MATH'S NOTES

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WHAT'S NEW AND HOW TO USE IT

A New 800 to 1000 MHz "Micro-Transmitter" Chip

It s truly amazing! The letters keep coming regarding the various micro miniature transmitters and receivers we have been discussing this year Perhaps the spark of homebrewing and experimenting has not died out yet! Anyway, I certainly am pleased that so many of you are ready to "heat up the old soldering iron,' and I will continue to try to pass on as many similar applications of "modern" technology as I can If you do choose to build any of the circuits, please don't hesitate to share your experiences with the rest of the readers of this column I will be glad to publish comments or pictures of your creations.

To address some of the questions that you have asked in regard to the previous columns, let me offer the following:

1 The various transmitter and receiver chips described can usually be obtained from the larger semiconductor supply houses such as Newark Electronics or Digi-Key In the event that they can't help you, don't hesitate to contact the manufacturer and ask for specific information as to who stocks it, or if they will be kind enough to furnish a sample We do this all the time at the office and it almost always results in success

2. The various coils and/or tuned circuits called out in the transmitter and receiver circuits are for reference purposes only. Most really are not overly critical, and any homebrewer "worth his salt" should be able to come up with the proper values to resonate at the frequencies of interest Just because a manufacturer suggests a particular value doesn't always mean that it is the optimum one. I can't even begin to count the number of application note articles I have come across describing "complete, finished' designs that needed extensive work to make the final result operate the way it was supposed to. Remember, the purpose of an application note is to describe a use or suggested use for a part, not necessarily to provide all the details for a complete manufacturable product. Above all, don't be afraid to experiment, as that's how you learn.

3. The "455 type" ceramic filters mentioned for some of the receivers are of the 455 kHz variety used in AM transistor radio IF applications Most ceramic 455 kHz units will work, including the TOKO and Murata devices. Even units salvaged from old AM transistor radios may perform properly

4 Finally, remember that the transmitters and receivers described cover the VHF and UHF range from 6 meters (50 MHz) to beyond 200 MHz Plug-in breadboards probably will not work well, since the interconnection capacitance is too high, and the ground-plane is too far away to provide adequate shielding. Your best choice is either to use "dead bug' construction techniques with the shortest possible leads or perforated copper-clad G-10 circuit boards for your experiments. Also don't forget to use plenty of 0 1 µF 01 µF and 100 pF bypass capacitors.

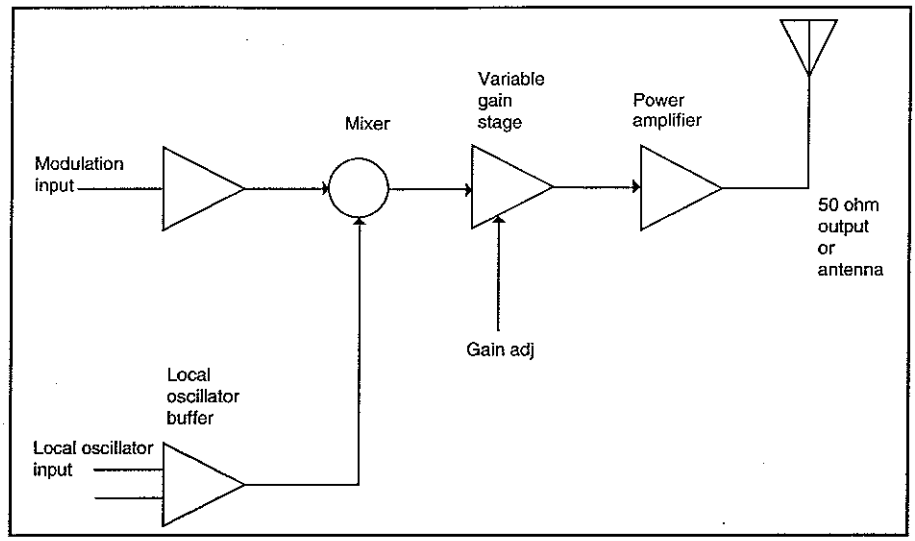

Fig 1– Functional block diagram of MAX 2402

In keeping with the promise we just made, this month we will describe still another UHF transmitter chip that has made it to the market (and probably will generate additional questions). This chip is the MAXIM 2402, which is called by the manufacturer "an 800 MHz to 1000 MHz Transmitter.' Originally designed for the new commercial license-free 902 to 928 MHz band and 900 MHz cordless telephones, the 20-pin surface-mount device will find use in the nearby amateur band as well.

Fig 1 is a block diagram of the MAX 2402, and fig 2 is the suggested operating circuit As you can see the chip contains a double-

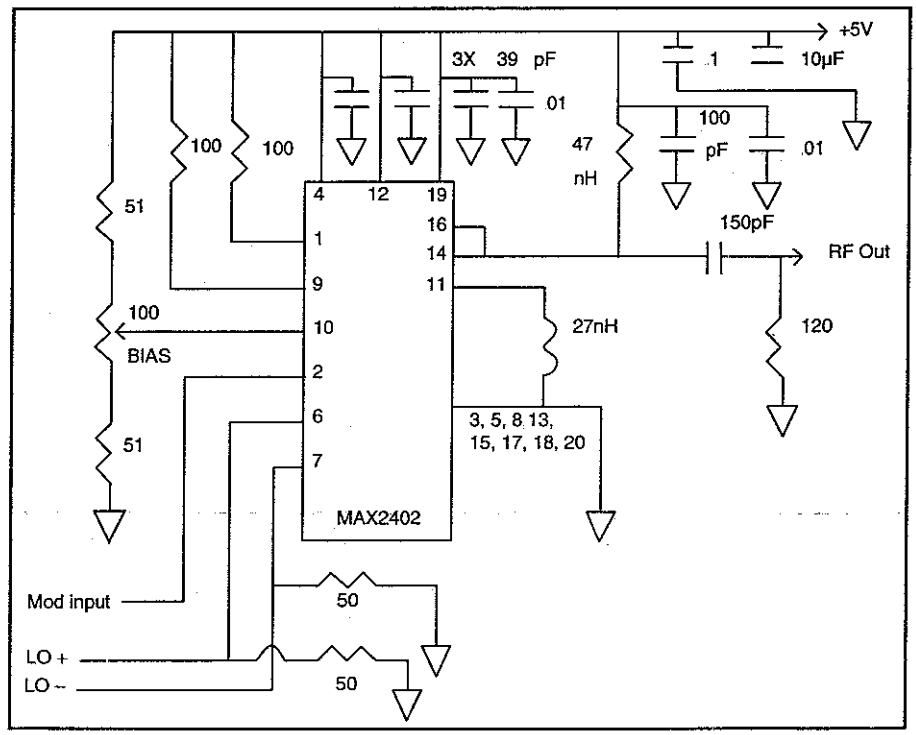

Fig 2– Typical application circuit for MAX 2402

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balanced mixer, a buffered local oscillator input port, a variable gain stage, and a final power amplifier matched to 50 ohms at 800 to 1000 MHz Power required is +5 volts single ended, and the chip comes in a tiny 20-pin SSOP package. In operation, a local oscillator is injected into the LO ports either signal ended or differential at a recommended injection level of 1 mw ±6 dB The MOD input is then used for either analog modulation (up to 25 MHz) or digital modulation depending on the application This port is also usable for the transmission of data or as an input for spread-spectrum frequency-hopping applications The variable gain input is used to control the drive to the final (over a 40 dB adjustment range) With proper drive the power amplifier will produce more than 100 mw into a 50 ohm load

The application circuit of fig 2 is derived from an evaluation kit that Maxim has available for the chip If you plan to experiment with this device, purchasing this kit will make it much simpler to get on the air. Do not rule out home-rewing, however If you send for the data sheet from Maxim, you will get a full parts list and suggested layout for an appropriate PC board Before building the circuit, however remember that you should have some UHF experience and the proper test equipment You also will have to provide a local oscillator signal signal, since none is provided in the chip.

Cost for the MAX2402 is $3 78 in lots of 1000 pieces, and somewhat higher for single quantities Prices for the evaluation kit must be obtained from Maxim or one of their representatives at 120 San Gabriel Drive Sunnyvale CA 94086 (1-408-737-7600) 73 Irwin WA2NDM