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# MATH'S NOTES

WHAT'S NEW AND HOW TO USE IT

## A Companion Receiver For February's 6 Meter FM Transmitter

Last month I referred all of you to a previous column for a receiver design to match the tiny micro-power 6 meter transmitter described. However, after sending the column to *CQ*, I felt that a better decision might have been to offer a complete companion 6 meter micro-power receiver. Since these types of circuits are so popular and my readers send so much mail asking for additional details, I have decided to 'finish the job' this month. Here then is a companion 6 meter micro-power receiver.

The receiver to be described, like last month's transmitter, uses a single chip—in this case the Motorola MC3367—for all functions other than a speaker driver. The design is single conversion for simplicity, but the technical specifications are quite impressive. Input threshold sensitivity is 0.2 µV (for 3 dB of limiting) and 0.6 µV for 20 dB (S+N)/N. Operating voltage goes down to 1.1 volt and maximum operating current required is about 3 ma, making a AAA penlight cell an ideal, long-life power source. The chip contains an on-board voltage regulator, low-battery detection circuit, and an Enable pin to reduce current drain even further (0.5 µA) in a standby mode. The receiver can be made crystal controlled or tunable as you wish.

Figs. 1 and 2 are schematic diagrams of the 6 meter receiver. As you can see, most components are contained within the chip. The two 455 kHz IF filters are of the type used in AM transistor radios and can even be eliminated if desired by replacing them with 0.1 µF capacitors. For best selectivity, however, you had better leave them in. Remember this is only a single conversion receiver. Since the IF is at 455 kHz, the crystal frequency should be 455 kHz lower than the desired operating frequency. If you wish to manually tune the receiver, replace the crystal with a series resonant LC combination. To utilize the Enable pin, connect pin 16 to ground instead of Vcc.

Tuning of the receiver is quite simple. Add an antenna and adjust the 0.7 µH coil and 455 kHz tuned circuit (L1/C1) for maximum recovered audio with a weak signal. If everything has been built correctly, you should be able to achieve an output of 0.5 to 0.8 volts into 600 ohms—enough to drive a small earphone. An outboard amplifier for a speaker can also be used to boost the audio higher if desired. Such a stage undoubtedly will draw more current than the entire receiver.

*c/o CQ magazine*

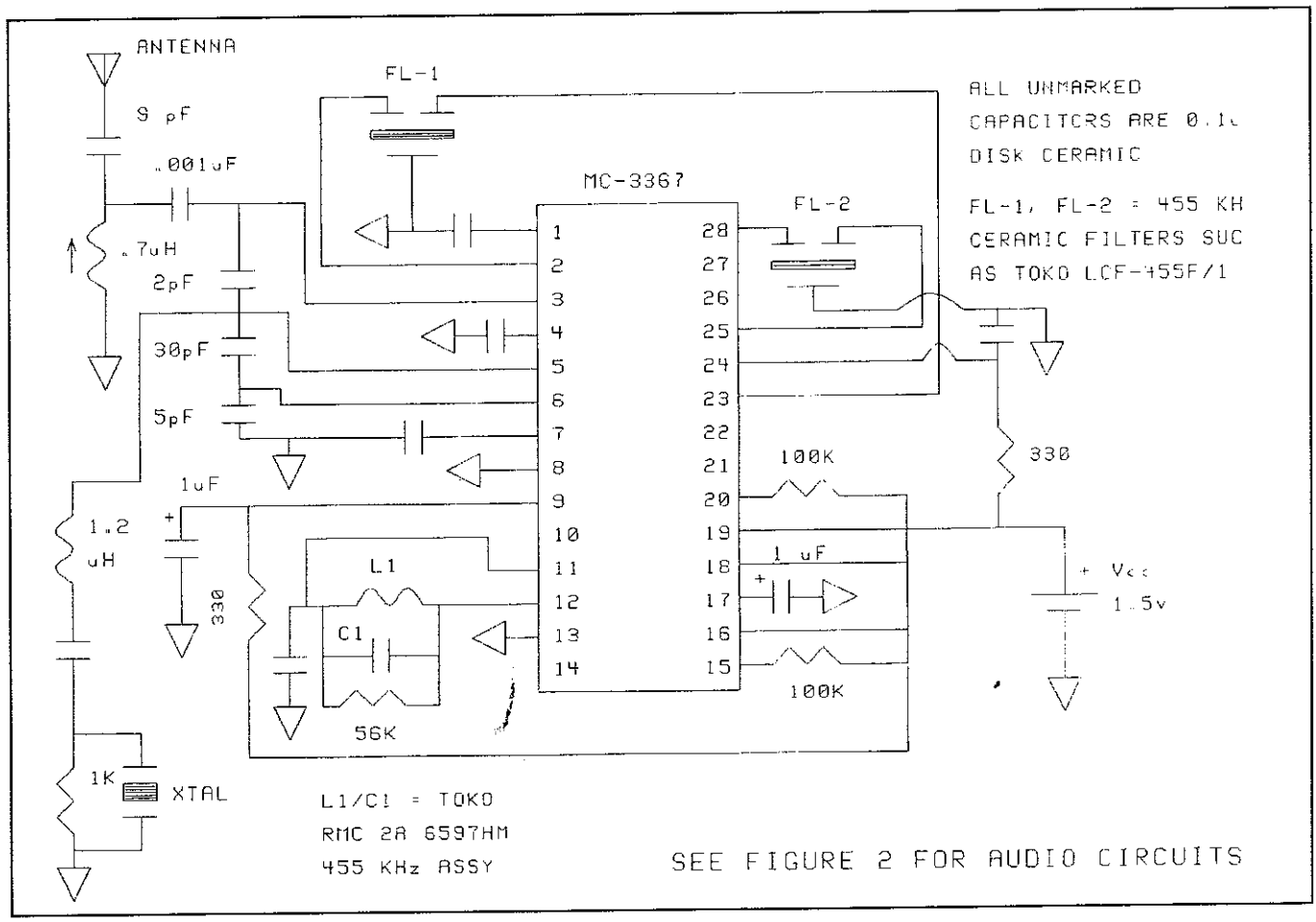


*Fig 1– Schematic diagram of a simple 6 meter receiver*

The construction is straightforward, but good RF techniques should be used. Keep all leads as short as possible and use good-quality ceramic bypass capacitors. The MC-3367 is supplied in a 28-pin surface-mount package, so those of you who are familiar with these types of components may wish to build the entire receiver using surface-mount devices. If you do the result truly will be tiny. For the utmost in miniaturization you could even use a button cell for power.

Further details on the MC-3367 can be gotten from Motorola Semiconductor, P.O. Box 20912, Phoenix, AZ 85036. The 455 kHz IF filters and other inductors are available from Digi-Key as are most of the other components.

I would be most interested in seeing a photo of any transceiver built using these or similar chips. Considering the correspondence I received when I described previous circuits of this type, I think many of you will experiment with these chips. Please enclose the photo of your results and I will certainly print it in a future column for all to share.

73, Irwin, WA2NDM

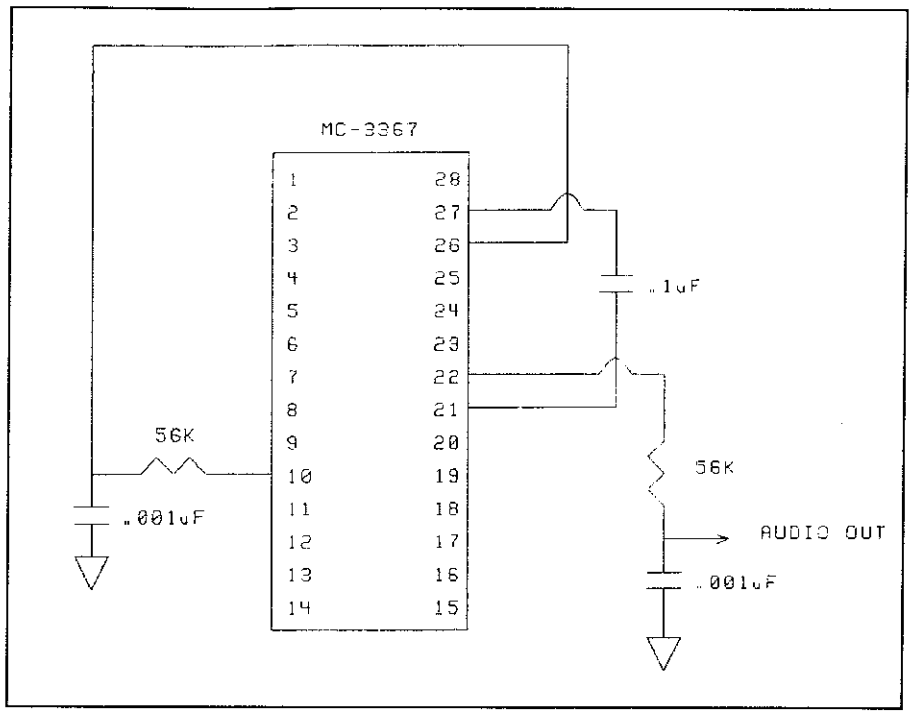


*Fig 2– Schematic diagram of audio output stages*