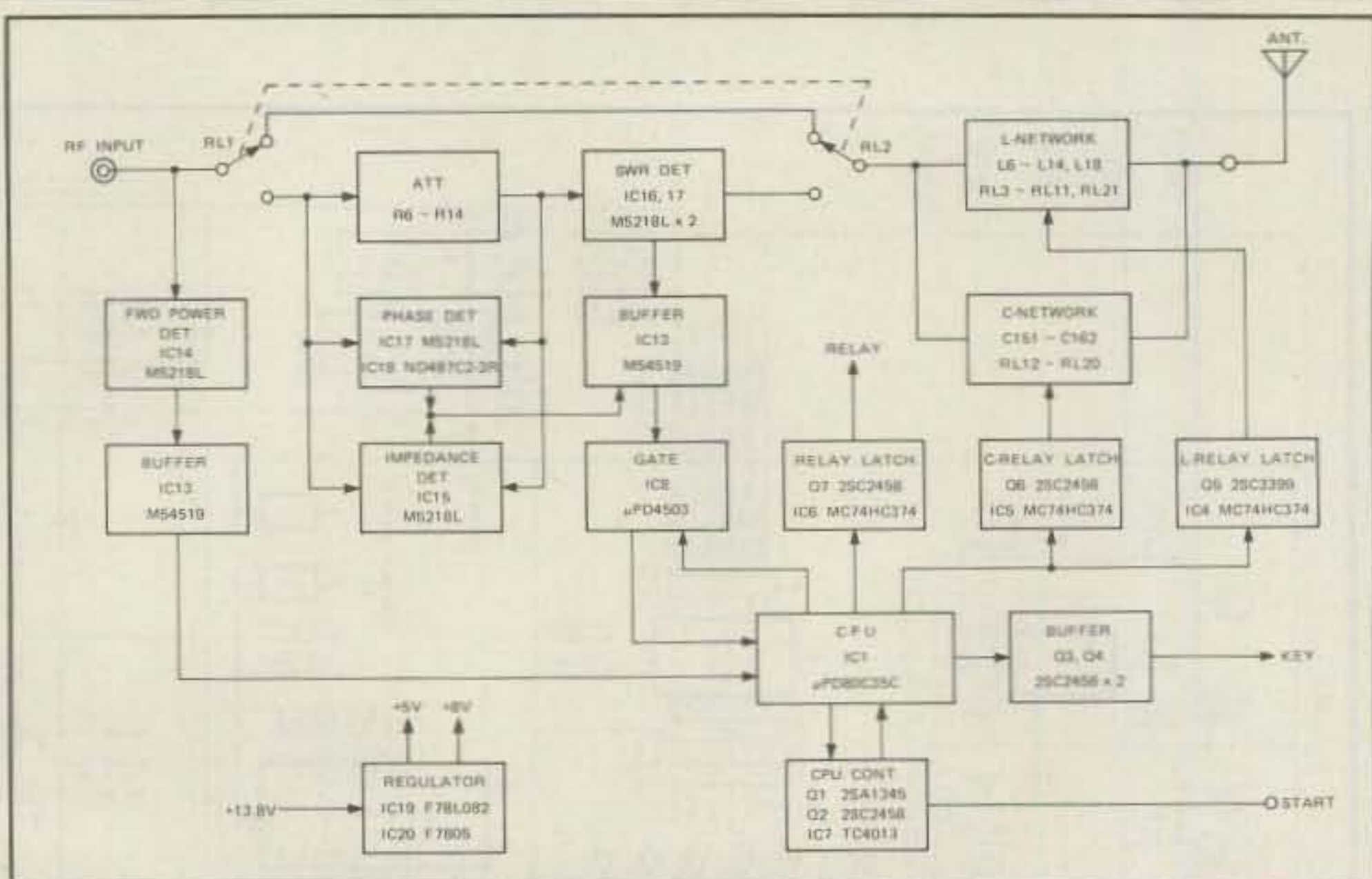


Fig. 2—Block diagram of the tuner unit.

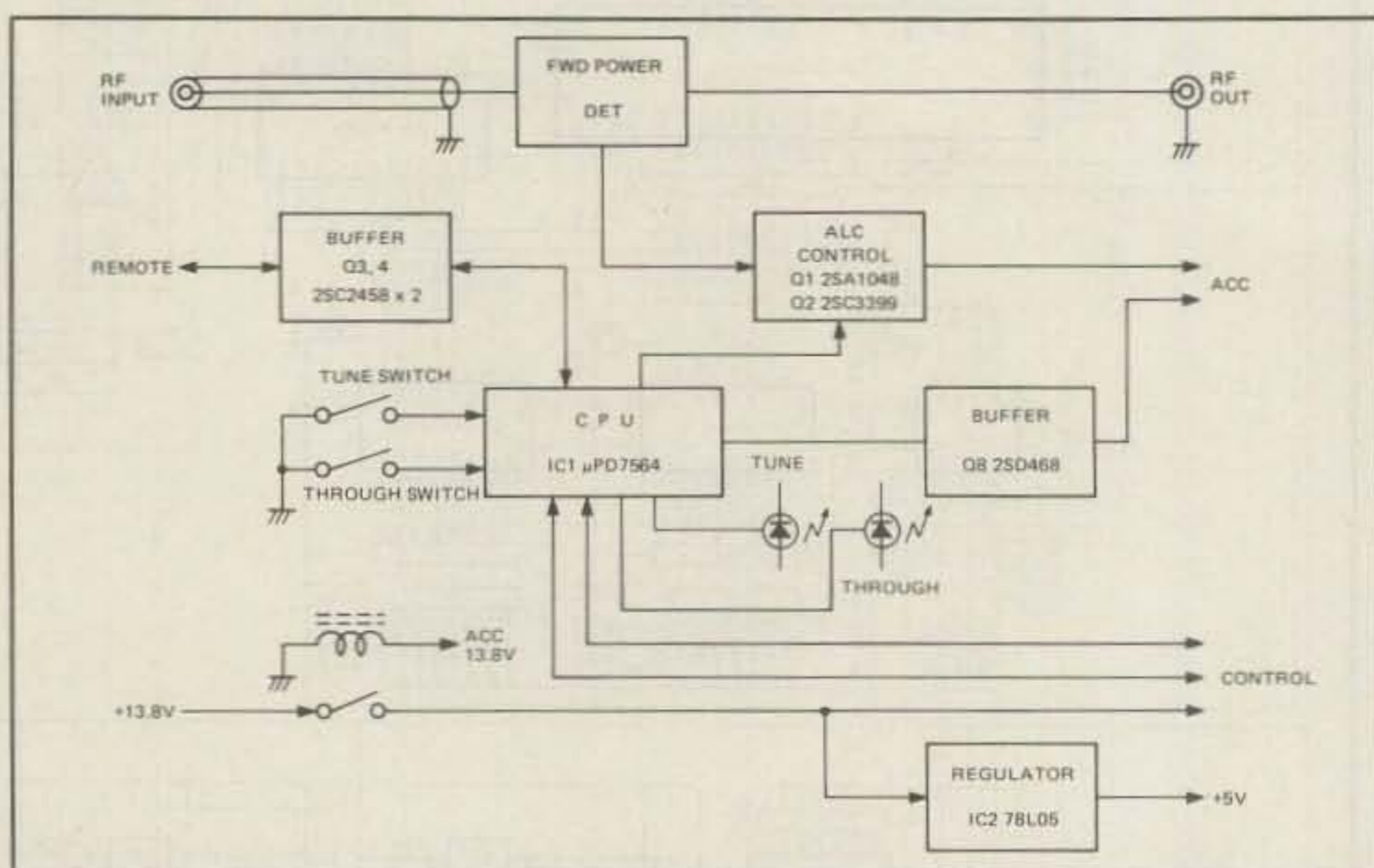


Fig. 3—Block diagram of the controller.

watt rigs. However, and this is very important, whatever rig is used there must be a system setup similar to ICOM's in that when the TUNE button on the controller is pushed, the level of the transmitter is dropped to 10 watts or less (5 to 10 watts). (See fig. 3, block diagram of the controller—Automatic Control Line.) There are two LEDs on the front of the controller, one for TUNE conditions and the other for THROUGH operation. In TUNE a green LED lights when the tuner unit is matched and ready to use. A red LED lights while tuning is in progress, and red (TUNE) and yellow (THROUGH) LEDs light when the tuner is unable to achieve a match. I might add that I never encountered this condition, but I assume it is possible with some extremely high or low reactive loads. The THROUGH LED lights when the tuner is bypassed and the antenna is fed directly.

A 15 foot (5 meter) 4-conductor cable

is used to connect the rig and controller to the tuner unit. Additionally, a coax line is needed from the controller to the tuner. Fifteen feet is adequate for most mobile installations, but I can see many cases in which an amateur would mount the tuner at greater distances. Any type of 4-conductor cable could be used as long as the ground and hot leads (12.5 volts) will handle 2 amperes, because that is the maximum power rating of the tuner.

Over the years I have had many requests for the design of a truly automatic tuner that can be used remotely. After using the AH-2, particularly with the tuned feeder system where I had complete matching, I would strongly endorse it.

The AH-2 lists at \$495 without the whip antenna and \$625 with the whip and whip-mounting hardware. The AH-2 is manufactured by ICOM and distributed by ICOM America, Inc., 2380 116th Ave. NE, Bellevue, WA 98004.



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