



*Avidyne's IFD540*

# M Touchscreen MANIA

The Infinitely Variable 'Digital' Interface

STORY BY DAVE HIGDON

**I**f you lived between 1979 and 1983, you may remember the old commercials for AT&T: “Reach out. Reach out and touch someone.”

The line became a tag line for Ma Bell, the only nationwide phone company at the time.

Somewhere, someone involved in marketing modern avionics wishes they could use this tag line for their latest panel product – one controlled and operated largely through a finger-touch on a color display.

The connection? In the past few weeks, avionics companies unleashed a flurry of new products tied more by their embrace of this widely popular user interface than merely their common main functions.

The products and systems addressed here operate, or can operate, via a screen interface reactive to the human touch.

The increasingly ubiquitous touchscreen – they’ve morphed from monochromatic business tools, such as ATMs and point-of-purchase systems, to full-color interfaces on everything from smartphone and tablet-computers to portable GPS navigators and electronic flight bags.

Now, the touchscreen interface is making big inroads into small plane cockpits and large planes as well.

The reasons are multiple, and often this is the case with technological leaps.

All in all, avionics makers attribute the embrace of touch-sensitive computer displays to a range of factors as varied as the list of devices offering them. And, it’s quite a list.

### **Details, Details: Not All of These Take the Same Touch**

Touchscreen technology is versatile enough that it can serve solely as an input device, displaying adaptive graphics to match various functions, or as the main display screen of a device with the touch-control icons working in parallel with the function displayed, such as a primary flight display, multi-function display or dedicated hazard display.

It all comes down to how the designers want the system to work in the targeted environment.

We continue the introduction with a quick catalog of the systems available.

### **Garmin Starts the Switch**

Look to a company barely two decades old for the launch of touch-screen avionics – well, touch-screen controllers for avionics.

In October 2009, Garmin started the ball rolling at the National Business Aviation Association meeting in Orlando, unveiling the G3000 package.

A significant advance in integrated panel systems, the G3000 Garmin features 16:9-ratio displays – diagonally 14.1 inches – and employs centrally mounted control heads based on graphical touch-screen interface panels, the GTC 570.

According to Garmin, the glass touchscreen

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controller serves as the primary point of entry for the G3000 system.

The GTC 570 serves as a desktop-style, icon-driven user interface built on a new “shallow” menu structure, enabling the user to access more systems and sensors with fewer keystrokes or page sequences.

This user interface is totally software-based, making it easily configurable for specific airframes and avionics configurations, as well as future enhancements, applications and system expansion. All can be accommodated without physically altering the mechanical controls.

The display screens themselves, regardless of

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At EAA AirVenture 2011, Rockwell Collins unveiled the industry's first touch-control primary flight displays for business jets and turboprop aircraft, which will be available on future applications of the company's Pro Line Fusion avionics system.

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the number employed, have their own dozen buttons across the bottom of the bezel. So far, Garmin has Cirrus, Honda and Piper as customers for their in-development jets; the SJ50, the Honda-Jet and the PiperJet Altair.

The next year, Garmin followed up with the G5000 system, the company's first foray into equipping FAR 25 aircraft. With a choice between 12.1- and 14.1-inch displays, the G5000 system also offers 16:9 display proportions and high resolution, and also its own vehicle management system – centrally mounted 5.7-inch touchscreen-controlled remote-management boxes.

And, in April 2011, Garmin unveiled its follow-up to the groundbreaking G1000 with the G2000.

Displays got touchy-feely with Garmin's new GTN 650 and GTN 750, replacements for the GNS530 and GNS430.

These three – the GTNs and the G2000 – all debuted in the spring at the AEA International Convention & Trade Show and Sun 'n Fun 2011.

Then came Oshkosh.

There, new touchscreen-controlled products were announced by Avidyne and the development partnership of Aspen Avionics and Honeywell's Bendix-King unit.

Like the two new Garmin GTNs, the display screen doubles as

the input device to manage their considerable functionality.

Avidyne calls its new IFD540 "a touchscreen FMS/GPS/nav/comm" leveraged off the company's FMS 900 and Entegra Release 9 integrated avionics package.

Essentially, Avidyne poured everything but the PFD hardware and functions into the IFD540 package – and upped the ante on the R9's easy-to-learn user interface by putting the controls on the display screen.

And, Avidyne also made the IFD540 plug-and-play compatible with the mounting trays for Garmin's GNS 530 – slide out the old one, slide in the new, which includes a WAAS GPS approved under TSO-C146c.

Already acknowledged as partners with the Honeywell unit, Aspen Avionics is working with Bendix/King to complete certification of the KSN 770, what Bendix/King's calls its "new multifunction display," a package which can replace up to four separate units.

The KSN 770 combines an IFR GPS navigator, integrated TAWS function, weather radar display, a 16-watt digital VHF comm and VHF nav/ILS.

And, now it's getting a touchscreen interface to augment Bendix/King's already simple three-step interface.

The KSN 770 sports a large, high-resolution display with a comprehensive moving map and a fully certified 24-channel WAAS-LPV GPS navigator.

Finally, Rockwell Collins took the touchscreen control interface upscale by giving displays in its Pro Line Fusion system – the PFD and MFD – touch-sensitive-screen control.

“These displays demonstrate our focus on empowering pilots with natural head-up, eyes-forward interfaces,” said Colin Mahoney, vice president of sales and marketing for Rockwell Collins. “Touch-controlled, icon-based controls on the main displays help keep pilots’ attention focused up and forward for safer and more efficient flying. For example, when programming the flight management system, instead of entering information on a console-mounted keypad, pilots can redirect to a graphically displayed waypoint or destination with a single swipe of a finger.”

### From portable devices to panel-installed

The inroads of touchscreen interfaces into many consumer-electronic devices certainly helped improve availability and, most importantly, made them more affordable, a factor cited by all the avionics makers involved.

For example, Tom Harper of Avidyne offered this perspective after introducing the world to the company’s new IFD540, an all-in-one VHF navigator, communications radio and WAAS GPS – with a touchscreen-display interface.

“Touch-screen technology has been around in various forms for several years, but the rise in popularity of electronic devices, such as smartphones and automotive mapping systems, has done much to make this technology ubiquitous and much more affordable for special purpose applications like avionics,” Harper said.

Brad Hayden of Aspen Avionics noted the company’s joint decision with Honeywell to equip the developmental KSN 770 – another all-in-one – was mutual.

“The touchscreen idea came out of both camps,” Hayden recalled.

Earlier this year, Aspen entered into a collaborative relationship with Honeywell to finish certification of the long-awaited 770 – a device originally conceived without a touchscreen control interface.

“This is a very collaborative project,” Hayden said. “They had this product well along when we came in. We both agreed that touchscreen really needed to be added.”

And, from Garmin, the company that started the touchscreen-interface ball rolling with the G3000 two years ago, avionics product manager Bill Stone offered this: “The touchscreen, the touch-sensitive aspect is half the appeal. The other half is the programmable nature that makes it context sensitive for whatever you want to do.”

Today, Garmin offers two varieties of touch-screen control interfaces on five products: a remote touch-sensitive control head for the integrated G3000 – the first launched – and the G5000 and G2000, launched this spring in Cessna’s Coravlis piston singles.

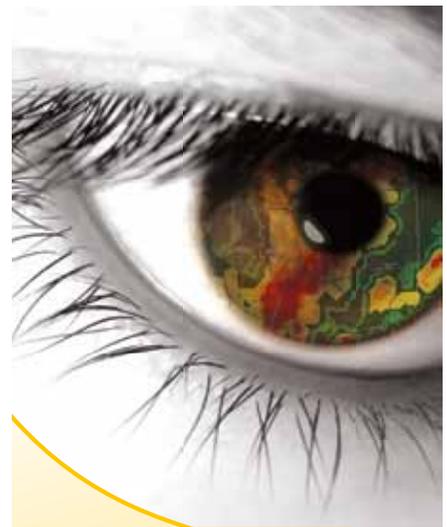
And, all four parties – Aspen, Honeywell, Avidyne and Garmin – cited the technology’s suitability for use because of its open nature and ability to improve the human interface.

“Technology should solve a problem or serve a purpose; the worst reason to design something is because you can,” Stone said. “The best reason is because they fulfill a need. Can we use technology to solve the problem of making the product friendly to use?”

The breadth and depth of acceptance by avionics makers makes the answer obvious.

“It’s discoverable – people can pick it up and start using it without a lot of in-

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struction,” Stone said. “This is the genesis of how we see touchscreen and adaptive display that changes the technology to solve the problem.”

That said, the touchscreen isn’t seen as the best solution for all conditions.

According to Avidyne president Dan Schwinn, “Touchscreen by itself does not necessarily result in an easy-to-use interface. For our first touch screen systems, we’ve chosen to use a multi-mode interface that includes touch as well as dedicated knobs and buttons. Given the current state of the art in touchscreen technology, it’s our belief that pilots will find this much more of an improvement on current avionics than an interface that requires you to use touch under all flying conditions and circumstances.”

Aspen and Honeywell followed the same tack, while Garmin has sought to minimize buttons and knobs in favor of more touch-tap controlling.

“For pilots flying in choppy and turbulent air, it’s nice to have a knob to anchor your hand, and there’s something comforting about the positive feedback from the detent of a mechanical switch,” Schwinn said. “But, as you can see with our new IFD540, augmenting the user interface with a touch screen adds new capabilities like flight plan ‘rubberband’ editing, while making many other tasks, such as map panning and frequency selection, even easier. Plus, the combination of knobs, buttons and touch gives pilots the choice, which they really seem to appreciate.”

The KSN 770 also blends a touch-sensitive display with an array of control buttons and knobs, allowing the pilot to use the best interface for the function and the moment.

“Flight conditions change, ATC demands change, weather conditions change...the touchscreen is really the ideal interface for making changes,” Hayden said. “But, like any other interface, it has its pros and cons. In smooth conditions, the touchscreen is the easiest. As conditions get rougher, the touchscreen may be next to impossible, so the buttons are there to anchor the control interface. It’s good for the pilot to have multiple ways to interact with the device.”

Aspen also is embracing touch-control technology through devices employed in its Connected Panel system – a box which allows wireless connectivity between devices and avionics working with the Evolution screen systems.

According to the company, by launching its Connected network of aviation-specific hardware and software applications, the Connected Panel architecture will allow pilots to bridge the gap between smart devices, such as the iPad, and panel-mounted avionics to allow direct input of flight plans, for example, from one of the smart devices directly into a

connected GPS navigator, like Honeywell’s KSN 770.

“In addition to the KSN 770 integration, all or part of Connected Panel functionality will be available for other legacy GPS navigators, depending upon that GPS’s ability to transmit and receive data,” Hayden said.

Regardless of how the avionics maker designs the interface – all touch, mostly touch, or touch and buttons – it’s clear these companies see other benefits.

### **It’s All in the Programming**

“While it’s just another way of controlling a device, it does mean adding a new layer of software, another layer of development,” Hayden said.

But, it’s a flexible interface with infinitely variable application potential.

“Our G3000, G5000, G2000 and the GTN 650 and 750 could not exist without this, because the user interface was designed around the touchscreen device and the adaptive user interface behind it,” Stone said. “A different user interface can easily be created through the adaptive interface using the same screen.”

Garmin could have easily added a touchscreen on the face of the GNS530.

“But, if we left what was underneath the same, it really wouldn’t improve the use,” Stone said. “It’s discoverable – people can pick it up and start using it without a lot of instruction.”

And, that aspect alone answers a complaint of many pilots who use the widely popular GNS boxes, the 530 and 430, or the G1000 found in Cessna singles, the Citation Mustang and other aircraft through retrofit.

“Some airline-style FMS (flight-management systems) take a week of training to use,” Stone said.

Cessna Aircraft includes a three-day introductory course on the G1000 for customers taking delivery of new airplanes equipped with the integrated panel system.

And, these displays offer considerable flexibility in adding new functions.

“The adaptive interface and display are very good platforms to introduce new technologies as they come forward,” Stone said.

That means enabling the introduction of new functions to devices, such as the two GTN models, using reprogrammed interfaces accessible through the graphical touch-sensitive interface.

Avidyne’s Schwinn summed up a view common to all four companies embracing the touch-sensitive control interface: “We believe touchscreen can provide significant improvements in functionality and work-load reduction for pilots when the technology is appropriately applied.”

And, now it’s being applied more than ever to the aircraft avionics stack. □