BETTER THAN NEW

172

MORE THAN SKIN DEEP

It's the details that make a quality paint job

BY THOMAS B. HAINES

What's most interesting about watching an aircraft get painted is not the painting process itself, but everything related to it. When you order up a paint job, your airplane will likely be out of commission for four or more weeks, yet it may spend only a few hours actually

PHOTOGRAPHY BY DENNIS WOLTER

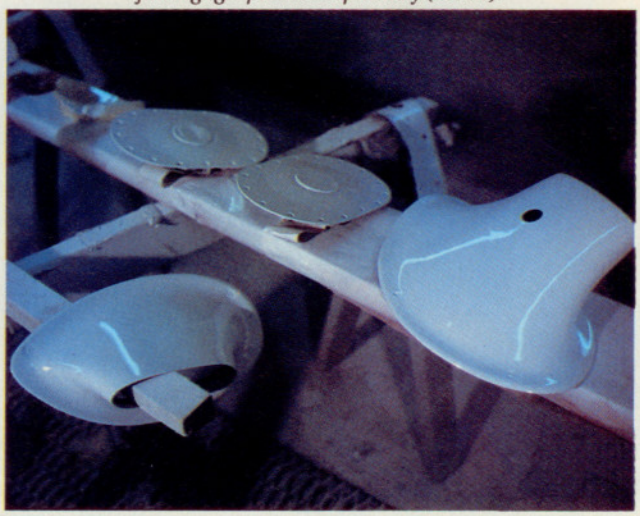
The chemical stripper leaves the aluminum surfaces shiny clean. Fiberglass parts, such as the nose bowl, must be hand sanded.

being hosed down with paint by workmen who look like they might be dressed for some sci-fi-themed Halloween party.

Those guys in the space suits are real craftsmen with a spray gun, but all their handiwork is for naught unless the prep crews do their work properly. It's the preparation that can take weeks.

In its pre-Better-Than-New condition, our sweepstakes airplane was fairly typical of a 1978 172. It had the usual case of hangar rash. The left elevator surface was so badly bent and torn that we eventually reskinned it. A couple of cracked plastic fairings were held together with 100-mph tape until we could get them replaced. In fact, all the fairings needed replacing. Several of the aileron corrugations were crushed and the bottom of the left wing tip had two serious wrinkles in it. Had someone pulled the airplane through a gate and dragged the wing over a fencepost?

The obvious damage is only the beginning. A little light sanding on a primed airplane causes all sorts of small dents and dings to appear. It's here that the difference between a good paint job and a great one emerges. A quality shop will take the time to hammer out and fill the small dents and then reprime the areas, leaving a smooth finish for the paint. It was that sort of attention to detail that turned N737QN into N172B, our Better Than New 172 sweepstakes airplane. The airplane will be given away in mid-January to a new or renewing AOPA member as part of the association's annual membership sweepstakes. Those who renew or join in 1994 are automatically entered to win. The sweepstakes closes December 31; as Ed McMahon says, "Send it in."



Primer and paint go on with wheels and flight controls removed (top). The engine upgrade required the moving of the oil access door—another patch to sand (above). Inspection panels and fairings get painted separately (below).

Paint shops live and die by their reputations and, therefore, the good ones will go out of their way to make a customer happy. Shop around to avoid paying too much for a paint job, but remember that paint is an investment in an airplane. It's not the place to skimp. Amortize the difference in price between a cheap paint job's 8- or 10-year life and a quality one's 15- or 20-year life, and the disparity can be minimal indeed. Expect to pay $4,500 to $6,000 to have a Skyhawk-class airplane painted; more for a larger aircraft. Putting in new windows, replacing fairings, and making significant skin repairs

can add substantially to the price.

Perfect Finish Aircraft Refinishing, the company we chose to paint our sweeps airplane, charges $5,900 to paint a 172. The price includes a high quality paint job and a lot of extras. Some shops charge a lower flat fee and then offer additional services at an added charge. Included in Perfect Finish's price, for example, is the reinstallation of all inspection panels with stainless steel screws. The cowling fasteners are also stainless with nylon cup rings to prevent scratching when the cowling is removed. The rebalanced control surfaces are put back on with new bolts, nuts, and bushings. Placards are painted on, not replaced with stickers or stick-on letters.

Most all the aircraft-grade paints in use today will provide a glossy and durable finish. Paint shops have chosen the product lines they use for a variety of reasons. What's important for a customer to consider is the quality of the shop's work. Don't ask a shop to use a different paint system on your aircraft than it normally uses. The shop personnel should be comfortable with the brand they use. Asking them to apply something else only invites trouble.

Perfect Finish uses Jet Glo and Acry Glo by Pratt & Lambert. Jet Glo is a very hard polyester urethane paint used on many business jets. It comes in a dizzying array of colors. Acry Glo is an acrylic urethane that can be custom mixed to any color for use as a trim paint on all aircraft and as a base coat on lighter aircraft. It's not quite as hard as the Jet Glo, but is plenty durable as a base coat for slower piston aircraft.

We ended up with both on N172B. The base color of Snow White is a standard Jet Glo color. The trim is Acry Glo because both the April Green and Platinum are metallics, a feature only available in Acry Glo. The Acry Glo metallics require a clear coat be put on top to provide additional gloss. The end result is quite stunning, particularly on a sunny day when the metallics really show off their sparkle. Many people who have seen the airplane remark that they "don't usually like green, but . . . " and then they want to jot down the name of the color to consider for their own airplane.

Choosing a color is just one of the many decisions an owner must make before ever reaching the shop. Paint scheme and N-number style also must be considered. Perfect Finish makes

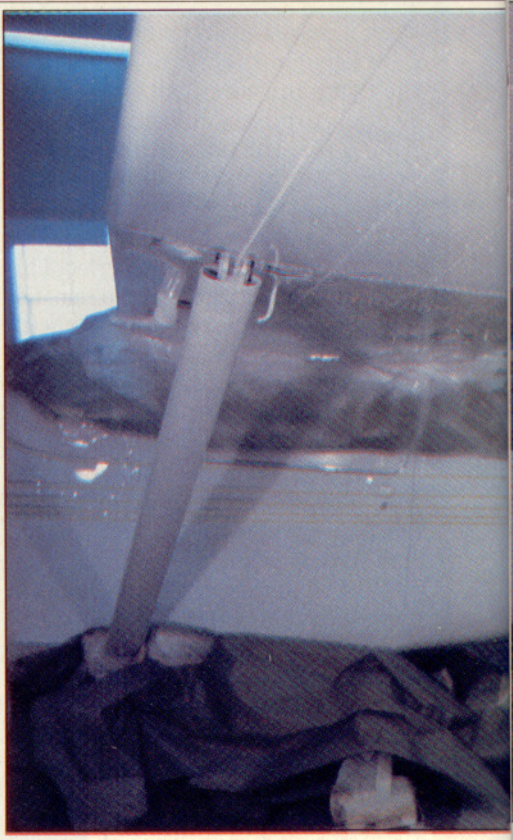
the decisions a little easier with its own computer system, which allows you to see on the screen or in a printout from a color printer just what your airplane will look like in the chosen colors and scheme. Your own designs are great for personalizing an airplane, but replicating a factory scheme will more likely increase the resale value. We chose a custom but fairly conservative scheme for N172B. The registration numbers are green Helvetica bold with a platinum drop shadow.

With the tough decisions made and the deposit check written, the real work gets underway.

Joe Conrad, president of Perfect Finish, which is located at Hamilton-Fairfield Airport near Cincinnati, likes to begin a paint job by walking around the airplane with clipboard in hand and owner in tow. He points out and notes any areas that need special attention. His experienced eye will undoubtedly find dings, dents, and corrosion you missed. Like most shops, Conrad includes a certain number of hours of repair work in his flat fee. Repairs that exceed six hours, in his case, will be charged at the shop rate.

Once in the shop, just about everything not riveted down is removed: control surfaces, flaps, fairings, wheel covers, and wing tips. The windows and any remaining fiberglass and plastic parts are then masked off with special tapes and foils. Perfect Finish also tapes out about one-half inch from the windows, preferring to hand sand those areas rather than risk getting damaging chemical strippers on the plexiglass.

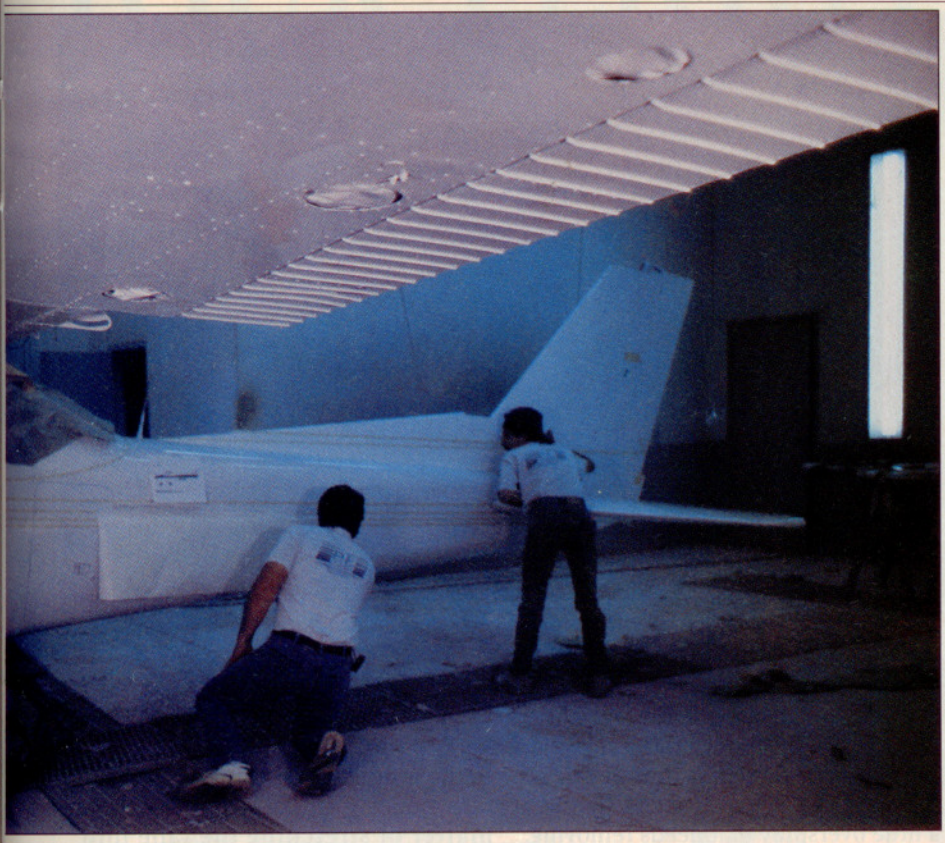
Perfect Finish applies the stripper with a spray gun and, after the paint bubbles up, removes the gunk with a pressure wash. The residue from the stripping process is what has gotten many paint shops in trouble with the Environmental Protection Agency. It contains solids from the old paint and the underlying chromate primers along with flecks of aluminum from the skin—all potential hazards, according to the EPA. The methylene chloride stripper itself is also considered a hazardous waste. Perfect Finish dries the solids and sends them to a waste management company for disposal, usually by incineration. A $25,000 treatment system must filter the water used in the process and rebalance the pH. The water is then permitted to be dumped into the public sewer system. Some shops have not been willing or able to invest in such treatment systems and have either gone out of business or come under scrutiny from the EPA. A company operating outside the law may be able to offer a too-good-to-be-true price on paint jobs, but its warranty will be worthless if the government moves in and closes it down.



Fiberglass cowlings, wheel covers, and other parts that won't stand up to the strippers must be sanded by hand. We replaced all the plastic fairings with new fiberglass ones from Stene Aviation in Polson, Montana. The original plastic often cracks and is difficult to repair. The fiberglass is more durable and repairs easily. A full set of fairings for a 172 runs about $900. Wheel pants are another $165 each.

Once the airplane is stripped, Perfect Finish removes the inspection panels and paints them separately so that the paint goes all the way to the lip of the opening, and so that the surface isn't cracked the moment the inspection panel is opened the first time.

After stripping, the aluminum is then cleaned with an alkaline cleaner that goes deep into the surface pores and removes the solvents. An acid-etch cleaner further opens the aluminum pores and stops any corrosion. Next, the alodine conversion coating acts as



Laying the striping tape on the base coat takes a careful and accurate eye (above). A detailed, multi-colored logo requires much masking, but computer-generated stencils assure crisp edges.

a corrosion barrier and prepares the aluminum to receive the primer.

Most small shops such as Perfect Finish still use zinc chromate primers that etch into the pores of the aluminum. Larger facilities have been forced by environmental regulations to switch to epoxy-based primers. The chromates can be damaging to the environment, but are acceptable on a small scale.

As noted earlier, a light sanding of the primer reveals any dents or corrosion that needs repairing.

Finally, the base color is applied, usually two coats. Perfect Finish does its painting in a down-draft paint booth. Vents below the airplane pull air from the overhead ventilation system down to the floor and out of the room, removing dust and particles that might otherwise settle on the wet paint, causing a rough surface.

After the base coat dries, the surfaces not receiving the trim colors are masked off and the second color is applied. If a third color is necessary, as in N172B, additional masking is required to keep that color off the other two and for the painting of the registration numbers.

Meanwhile, the control surfaces, fairings, wheel pants, and other fiberglass parts are painted separately. The control surfaces should be painted while suspended from their hinge points to keep the weight of the paint properly distributed across the skin. The FAA considers aircraft painting as cosmetic and, therefore, a painter need not be certified. But all the airframe manufacturers require in their operating manuals that the control surfaces be rebalanced before they are reinstalled, a step that requires certified personnel.

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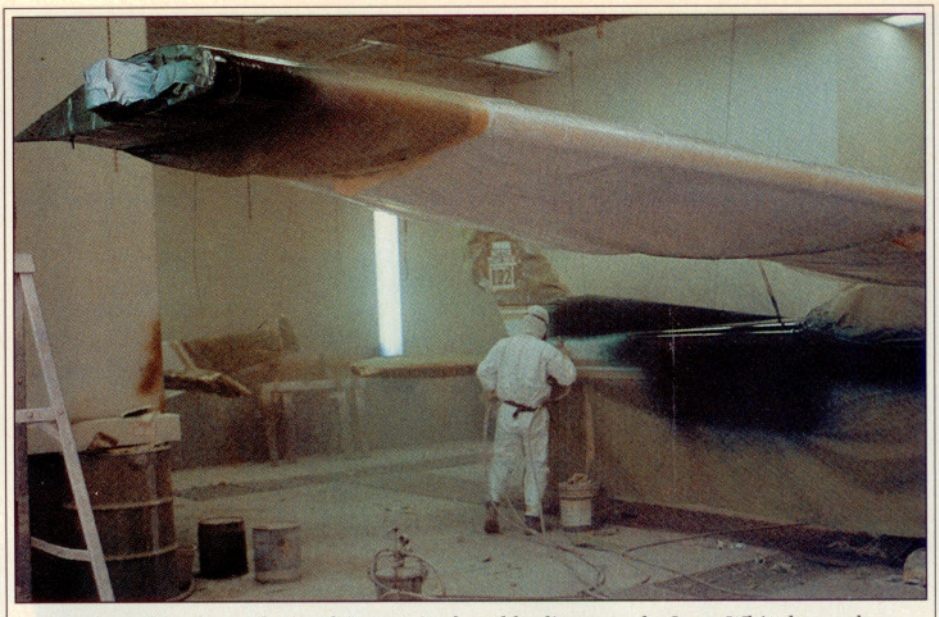


Much masking keeps the April Green trim from bleeding onto the Snow White base color. Both those colors will be masked off to make way for the Platinum gold stripes (above). The detail work continues for hours after the spray gun is put away (below).

Once the masking is removed and all the pieces are back on the airplane, most shops spend another day or so detailing the airplane. There's always a little overspray that needs removing, landing gear to be detailed, and other small items to be primped before the owner arrives.

Few things in life are as frustrating as seeing a pretty paint job marred within a few weeks by stone chips and rain and ice erosion. To help prevent that, we had a clear polyurethane protective tape applied to the leading edges of the wing and tail surfaces and to the struts. The tape is manufactured by 3M and distributed in the aviation market by several companies, including Hallmark Aviation of Dallas, Georgia. Hallmark calls the product "The Leading Edge."

The tape can be applied by an owner. It's a simple installation, but can take the better part of a day to apply properly. Hallmark cuts the tape to the width necessary for your particular model of aircraft. Then it's just a matter of stretching the tape into place. A solution of water and dish washing soap is sprayed on the surface first to allow proper positioning of the tape. Once the water dries, the tape is on for good. A kit for strutted airplanes sells for $330 from Hallmark. Other airplanes can be protected for $300.

As noted earlier, a good paint job really ought to last a couple of decades, even longer on a hangared airplane. To keep it looking good, Pratt & Lambert recommends waiting 30 days after painting and then washing the airplane often and in the shade with cool water and a mild car wash soap. The surface should be rinsed well after washing and then dried with a chamois. A good quality automotive polish or wax will

maintain the shine. Avoid using products that claim to clean, polish, and wax all in one step. They contain abrasive cleaning agents that can scratch the surface and dull the finish.

To prevent scratches, remove snow and ice with a brush rather than a scraper. Rinse off bird droppings, avgas, hydraulic and brake fluid, and oil as soon as possible.

With proper care, a new paint job will turn heads on the ramp for years to come. And besides, it's important for the person who's going to win our Better Than New 172 to know these things. I retain visitation rights to the airplane and I'll be watching. □

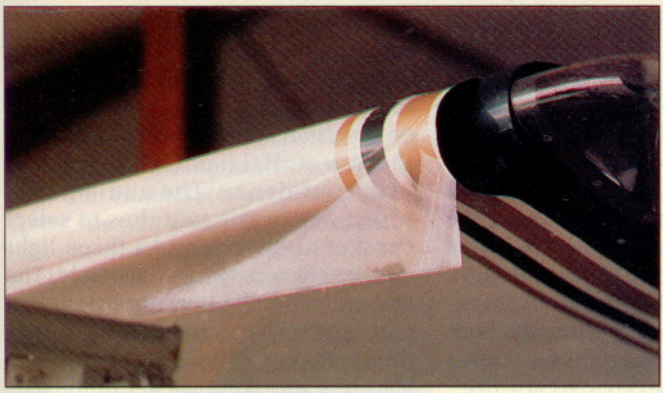
Hallmark Aviation, 1408 Powder Drive, Dallas, Georgia 30132; 404/443-9825.

Perfect Finish Aircraft Refinishing, 2800 Bob Meyer Road, Hamilton, Ohio 45015; 513/867-0303.

Pratt & Lambert, Industrial Coatings Division, Post Office Box 2153, Wichita, Kansas 67201; 316/733-1361, fax 316/ 733-4420.
(Alpha Coatings, Incorporated, Post Office Box 131, Washington, Missouri 63090; 314/390-3903, fax 314/390-3906.)

Stene Aviation, Incorporated, Post Office Box 559, Polson, Montana 59860; 800/597-1911.

A typical Terra stack might consist of an audio panel with built-in intercom and marker beacon receivers, GPS, a pair of coms and navs, transponder, and ADF. Terra also makes its own ADF heads and the unique electronic Tri-Nav indicators (far left). Unlike some other brands, the Terra navs and coms are all separate units.



Steve Maglione of Hallmark Aviation applies 3M's clear protective tape to the leading edges. A razor blade, soapy water. and a small squegee are about all that's needed to finish the job.

TUNING IN TERRA

A trim and tidy avionics stack.

BY MARK R. TWOMBLY

AOPA's Better Than New 172 is equipped with a center stack of Terra Avionics radios. Why Terra? We've had plenty of experience with Brand K—they were installed in the Good As New 172 last year—and we wanted to play the field. We were intrigued by the light weight, compact size, and installation flexibility of the individual Terra units. Those are major considerations when panel real estate is precious, as it is in a 172.

Terra offers a top-of-the-stack-to-the-bottom complement of solid-state, digital-display gear including the TMA 230 D audio panel/marker beacon receiver, TN 200 D nav receiver with glideslope receiver, TX 760 D com transceiver, TGPS 400 GPS (manufactured by Trimble), TDF 100D ADF, and TRT 250 D transponder. Also, the company has a unique product in the Tri-Nav electronic course deviation indicator. Electronic CDIs are not new, but no company other than Terra currently offers one. Given the number of microprocessors busily controlling the many digital-display instruments across most of the rest of the Better Than New panel, the Tri-Nav seemed the logical choice.

Finally, Terra's prices are attractive. The stack of Terra avionics in the Better Than New 172, which includes everything listed above plus backup nav and com units but not the GPS (the airplane has a Garmin GPS certified for non-precision instrument approaches), lists for $10,270 uninstalled.

The decision to go with Terra was not without some hands-on experience. I have been flying with Terra radios in my Skyhawk for more than a year. Soon after buying the airplane, I added a Terra TMA 230 D audio panel/marker beacon, replaced a decrepit Narco unit with a TN 200 D nav receiver with glideslope and TX 760 D com transceiver, took out a conventional CDI and replaced it with a Tri-Nav, and added a Terra TGPS 400, which is the same as a Trimble TNL 1000 DC. Given the narrow confines of my avionics budget, I had to live with the remainder of the radio gear in the airplane: a Michels MX-300; an old, but superb, Bendix T12B ADF; and a Cessna 300A transponder that is close to getting the boot because it seems to prefer working a part-time schedule.

The Terra upgrade transformed the airplane. Although it had a current IFR certification with the old equipment, I wasn't keen on flying in the clouds with radios of questionable character, and no precision approach capability. With the new stuff, I launch into weather with confidence. The audio panel, which has toggle switches to select speaker or phones and a three-light marker beacon, works flawlessly. The nav and com displays are bright and crisp, and each has a standby frequency displayed plus a 10-frequency memory feature. I was skeptical about the usefulness of the memory function, but I took a few minutes one afternoon to read the manual and enter 10 com frequencies and 10 nav frequencies in the storage bins. I've been pleasantly surprised to find that it's a handy, useful feature.

A big plus for Terra is the three-year, no-cost warranty on all its equipment.

I have become a fan of the Tri-Nav indicator. Terra readily admits that many pilots resist the change from a simple swinging needle CDI and analog glideslope indicator to an electronic presentation, but I think the electronic processing and presentation are a step forward. Full-scale deflection on the deviation bar is 10 degrees left and right, the same as a conventional CDI, but the bar is composed of 14 light bars, each representing a 0.7 degree deviation. The larger scale on the electronic CDI means off-course indications appear sooner than on a conventional instrument, which makes for quicker course corrections and more precise flying. The same is true of the electronic glideslope deviation bar.

The indicator also has a lot more capability than a conventional one. It can display the active radial from a second VOR receiver or, in the case of the Tri-Nav C, a loran or GPS track. The signal source, whether a To/From radial, Localizer, ILS, or Backcourse, is displayed. The instrument also has a To/From radial-centering feature and a count-up electronic timer.

Terra's TGPS 400 is a GPS receiver with a front-load, slip-in Jeppesen NavData aviation database card. The 400 has a liquid crystal display that has proven to be perfectly satisfactory. The installing

shop recommended the GPS be placed high in the stack for maximum readability, and that was good advice. The 400 has all the typical features of a state-of-the-art VFR GPS except special use airspace alert—a lamentable omission, but one that enables a lower price. No surprise, the GPS is an incredible enhancement to a humble Skyhawk.

I did experience failure of the nav receiver display about a year after the radio was installed. The radio was shipped back to the Terra factory in Albuquerque for repair. A big plus for Terra is the three-year, no-cost warranty on all its equipment. The customer pays shipping charges only; Terra picks up parts and labor costs.

I've also had some difficulty tuning nav and com frequencies in turbulent conditions. The radios each have a single knob to scroll up or down through the frequency ranges. The knobs are hair-trigger sensitive, and when the airplane is bumping around, it is difficult to tune the kilohertz frequencies precisely. Terra says a few customers have had similar complaints. The company is contemplating a survey of its customers to see if nav and com frequency tuning is indeed perceived as a problem.

Until recently, Terra's digital transponder employed the same single-knob-scroll tuning system as the nav and com units. The company recently made a software change to the TRT 250 D that is now being field tested in a few units, including the one installed in AOPA's Better Than New 172. In the new version, the tuning knob controls one squawk code digit at a time. The user pushes the knob to move the cursor to the next digit to tune. It's a more accurate and faster method of inserting the proper transponder code.

The FAA earlier this year issued a proposed airworthiness directive that would require the 5,300 or so TRT 250-series transponders shipped from 1985 to March 21, 1994, be returned to the factory for modifications. It seems that the new ATC Mode S radars and airborne traffic alert and collision avoidance systems (TCAS) emit a unique pulse that momentarily jams the Terra transponder's circuitry. The transponder's original design met then-current FAA specifications, according to Terra officials. The company believes the FAA should pay for the changes. So far the FAA has refused. As it stands now, the fix costs the transponder's owner about $300. The comment period on the airworthiness directive closed in early November. A final decision from the FAA is expected soon.

AOPA's Better Than New is just beginning to build time with its spectacular panel. One nav reception problem has been reported. On a recent long cross-country trip the nav receiver did not pick up a good VOR signal until within about 40 miles of each station, even though the airplane was flying at relatively high altitudes. The source of the problem, which could be related to the antenna or installation, has not yet been identified. I have not had a nav signal reception problem with the TN 200 D in my Skyhawk.

The Terra upgrade has greatly enhanced an older, nowhere-near-good-as-new Skyhawk. I now have far more sophisticated avionics that weigh less than what they replaced. The much more extensive package in the Better Than New 172 is in harmony with the full panel's digital personality and capability. The eventual owner of the airplane will be able to fly it to its fullest potential. □

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