

programmed channel number is selected. These address codes are highs and lows that enter IC104 at pins 15, 16, 17, 18, and 1 (see Figure 7).

The address decoder selects the proper location in the IC104 20-location RAM (that's for the tuning-voltage memory data), according to the address code.

Each memory location has 12 flip-flop circuits that produce a certain binary number between 0 and 4096. This binary number goes through the 4096-transfer/counter to the comparator. The other signal for the comparator is from the 4096 counter, which is driven by the 910-KHz clock signal. The counter runs constantly, so it counts from 0 to 4096 and repeats over and over.

A digital-to-analog convertor is formed by the 4096 counter, the comparator, and the flip-flop (shown at the lower-right corner of the schematic). **The pulses from the flip-flop are the start of the tuning for each channel.**

Output of the flip-flop goes *high* each time the 4096 counter begins the count of 1, and the output remains *high* until the counter reaches the number that has already been transferred to the comparator from the selected RAM location. When the two numbers at the inputs of the comparator are equal, the output of the flip-flop goes *low* until the 4096 counter reaches the count of 1 again. At that point, the output of the flip-flop goes *high*. This is the end of the first cycle of operation.

Therefore, the pulse output from the flip-flop at IC104 pin 6 has a duty cycle (pulse width—not repetition rate) that is different for each channel (the time period between the 4096 transfer and the 4096 counter is different for each channel.)

These variable-duty pulses are amplified and filtered to form the tuning DC voltage for both tuners. But, before that process is described, we must cover the programming of the IC104.

Programming channel-tuning

To program the RAM with the memory for a certain channel, it's necessary only to store the correct binary number in the RAM. This is done by the S303 blue switch, which grounds (through the yellow

switch) either pin 11 or 10 of IC104.

Grounding one pin sends an up or down signal to the transfer/counter and a starting pulse to the 7-speed clock. Then the 7-speed clock determines how fast the transfer/counter operates. Output of the transfer/counter is a binary number that changes between 0 and 4096, and it is applied both to the RAM memory, and to the comparator.

Normally, the blue lever is held in position for several seconds, while the varying duty cycle of the flip-flop signal changes the tuning voltage. **When the blue switch is turned off, the output of the transfer/counter stops, and the binary number at the output is stored in the RAM.**

Because considerable time would be required to cover an entire half of the VHF band, for example, the designers have included a helpful feature. When the blue switch first is operated, the 7-speed clock starts at the slowest speed. If the switch is held on constantly, the clock advances through each higher speed in turn, thus allowing fast changes between widely-separated channels. However, short operations of the blue switch allow slow and accurate channel tunings.

UHF tuning normally would proceed at a faster rate than VHF does, because only one range is used. Application of a DC voltage (of about +0.68 to the 7-speed clock by way of pin 13) reduces the tuning speed to about half.

Of course, the transfer/counter can increment or decrement, according to the position of the blue lever and switch.

Bandswitching

When the blue switch is in the up position and the transfer-counter is decrementing (counting down), the DC tuning voltage is increasing. When the transfer/counter reaches 0 (where the tuning voltage is maximum) and recycles back to the starting point of 4096 (zero tuning voltage), a single positive-going pulse is developed. This pulse emerges from IC104 at pin 5, and it goes to pin 17 of IC103 where it controls the band memory. Therefore, the bandswitching circuitry

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