tion (100 wpm maximum) with a 455-kHz i-f strip.

multi-ic loops

An integrated-circuit phase-locked loop does not have to be confined to a single IC. There are a variety of special-purpose ICs that can be combined into phase-lock systems and tailored for specific applications. For example phase-detector ICs such as the Motorola MC4344/4044 and voltage-controlled multivibrators such as the Motorola MC4324/4024 can be combined with a low-pass filter to form a simple phase-locked loop.

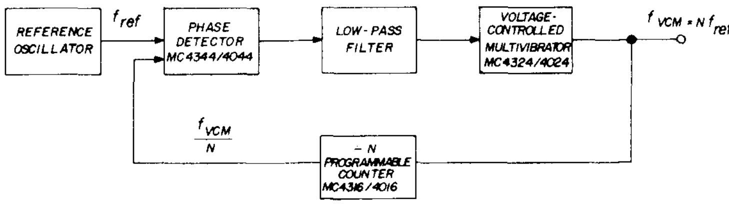


fig. 7. Frequency synthesizer uses programmable divide-by-N counter within the phase-locked loop. Typical Motorola ICs for this circuit are shown.

A system of separate integrated circuits is especially attractive for building complex circuits such as a frequency synthesizer. A typical arrangement is shown in **fig. 7.** With a programmable counter in the loop the system can be programmed to provide practically any output frequencies. The output signal is phase locked to a stable reference oscillator so output stability is essentially that of a crystal oscillator.

In the circuit of **fig. 7** the reference oscillator signal is compared to the signal from the programmable counter. The input to the programmable counter comes from a vco which is controlled by the error voltage from the phase detector. With a 1-MHz reference oscillator and a divide-by-2 counter, the output signal is 2 MHz. With a divide-by-3 counter the output is 3 MHz; divide-by-10 counter, 10-MHz output, etc. By placing a divide-by-N counter (where N is any number) in the loop you can build a frequency synthesizer which will provide any desired output frequency.[3]

army loop antenna – revisited

A simple method of tuning the ends of a small resonant-loop antenna has been evolved by James E. Taylor.[1,2] This technique, shown in **fig. 8,** eliminates lossy loading-coil arrangements. Maximum horizontal length for operation on 80 meters is 20 to 25 feet. Although Taylor used RG-8/U cable for his antenna any large diameter conductor is satisfactory.

The capacitive element in **fig. 8** consists of 300-ohm twin-lead. Note that the ends of the resonant loop connect to opposite conductors of the twin-lead. The loop is resonated by clipping even amounts off each end of the twin-lead. (Shortening the twin-lead lowers its capacitance, raising the frequency of the resonant loop.) The large capacitor across the feedline provides proper matching.

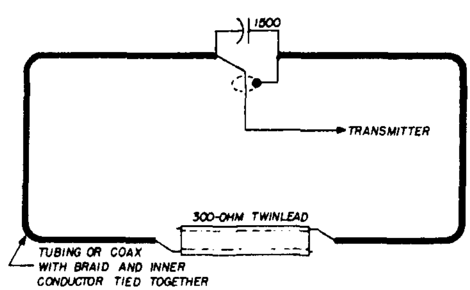
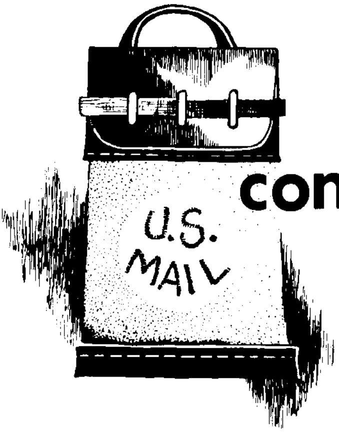


fig. 8. Balanced Taylor-loop antenna.

linear transistor amplifier

Despite the popularity of high-frequency ssb transmission there have been few bipolar transistors designed specifically for linear operation at higher power levels; most of the rf power transistors



comments

army loop antenna

Dear HR:

The Army loop antenna mentioned in the September, 1971 issue (page 59) and the method of tuning it seems rather lossy and not very rugged mechanically. This is especially true since a good solid capacitor is already built into the antenna.

When coaxial cable is used for loop antenna construction the capacitance between the inner and outer conductors can be used to advantage both mechanically and electrically. A balanced loop such as the one described could be constructed leaving the inner conductor floating and sealed at the feedpoint. Prune-tune as required from the center equally in both directions. Since an unbalanced coaxial feed does not do too much for a balanced antenna it might be just as well to use one side of the coax loop for one feedpoint and the other side for the other, and do all of the prune-tuning at the base where it is handy.

There is one limitation to this type of loop construction: the inductance and capacitance of the coaxial cable used, i. e. the diameter of the loop and the type of the cable. For a quick check I took a 38-foot section of ½-inch semiflexible line (25 pF per foot) which ran in a single-turn loop and grid-dipped it at about 10.5 MHz. A 7-MHz loop antenna with the inner and outer conductors of the same length are a practical size and could be used on 75 meters with a plug-in series capacitor.

Since short loops have quite low radiation resistance, the resistance of all conductors and connections must be kept to a minimum. Coaxial-cable construction should minimize (or eliminate) the need for additional tuning units that are lossy, bulky and do not stand the weather very well. Vinyl-covered coaxial cable is well protected from corrosion and the weather, and the ends can be sealed and painted with corona reducing material; rf power-handling depends upon the size of the cable. There are a number of easy-to-form semiflexible cables from which to choose.

This type of coaxial cable also makes a good solid weatherproof gamma rod capacitor for feeding parasitic beams because it eliminates the corroding slide rod and variable capacitor. Prune-tuning the coaxial-cable gamma matching system may take a little longer but is well worth the effort when it comes to durability. I used such a gamma match on a recently built full-size loop antenna (one wavelength long) to good advantage; the winter snow and icing are rough down here!

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