

Review and test of the Caringella ACP-1 Compressor-Preamplifier



The ACP-1 is available in either kit or assembled form from Caringella Electronics, P.O. Box 327, Upland, California 91786.

The Caringella unit offers some unique features as an audio compressor. It is available at reasonable price in both kit and wired models.

One hears and has read about so many audio compressors, both commercial units and those described in various magazines, that the tendency is not to get particularly excited when another unit of this type appears on the scene. This was my initial reaction when I started to review the Caringella ACP-1 unit. However, upon some study of the compressor circuit and particularly after

John J. Schultz, W2EEY/1
40 Rossie Street
Mystic, Connecticut 06355

I had built and tested the unit, I felt that it had various unique features that made it well worth a detailed review.

Fig. 1 shows the schematic of the ACP-1 unit and the table below gives the "dry" specifications on the unit. I use the word "dry" to describe the specifications because they are technically accurate, but they give only a static presentation of the performance to be expected from the unit. A better illustration of the performance of which the unit is capable is shown in Fig. 2. This graph shows quite clearly the large compression range over which the unit is effective.

Circuit Description (Fig. 1)

Five transistors and one diode made up the semi-conductor complement of the ACP-1 unit. The input stage, Q1, is a silicon N-channel FET (Texas Instruments 2N3819).

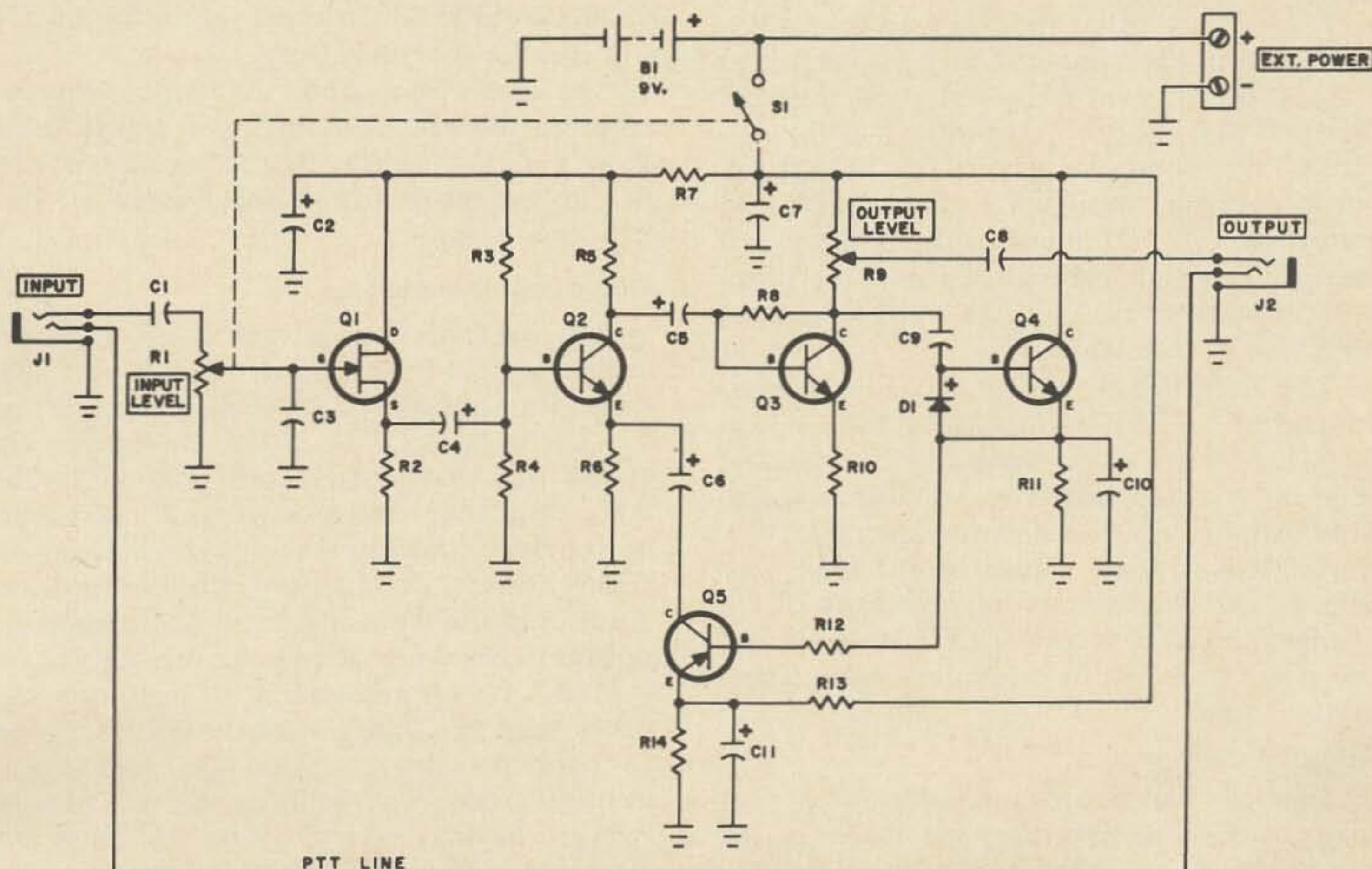


Fig. 1. Schematic and performance specifications for the ACP-1.

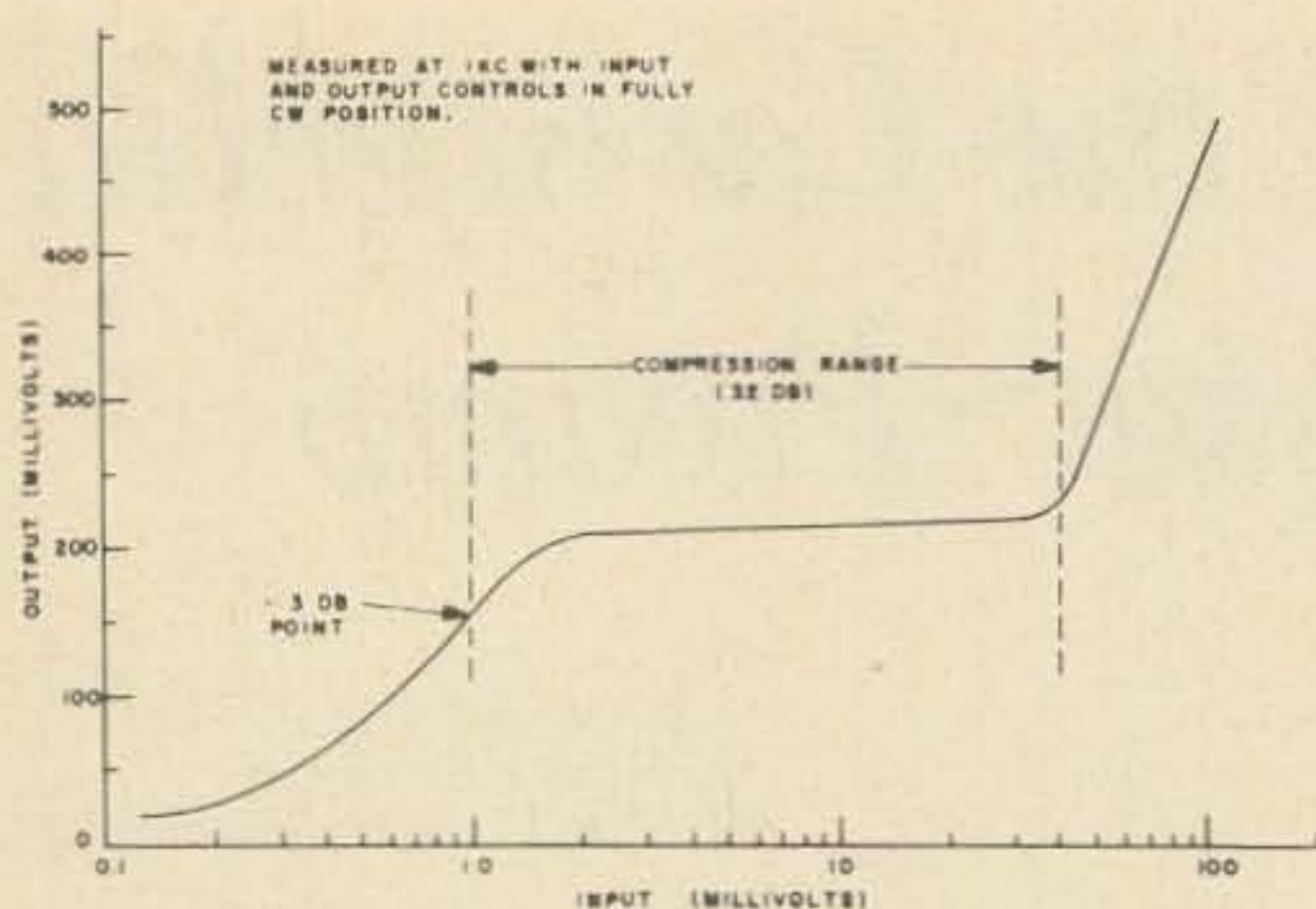


Fig. 2. Extreme compression range of the ACP-1 is illustrated by this graph.

This unit is an extremely low-noise device and, therefore, input noise from the "front-end" of the compressor is negligible. The 2N3819 also provides a very high input impedance for this first stage. R1, a 1 megohm potentiometer, serves as the input level control and is located on the front panel of the compressor.

Transistors Q2 and Q3 are NPN silicon devices used as common emitter amplifiers to boost the audio signal coupled through the source output of Q1. The emitter swamping resistor of Q2 is bypassed through C6 via Q5 in a circuit arrangement which provides the basic compressor action. The emitter swamping resistor of Q3 is not bypassed and the stage operates in a slightly degenerative mode.

The output signal is developed across R9, a 5K ohm potentiometer which also serves as an output level control mounted on the back panel of the ACP-1. Regardless of the setting of R9, however, part of the output signal is coupled through C9 to diode D1 and transistor Q4. D1 rectifies the audio signal segment coupled through C9 and the resultant dc current is amplified by Q4, another NPN silicon transistor.

The amplified dc output of Q4 is used to control Q5, a PNP germanium device. Q5 is operated in its linear resistance region and acts as a current-sensitive variable resistor. This variable resistance is in series with C6, the emitter bypass capacitor for Q2. The gain of Q2 changes as the resistance of Q5 changes since the effect of C6 is reduced and the stage operates in an increasingly degenerative mode.

Circuit Features

One of the significant differences over many other circuits that one notes in the foregoing description is the use of the 2N3819 FET input stage. The use of this

FET provides two significant features. One is very high input impedance so that a correct match is provided to the usual hi-z crystal or dynamic microphone. Low impedance microphones require the use of a matching transformer for proper operation. The other significant feature is that the extreme low-noise characteristic of the FET prevents the noise buildup or noise "rush" that is common between speech pauses when using various other compressor circuits. The lack of noise "rush" is also partially due to the well chosen release time of about two seconds.

Another significant feature is the use of Q4 as a dc amplifier stage. The use of this extra stage provides a greater compression range than is possible when only a diode or dual-diode voltage multiplier is used to control the variable resistor element in a compressor. R11 and C10 determine the compression release time while the voltage divider formed by R13 and R14 set the output level at which compression action starts.

Construction

All the components supplied were of high quality and a complete set of plugs and battery connectors are included (the battery itself is not supplied). The components all mount, except for the panel controls, on a heavy duty glass epoxy printed circuit board. The enclosure has a gloss brown speckle finish with white lettering. Provisions are made for internal mounting of a 9 volt transistor-type battery.

The assembly, circuit and operating details are all described in a 3½ page folded sheet. Following the instructions given, the assembly time required was somewhat less than two hours.

Operating Experience

The unit was tried with a SB-34 transceiver and crystal microphone (as well as a SBE microphone through a matching transformer for the input). The SB-34 has no alc circuitry and particularly outstanding results were obtained. Stations worked consistently reported an apparent 6-8 db increase in signal strength when using the compressor. Audio reports were clean and no appreciable noisiness from use of the compressor was reported. It was interesting to note that the tubes used in a linear with the SB-34 started to redden slightly, a sure sign that greater average power was being generated. Transmitters having a usual 8-10 db range alc circuit should exhibit only a slightly less improvement when using the compressor.

SPECIFICATIONS

VOLTAGE GAIN: 40 db minimum

COMPRESSION RANGE: 30 db minimum

FREQUENCY RESPONSE: Flat 20 to 20,000 cps (without RFI filter)
Flat 20 to 5,000 cps (with RFI filter)

INPUT IMPEDANCE: 0.5 megohm

OUTPUT IMPEDANCE: 5K ohm

ATTACK TIME: 1 millisecond maximum (time required to reach full compression from zero compression)

RELEASE TIME: Approximately 2 seconds (time required to reach zero compression from full compression)

SEMICONDUCTOR COMPLEMENT: 1 — n-channel silicon FET
3 — npn silicon transistors
1 — pnp germanium transistor
1 — germanium diode

FRONT PANEL: Input level control with on/off switch, 3-way phone jack for input connection

REAR PANEL: Output level control, 3-way phone jack for output connection, terminal strip for external power connection

POWER REQUIREMENTS: 9 VDC to 12 VDC, 3 ma. to 5 ma.

DIMENSIONS: 4¼" wide x 2½" high x 3½" deep

MISC: Furnished with two matching phone plugs, high quality MIL-type glass-epoxy printed circuit board, and easy-to-follow instructions

SHIPPING WEIGHT: 15½ oz.

PRICE: Model ACP-1 KIT.....\$18.50*
Model ACP-1 WIRED.....\$26.50*
F.O.B. Upland, California
*less battery

The unit was tried both using an internal battery and powered by the 12 volt line in the SB-34. In the latter mode, for best stability, it was found necessary to use a 100 pf bypass and a 100 ohm/50 μ f decoupling network on the 12 volt line to the ACP-1. The need for these components may partially have been due to the use of an unshielded cable between the SB-34 and the ACP-1.

Summary

The ACP-1 confirmed its specifications as a superior compressor unit. The emphasis in the ACP-1 kit seems to be more on hardware rather than software but, in this case, the emphasis is certainly correctly placed.

The output level control is generally not necessary when the unit is used with a transmitter having a microphone gain control. This "surplus" control space on the back panel plus the space still available in the ACP-1 enclosure sorely tempts one to compact into the enclosure other small transistor or IC station accessories, such as tone generators, VOX or keyer units. I, in fact, easily put an IC keyer that was unhoused into the enclosure and there is still room for a VOX unit.

...W2EEY/1

Promoting vhf

An excellent way of promoting contacts, friendship, and interest in ham radio on the vhf bands is to collect a list of operators on a particular band and mode. In many areas the vhf bands are sparsely populated and for this reason there is much dependence upon ground wave contacts to keep the bands alive. Collecting the call, handle, and city of all known operators within a 200 to 300 mile radius and sending a copy to each new operator along with your qsl creates a feeling of comradeship which can't be gotten any other way. The new man appreciates being a part of the gang, knowing everyone's handle, and what to expect in the way of contacts.

Keep your list current by adding and deleting as soon as changes are made and making new copies at regular intervals. The list will be most useful if some blank lines are left for additions to be made between issues.

Usually there is someone in the area who has access to a copier or mimeograph, who can make copies at little or no cost. Postage costs the same as a qsl when the qsl is stapled inside the list and the two are sent together.

William P. Turner, WAØABI

NEW! SOLID STATE KITS



COMPRESSOR-PREAMP MODEL ACP-1 KIT.....\$18.50

30 db compression range ■ Low-noise FET input stage ■ 5-transistor and 1-diode circuit ■ Adjustable input and output levels ■ Printed circuit construction with easy-to-follow instructions ■ 3-way jacks for PTT operation ■ Easily installed in mike line

Other Kits

Audio Amplifiers ■ Power Supplies ■ Test Equipment ■ Treasure Locators ■ and many others

FREE Data sheets with circuit description, diagram, and specifications for all kits.



CARINGELLA ELECTRONICS, Inc.
P.O. Box 327 ■ Upland, California 91786
Phone 714-985-1540