

Some hams like the features of the high-end commercial CODAN Envoy transceivers, but have trouble interfacing them with anything except CODAN's very expensive amplifier. N5SK takes a close look at the new CODAN High Power Amplifier Controller, which is designed to let the Envoy operate with the popular (and much less expensive) Ameritron ALS-1306 amplifier.

CQ Reviews:

The CODAN High Power Amplifier Controller (HPAC)

BY STEVEN KARTY,* N5SK

This article evaluates a new device that Australian-based CODAN recently introduced to interface its Envoy HF transceiver with an Ameritron ALS-1306 power amplifier, the CODAN High Power Amplifier Controller, or HPAC. Even though the Envoy is a commercial radio transceiver, most hams who bought Envoys assumed that connecting them to ham radio amplifiers would be easy. But trying to use the Envoy with anything other than a CODAN amplifier was a problem because there is no easy way to get a PTT output from the Envoy without an HPAC.

Photo A shows the HPAC, which measures 2 inches high by 5-11/16 inch wide and 3-3/4 inches deep. The mounting foot extends the width to 6-3/4 inches, and the TCVR (transceiver) connector protrudes from the front panel by 5/16 of an inch.

Although the Envoy is a fairly expensive commercial HF radio transceiver <<https://tinyurl.com/2cmxssw>>, it has some unique features that are interesting to many hams. What makes us cringe is the thought of having to buy CODAN's companion 1,000-watt amplifier because it costs \$43,000! Trying to use any other amplifier was a problem because there was no easy way to get a PTT (push-to-talk) output from the Envoy until CODAN developed its HPAC.

There are also several more incompatibilities between the Envoy and the \$4,000 Ameritron ALS-1306 that the



Photo A. CODAN 08-07650-001 High Power Amplifier Controller (HPAC)

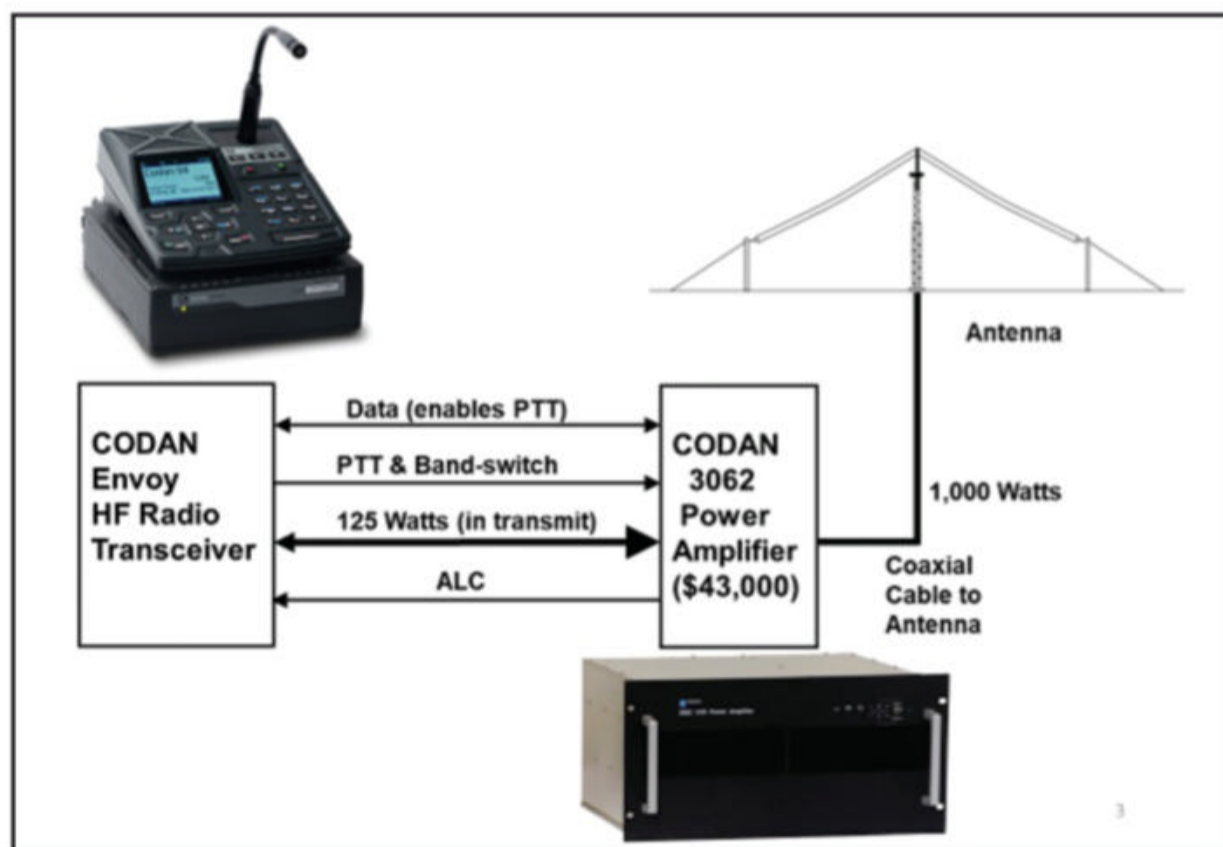


Figure 1. CODAN Envoy with CODAN 3062 amplifier. This combination, while excellent, is beyond the budgets of most amateurs.

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\$600 HPAC solves: These include automatic band-switching and Automatic Level Control (ALC). No HPAC is needed with CODAN's own \$43,000 amplifier because it has all the HPAC functions built-in. Before the HPAC was introduced, I heard about some hams who developed a way to get a PTT output from the Envoy: They wrote their own custom firmware which also required cutting and rewiring some of the existing Envoy interface cables. Although their method provides a PTT output, they weren't able to fix the other interface problems.

Evaluation

Figure 1 shows the normal connections between a CODAN radio and a CODAN amplifier. HF radio amplifiers normally have a push-to-talk (PTT) input pin that needs to be connected to a radio's PTT output pin, so the radio can tell the amplifier when to transmit. Although the Envoy has a PTT output pin, it is not enabled by default. The Envoy has another pin for serial bi-directional data transfer that must be connected to the corresponding pin on a CODAN amplifier. The CODAN Envoy and the CODAN amplifier use their data pins to talk with each other so that, if they both agree, the Envoy enables its PTT output pin for use by the amplifier. The Envoy also has connections for providing band data to the amplifier and for receiving an ALC signal back from the amplifier.

Since ham radio amplifiers like the Ameritron don't have a serial bidirectional data pin, there is nothing to tell the Envoy to enable its PTT output pin, and there is no way for the Envoy to tell the Ameritron amplifier to go into transmit. Even if we could somehow get the Envoy's PTT output pin enabled, its output impedance of 1,000 ohms to ground is much too high to activate most amplifiers. The Ameritron amplifier must have its PTT input pin pulled down to less than 200 ohms to ground for transmitting. Although the Envoy provides an automatic band-switch selection output, its signal voltage levels are different from those needed by the Ameritron. Also, the Envoy switches bands at different frequencies from those needed by the Ameritron. The ALC voltage output from the Ameritron is also different from the ALC voltage input level needed by the Envoy. Because of all these differences in the data level voltages, formats, and impedances, the CODAN Envoy was completely incompatible with anything but a CODAN amplifier until CODAN developed the HPAC.

Figure 2 shows the normal operating configuration for connecting the Envoy to the Ameritron amplifier through an HPAC. The HPAC takes all of the signals from the Envoy and reduces them to a much simpler interface for the Ameritron amplifier. The HPAC enables the Envoy's PTT output and lowers its impedance, changes the Envoy's band-switch format to match the Ameritron's input, and changes the Ameritron's ALC level to match the Envoy. The PTT and band-switch lines shown in Figures 1 and 2 are

really eight different lines, seven of which are for the band-switch data. The HPAC accepts the band data output from the CODAN Envoy which is a ground on one of those 7 pins, depending on the operating frequency band selected: The HPAC translates those 7 pins into a single output pin going into the Ameritron amplifier that requires a different voltage input level for each band (ICOM format). This was the easiest interface problem for the HPAC to solve and it uses simple voltage dividers.

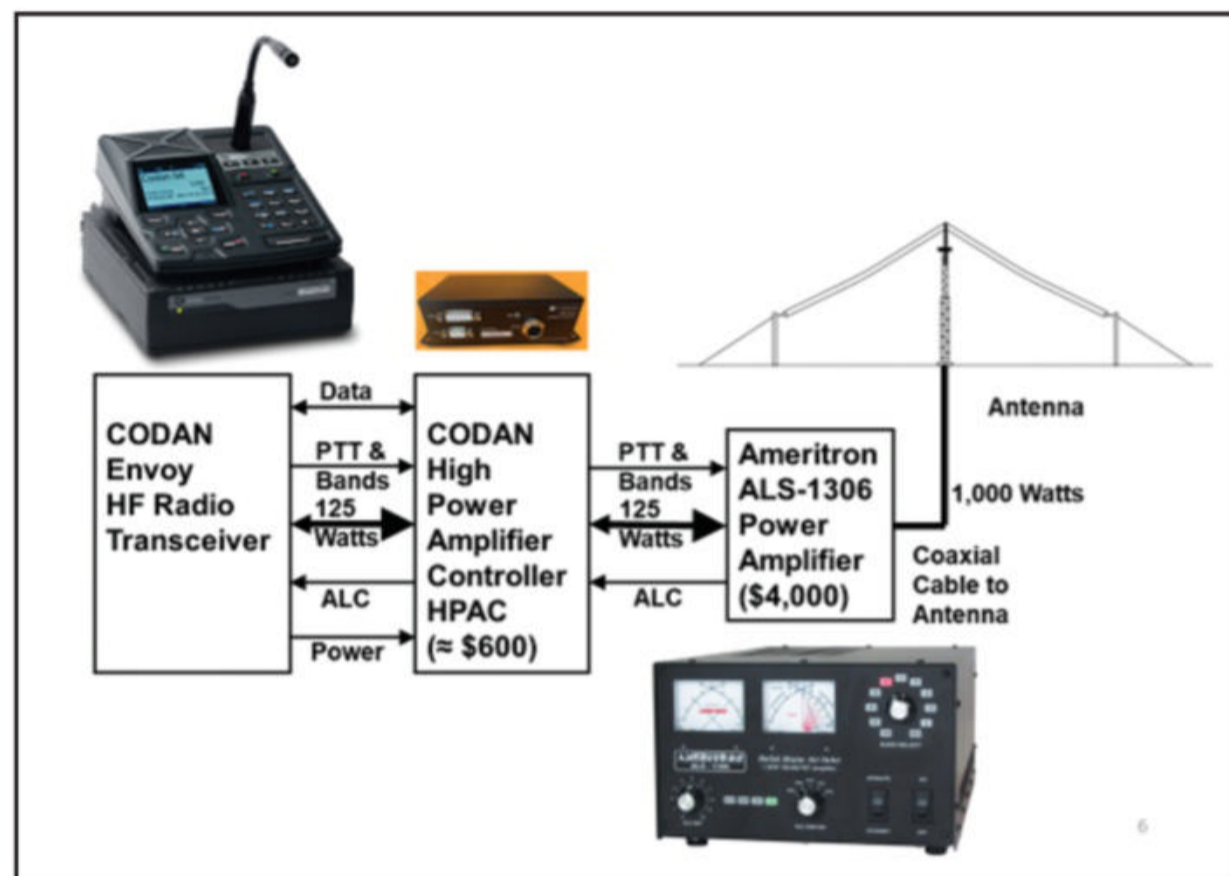


Figure 2. CODAN Envoy connected to Ameritron ALS-1306 amplifier through HPAC.

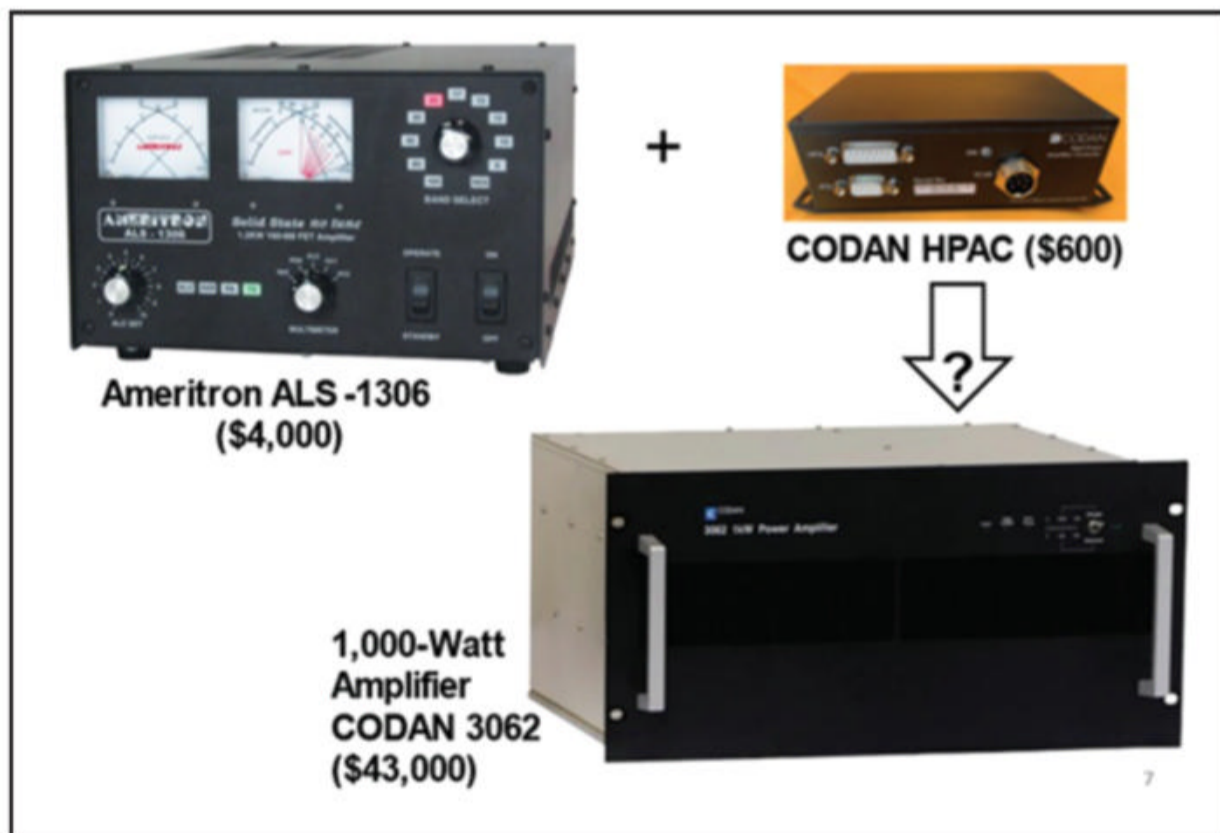


Figure 3. Ameritron ALS-1306 plus CODAN HPAC \approx CODAN 3062? (No, not really.)



Photo B. The 08-05956-001 cable connects the transceiver to the HPAC.

Figure 3 asks the \$43,000 question of whether the Ameritron ALS-1306 amplifier with the CODAN HPAC (for a total of \$4,600) are the equivalent of the \$43,000 CODAN 3062 amplifier: Although it's not an optimum configuration for commercial and government users who may need to access any portion of the entire HF radio band, it's a very workable combination for ham radio use.

Even with the HPAC, the Ameritron amplifier cannot operate over the entire HF radio band because it was not designed to operate outside ham radio frequencies. But its relatively low price makes it ideal for ham radio use. Also, the Ameritron is not suitable for completely unattended operation because it must be manually reset at its front panel if it experiences a problem. The Ameritron goes into standby mode when it senses a problem (such as high SWR) and it then has to be manually reset by an operator.

The CODAN amplifier is much more robust, and it will operate through problems that would cause the Ameritron to go into standby. Even if the CODAN amplifier faults, it has both automatic and remote reset capabilities. But it also costs ten times as much as the Ameritron / HPAC combo.

Equipment Description

HPAC Kit OPP-23652 Ameritron HPAC and accessories consists of the following items:

Part Number	Description
08-07650-001	HPAC (for ALS-1306 Amplifier)
08-05956-001	Cable, HPAC, 1m
08-07662-001	Cable, HPAC to Ameritron ALS-1306, 2m
15-04226-EN	Instruction Booklet, HPAC
08-01503-002	Cable, Coax assembly (RG58 UHF), 2m

The total cost of the first four items is approximately \$600. Addition of the last item (the coaxial cable assembly) would increase the total by \$142, so it is recommended that it be

fabricated or separately purchased from a local source. (The MFJ-5806 6-foot long RG-58A/U patch cable with PL-259 connectors on both ends is available at Gigaparts <www.gigaparts.com> for \$18.89 plus shipping.)

The 08-05956-001 cable in Photo B connects the CODAN Envoy transceiver to the HPAC. The male end of the cable connects to Envoy's antenna control connector and the female end of the cable connects to the TSVR (transceiver) connector on the HPAC. Although this cable appears to use the same type of connectors on both ends (except for one being male and the other female), the pin location for the second pin of the male connector is missing. The pin numbering also skips over the missing pin, so that the next pin is pin 2. This series connector does not seem to be readily available, and so this entire cable assembly should be purchased from CODAN along with the HPAC.

The 08-07662-001 HPA cable (Photo C) has a DA-15M connector on one end and two connectors (an RCA phono plug and a DE-9F connector) on the other end. The DA-15M connector plugs into the HPA connector on the HPAC. The end with two connectors plugs into the Ameritron amplifier's mating DE-9F Radio Interface connector and its RCA phono jack ALC connector. Although these are all readily available standard connectors, the plastic back shell of the DA-15M connector contains active circuitry. This active circuitry is a personality module for matching the Ameritron ALS-1306 amplifier. In the future, personality modules to suit different amplifiers may be made available if there is enough interest. This entire cable assembly must be purchased from CODAN along with the HPAC because of the active circuitry in back shell of the DA-15M connector.

The 08-01503-002 (Photo D) is a standard coaxial jumper cable with UHF connectors on both ends: This cable connects the Envoy's antenna connector to the amplifier's RF IN connector through a 2-meter length of RG58 coax. This cable can be fabricated or purchased locally for much less than its \$142 price from CODAN. It is therefore recommended that everything else *except* this cable be purchased from CODAN, to keep the total price down to the \$600 region.

Instruction Booklet

The instruction booklet does an excellent job of explaining the HPAC and how to use it to interface the CODAN Envoy with an Ameritron ALS-1306 power amplifier. Although the CODAN HPAC compensates for most of the Ameritron's idiosyncrasies, the instruction booklet contains the following note: "Each time the Envoy transmits on a different frequency, the amplifier PTT will be delayed by up to 700mS while the amplifier configures itself for the new frequency. Subsequent PTTs on the same frequency will not be delayed if the internal delay has already occurred however."

The initial version of the instruction booklet missed providing any explanation of what the different colors and flashing of the ON LED mean. The HPAC instruction booklet will be updated with the LED status details shown in Table 1. One additional observation is that the "red" LED color looks more

ON LED status	Meaning
Steady green	Device is functioning normally
Slow flashing green	Device is establishing communication with the radio
Steady yellow	Device is being reset
Slow flashing red	Device has been requested to perform a command that is not available
Steady red	Device has a non-recoverable configuration error

Table 1. What the HPAC "On" LED is telling you



Photo C. The 08-07662-001 HPA cable provides the communication between the HPAC and the Ameritron amplifier.



Photo D. The 08-01503-002 cable is a standard coaxial jumper. It's very expensive if you buy it from CODAN, but many other options are readily available.

orange than red. When the ON LED is glowing a steady green, it only indicates that the HPAC is connected correctly, and communications are available; it does not mean the correct Envoy settings have been selected for the Ameritron amplifier, nor that the power amplifier (PA) settings are correct.

The Envoy must have firmware version 3.10 or later to operate with the HPAC. Your CODAN distributor can remotely update your Envoy's firmware to a more recent version (currently 3.20) over the internet (if you have the CODAN 08-07215-001 Ethernet adapter plugged into the Envoy), after which the Envoy Desk Console firmware will automatically update itself.

Because the Ameritron ALS-1306 amplifier was built for amateur radio use, it is unable to operate over the entire HF spectrum from 1.6 to 30 MHz. The Ameritron amplifier also disables itself between 25 and 28 MHz, in accordance with FCC rules and regulations for ham radio power amplifiers, and it

may not operate correctly beyond the ham radio bands' edges.

RF Pulse Issues

The CODAN Envoy normally transmits a short RF pulse at the start and end of each transmission. The Envoy Desk Console also beeps twice the first time it is PTTed after changing to a new frequency, coinciding with the initial RF pulse: The beeps are indicative of RF power being generated, which is required for a commercial external antenna tuner. The RF pulse at start of transmission is 50 watts, which occurs before the Envoy has PTTed the Ameritron amplifier (while the amplifier is in bypass). Ham radio automatic antenna tuners typically must be tuned at less than 20 watts, so it might be possible for CODAN to provide a future firmware upgrade to reduce the level of this pulse to between 10 and 15 watts when it is connected to the HPAC.

The end of transmission pulse from the Envoy is approximately 60 watts,

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and it occurs while the amplifier is active so it causes the amplifier to produce full power. This ending pulse is slightly shorter than the starting pulse, but it contributes to the Ameritron amplifier sensing excessive reflected power on some frequencies and going into its standby (bypass) mode. CODAN provided instructions for turning off the ending RF pulse by going into the Envoy's Admin mode and selecting *Settings > Configuration > Handset PTT Beep*. The Ameritron amplifier operated much better after this simple change was made because it is overly sensitive to SWR above 2:1. The Ameritron amplifier faults and goes into its STANDBY (bypass) mode whenever it senses an SWR above 2:1 — after which it must be manually reset. Preventing this problem will probably require using an external automatic antenna tuner such as the MFJ-998 Intelli-Tuner.

It would be ideal to use the CODAN Envoy together with its companion CODAN power amplifier, but the high cost of the CODAN amplifier is dis-

couraging when compared to other brands like the Ameritron ALS-1306 power amplifier. There is a huge price-performance trade-off from using the less expensive Ameritron amplifier: The CODAN amplifier is commercially rated versus the Ameritron amplifier's amateur status. Commercially rated amplifiers are built to much higher standards than amateur radio amplifiers, with better characteristics including improved reliability and longevity (especially when operated in continuous duty) with better harmonic suppression. The CODAN amplifier operates properly throughout the entire HF radio frequency band without any compromises, and it is able to accept fairly high SWRs and reflected power levels without faulting.

Additional Information

Step 3 on page 2 of the instruction booklet is confusing: It should say "To change to ALC Mode, the left arrow (<) on the Desk Console must be depressed and held down (as if reducing the power level) until 'ALC Mode' is displayed."

If the HPAC seems not to be functioning after connection, check to ensure that "PA" is displayed on the top notification bar of the Desk Console display. If not, press and hold button "6" until "PA" appears. If "PA" does not appear, check that the *Menu > User Data > Peripherals > Power Amplifier* is set to HPA Controller. If it was necessary to change this setting to HPA Controller, then press the checkmark key to save this change, power off and restart. Check that the RCA connector on the Ameritron end of the HPA cable is plugged into the Ameritron's "ALC" socket, which is the lowest RCA connector. If there is a slide switch on the Ameritron's back panel next to the Radio Interface connector, its slider should be at the Radio Interface connector end of its travel. Check that the Ameritron Band Select switch is set to REM.

Summary

The HPAC correctly controls PTT, enables proper automatic power amplifier band-switch filter selection, and level shifts the Automatic Level Control (ALC) signal from the Ameritron amplifier to the Envoy. Alternatively, the Envoy can be set to user-defined power so operators can run without ALC. The HPAC's ON LED is also helpful for verifying that most of the cables are connected to the Envoy and the amplifier, and that they are on and operating. The HPAC works perfectly with the Ameritron amplifier in its single-frequency mode and no problems were found with initial testing of ALE operation. Adding a \$600 HPAC to a \$4,000 Ameritron amplifier will not turn it into the equivalent of a \$43,000 CODAN amplifier: The HPAC does everything that could possibly be expected of it to solve the interface compatibility problems between CODAN Envoy HF radio transceivers and Ameritron ALS-1306 amplifiers. Adding one \$600 HPAC to an Ameritron amplifier makes it compatible with a CODAN Envoy HF radio transceiver.

Ordering Information

The HPACs can be ordered from Feather Tippetts <ftippetts@nviscom.com>, who works for John Rosica <john@nviscom.com> at NVIS Communications, LLC, 28850 Shannon Court, Tehachapi, CA 93561, (408) 782-8002 ext. 200. The HPACs cost slightly over \$600 each, but only if the 08-01503-002 coax cable assembly is omitted when placing your order. Otherwise, the HPACs are \$142 more.

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