

The Masher

— son of The Amazing Audio Elixir

When I first read the article on which this article is based, "The Amazing Audio Elixir," 73, September, 1979, I really didn't read it at all. It looked a little hokey. Words like "amazing" and "cure-all" turn me off, especially when they're used to describe an audio limiter, processor, compressor, etc. I flipped on through the magazine to find something more interesting and useful. It wasn't until several months later, when a friend asked me to help him check out a compressor he had just built, that I gave any serious attention to N6WA's article and circuit.

My friend, John W8SSM, had built The Amazing Au-

dio Elixir and he was anxious to receive some on-the-air reports. John was using the Elixir with his Kenwood T-599D and Heath SB-221. We were on 40 meters and the band was in good shape. I would be able to give him an accurate and, I expected, negative report. It had long been my belief that unless you wanted to spend a tidy sum for a store-bought rf speech processor like the Vomax, all that an external audio limiter, processor, compressor, etc., would do would be to junk-up an otherwise clean and intelligible signal. Got the picture?

John started the tests: "Compressor on: 1, 2, 3, 4, 5 . . . Compressor off: 1, 2, 3, 4, 5 . . ."

And on and on. I couldn't believe what I was hearing! The blooming thing actually *improved* his signal! It reduced the peak-to-average ratio of his audio, and it seemed to give his audio more brilliance; that is, it attenuated many of the lows, which only consume power without adding to intelligibility, and it enhanced the mid-range and highs. It did this *without causing undue distortion and without raising background noises noticeably*. John turned on The Amazing Audio Elixir, and he turned me on to it. I liked what I heard, and I decided that I should have one.

It should be noted that the circuit diagram appear-

ing in the original 73 article contained one error. It showed the gate of Q1 and capacitor C4 connected to the junction between R1 and R2. This should not be, and the corrected diagram is shown in Fig. 1. This is the circuit that John used and that worked so well as is.

But few things are so good that they can't be improved upon. After all, the original Elixir was described as a multi-purpose device — for tape recorders, computers, phone patches, repeaters, etc. N6WA mentioned only in passing that it might be used as a transmitter speech processor/compressor.

So, I set out to optimize the Elixir for use as a

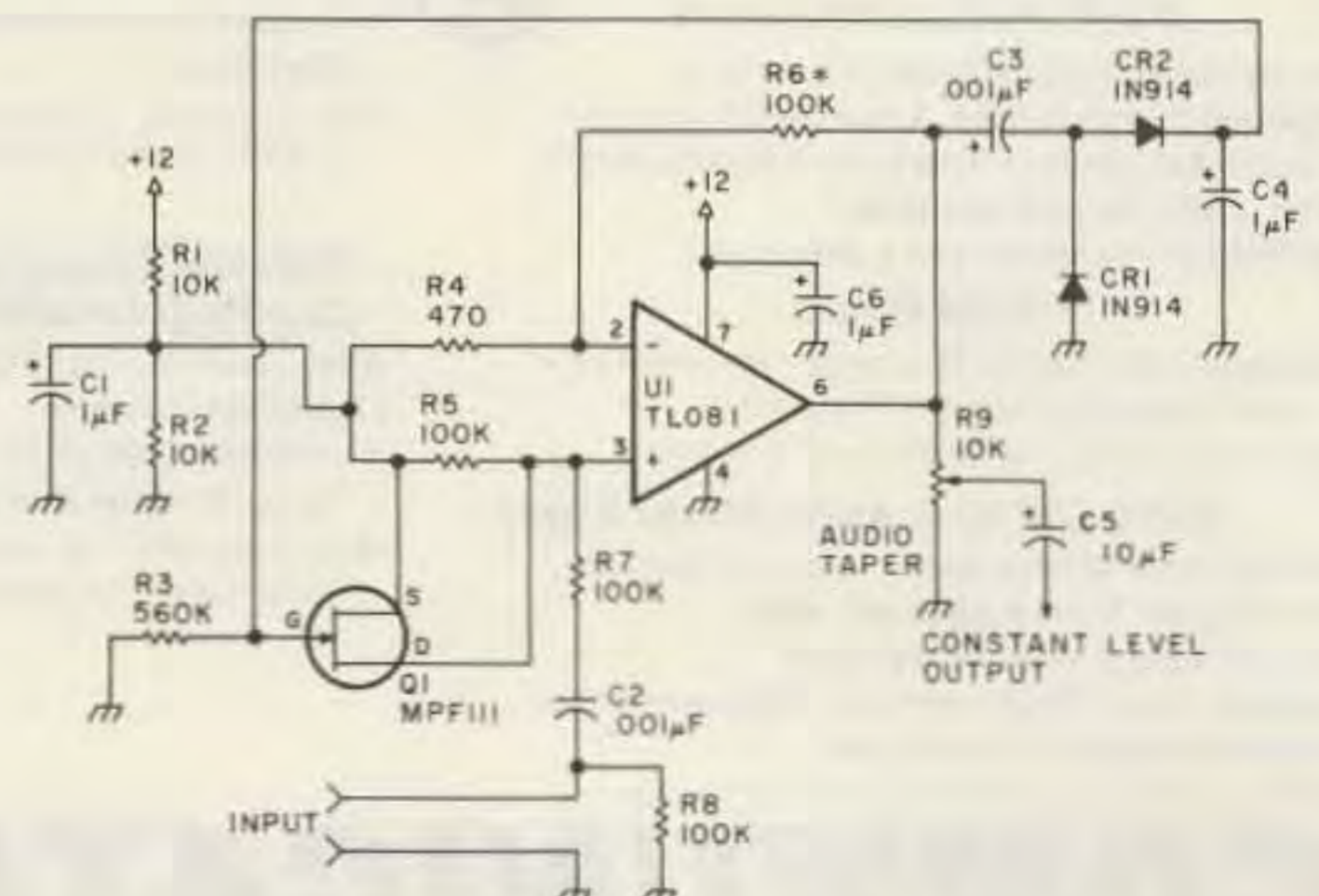
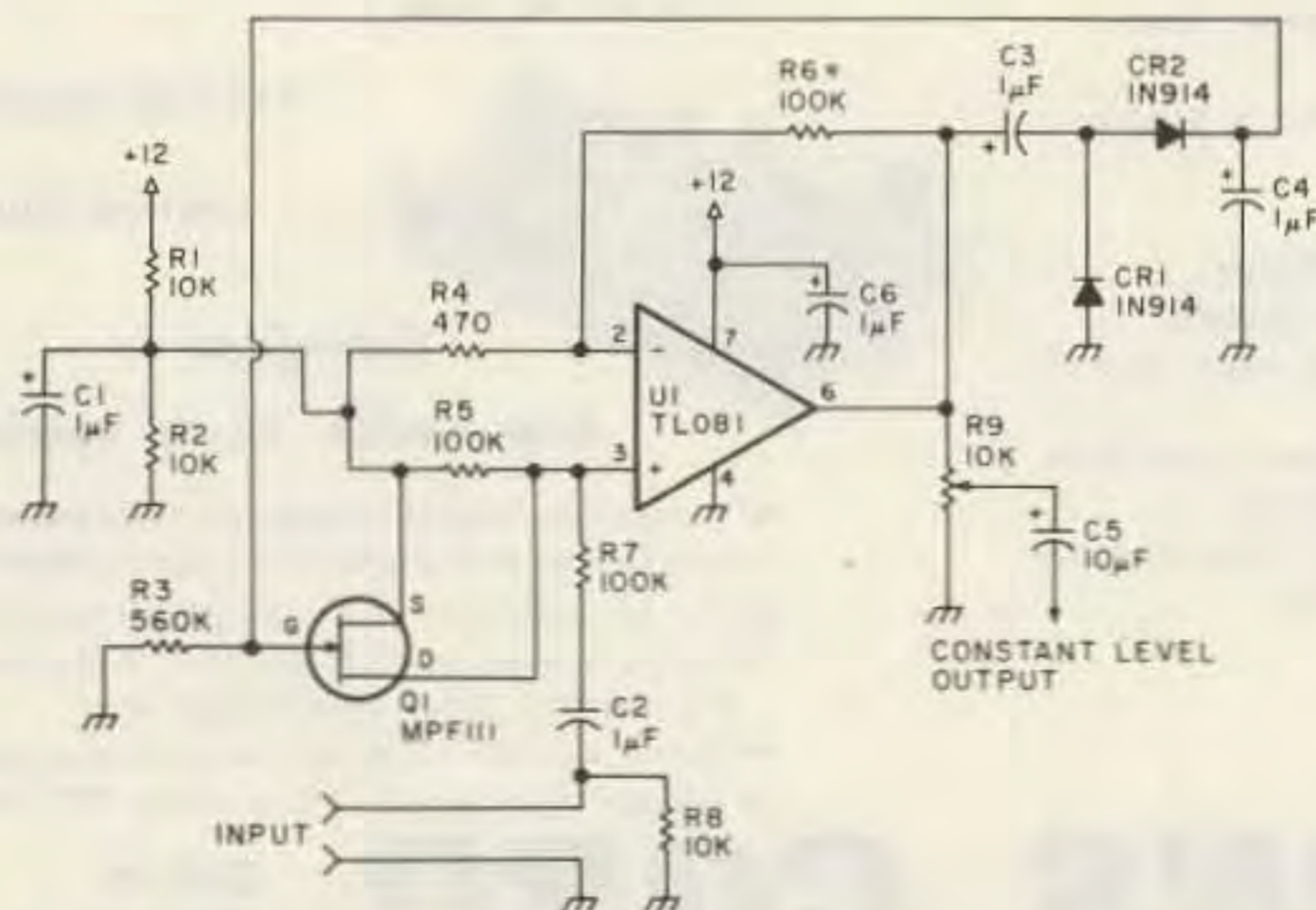


Fig. 1. Original circuit of the Amazing Audio Elixir (with correction).

Fig. 2. The Masher circuit, fine-tuned for speech processing tasks.

transmitter speech processor/compressor. By the way, John found it clumsy to refer to the gadget by its given name, The Amazing Audio Elixir, or by its generic name, a transmitter processor/compressor, so he tagged it The Masher. It does "mash" the audio peaks down closer to the average modulation level—a descriptive name, I think, and a whole lot less clumsy to use.

Fortunately, N6WA makes available a neat 2" x 2" printed circuit board for \$3.50 ppd. I ordered one, and when it came I was pleased to find that an accompanying data sheet gave significant technical information and specifications, which I found useful in my subsequent modifications. For example, the original circuit provides an af range of 100 Hz to 25 kHz to the 2-dB points. Ham transmitters don't need that extremely low frequency response. The data also showed that the input impedance was 10k Ohms. My microphones are high impedance. These considerations prompted the modifications to change the Elixir into the Masher. The modified circuit is shown in Fig. 2.

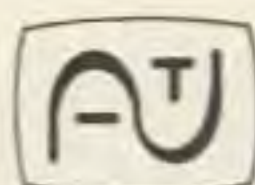
Experiments and on-the-air tests indicate that changing R8 from 10k to at least 47k not only raises the input impedance, but also allows a high-impedance microphone to retain its original characteristics. Values from 47k to as high as 1 meg were used without noticeable difference. I settled on 100k.

C2 and C3 were changed from their original values to 0.001 µF, providing a low-frequency roll-off at about 400 Hz. R3 was changed to 470k (Radio Shack does not stock 560k) with no effect on performance. And, finally, I used a regular 1/2-Watt audio-taper potentiometer for R9 and mounted it on

the front panel of a small minibox. The multi-turn, board-mounted trimpot originally specified made adjustment of the output level much too difficult.

Construction is simplicity itself, whether you use N6WA's PCB (that makes it really simple) or perfboard. The hardest part for me was drilling the holes in the minibox for the switch, potentiometer, microphone, and power connectors—and that was easy. I should caution you, however, to be careful in your selection of cable to be used between the microphone and the Masher and between the Masher and your transmitter, especially if you use a high-impedance microphone. Use a shielded cable, but *do not* use the type that has the audio and PTT wires inside the shield. Only the audio wire should be inside the shield, as the PTT wire may carry hum and rf to the sensitive audio stages. I recommend Belden No. 8734 (straight) and Belden No. 8497 (coiled) for this purpose.

Testing and adjusting the Masher should present no great problem, especially if you have a cooperative friend with a good ear for audio. With the Masher switched out of the circuit, adjust your transmitter microphone gain as usual, for an alc indication of one-half to two-thirds of the alc range while close-talking the microphone at one to two inches. Set the Masher output level control at minimum, switch the Masher in, and while continuing to talk in a normal voice slowly increase the Masher output level until the alc meter *just begins to flicker*. In most cases, further adjustment will not be necessary. By no means should you try to kick up the alc meter as high with the Masher as you do without it. If you do, your friend out there, listen-



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ing with the good ear, will probably tell you that your audio doesn't sound very good and that the background noise is too high.

A final word. I didn't have any particular problem finding suitable parts or substitutions for the MPF111 or the TL081—lucky, I guess. But you may

save yourself a lot of time by ordering them from N6WA (C. W. Electronics, Box 8306, Van Nuys CA 91409). The PCB is \$3.50, the MPF111 and TL081 are \$2.00, and a complete kit of parts is \$14.95.

That's all there is to it. Try it and you'll be amazed. ■

Designation	Parts List Description	Qty.
U1	TL081 BIFET op amp	1
Q1	MPF111 FET	1
CR1, CR2	1N914 signal diode	2
R4	470-Ohm, 1/4-Watt, 5% resistor	1
R1, R2	10k, 1/4-Watt, 5% resistor	3
R5, R6*, R7, R8	100k, 1/4-Watt, 5% resistor	3
R3	560k, 1/4-Watt, 5% resistor	1
R9	10k pot, audio taper	1
C2, C3	.001-µF capacitor	1
C1, C4, C6	1-µF electrolytic capacitor	4
C5	10-µF electrolytic capacitor	1
	PCB	1

*R6 is a feedback resistor that determines the gain level for the operational amplifier chip. If the mike has a particularly low output level, it may be necessary to increase the gain by making R6 as large as 150k Ohms.