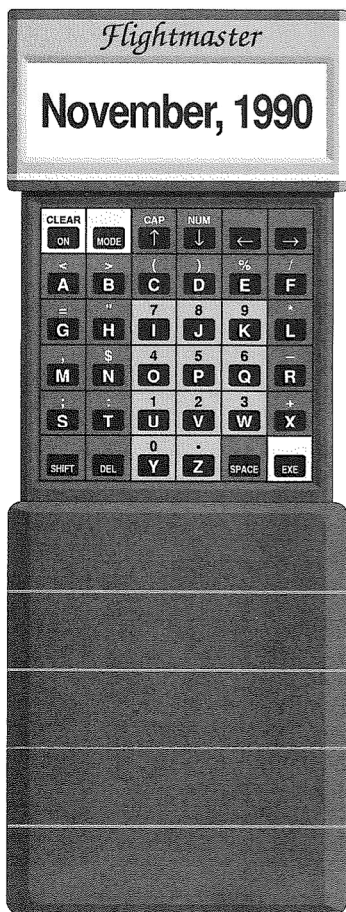


Flying with

*Flightmaster*TM

The latest news, tips and techniques for owners of the Flightmaster handheld flight management system.



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What's New?

FM Pioneer is New AOPA President

John Baker has announced his retirement as president of the Aircraft Owners and Pilots Association after a tenure of 14 years at the helm of AOPA. The AOPA board of directors selected Phil Boyer to succeed Baker as AOPA president. Phil has had a long and upwardly mobile career in the broadcasting industry as an executive for the American Broadcasting Company. He is probably best known to pilots as the driving force behind ABC's *Wide World of Flying* videomagazine.

Flightmaster owners may recall (from reading "The Flightmaster Story" in the inaugural issue of *Flying with Flightmaster*) that Phil Boyer is also a pioneer FM owner. Other than FM developer Mike Busch, Phil was the very first pilot to fly with a Flightmaster and played a significant role in the evolution of FM's features and user interface.

Phil first started using his Flightmaster in 1987 in his Beech Baron. He subsequently traded up to a pressurized Cessna 340A, in which he travelled all over the U.S., and even flew to Europe and back last summer. Starting January 1st, he will be flying left seat in the AOPA president's airplane, a Cessna 425 (Conquest I) turboprop.

We'd like to think that Phil Boyer's Flightmaster played a small but important part in guiding him safely to his new career in Frederick, Maryland. Good luck in the new job, Phil! We know you'll do a great job of promoting and defending general aviation in the decade of the '90s.

FM in the Aviation Press

Flightmaster continues to receive uniformly positive coverage in the aviation press.

IFR magazine from Belvoir Publications is an excellent monthly magazine for serious instrument pilots. (Belvoir also publishes *Aviation Consumer*, *Aviation Safety*, *Light Plane Maintenance*, and *Avionics Review*.) *IFR* editor Paul Bertorelli started off quite skeptical about the Flightmaster, feeling that no handheld flight computer could possibly be worth \$595. After getting a one-on-one demonstration from FM developer Mike Busch over lunch one day at Oshkosh, Paul agreed to try out a FM on his flight home to Danbury, Connecticut. Two weeks later, he phoned to ask "okay, where do I send the check to pay for this damned thing?" Paul subsequently wrote the very positive feature-length product review of Flightmaster that appeared in the October '90 issue of *IFR*, and now flies nowhere without his FM. In addition to his journalistic duties, Paul is an active charter pilot and flight instructor who flies mostly singles and light twins.

The *American Bonanza Society Magazine* contains a three-page article on the Flightmaster in the October '90 issue. Entitled "Love at First Flight" and written by ABS member Steve Caine from Wichita, the article says that Flightmaster is "a fantastic device—I wouldn't want to fly without one," and concludes "Please don't take my Flightmaster away...I think I'm in love with an inanimate object."

The November '90 issue of *Professional Pilot* magazine includes a feature-length article on the Flightmaster written by Myron Collier, avionics editor for *Pro Pilot*, chief pilot for Cyclops Corporation in Pittsburgh, and long-time member of the NBAA board of directors. Myron flies a magnificently equipped Cessna Citation II for Cyclops, and is a great aficionado of RNAV. Myron tells us that his Flightmaster has paid for itself many times over by enabling him to take advantage of RNAV-direct routings more often. (Considering the hourly operating cost of a Citation II, that's not too hard to imagine!)

Brief product reviews of Flightmaster can be also be found in the

November '90 issue of *Plane & Pilot* and in the December '90 issue of *FLYING*.

New Items in FM's Trip Log

Several Flightmaster owners have asked us to add a few additional items to FM's **View** trip log. So we did.

Climb/descent mileage

Starting with v2.03, the trip log now includes the *mileage* (as well as time) from departure airport to top-of-climb, and from top-of-descent to destination airport. This can be found in column B of the trip summary row.

Heading

In addition, column D of each trip leg row now includes the estimated *heading* to fly (in addition to the WCA).

Editorial—Is FM Overpriced?

In his recent feature-length article in *IFR* magazine, editor Paul Bertorelli raves about what a phenomenal machine the FM is, but then adds: "and at the breathtaking price of \$595.00, it should be!" Other reviewers have also expressed surprise at FM's price, but every review concludes that FM is money well spent.

Hardware Cost

Flightmaster utilizes a mass-produced handheld computer, the PSION Organizer Model XP, and two 128K solid-state datapaks. The computer is manufactured in England, the data-paks in Europe. The computer retails for \$249.99 in the US, and the data-paks for \$199.99 apiece. So you actually get \$649.97 worth of hardware in FM's \$595.00 price, with the FM software and database thrown in free!

The hardware would probably cost less if it came from a U.S. or Japanese manufacturer. Unfortunately, none of the mass-produced handheld computers from HP, TI, Sharp or Casio have anywhere near enough memory capacity to support FM's navigation database (the heart of FM's capability). Flightmaster's price is a small fraction of the cost any other item of database-capable avionics on the market, precisely because it uses mass-produced hardware. If we used hardware specially built for aviation use, FM's price would be astronomical.

Perceived Value

Every Flightmaster is sold on a 90-day trial basis. We encourage each purchaser to fly with his new FM for a few months, then return it for a full refund if he feels dissatisfied with his purchase for any reason (or *no reason*, for that matter). Only a very few FMs are actually returned. We believe that says a lot.

Flightmaster On The Road

In the last few months, Flightmaster has been exhibiting at major aviation events across the U.S. We've demonstrated Flightmaster to thousands of pilots, and had the opportunity to meet and talk to hundreds of enthusiastic Flightmaster owners. For those of you who couldn't attend all of these events, we thought you might like to get some idea of what they were like.

EAA—Oshkosh

Our first major exhibit was at the week-long EAA Fly-In in Oshkosh, Wisconsin, held in late July/early August. Oshkosh is a unique phenomenon that every pilot should experience. This year, 15,000 itinerant aircraft flew in to Oshkosh's Wittman Field, making it the world's busiest airport for one week. Approximately 850,000 people came to see the airplanes. You simply cannot fathom the size and scope of this event without having actually experienced it.

Flightmaster was a major hit at Oshkosh, and the response exceeded our most optimistic expectations. The Flightmaster booth attracted constant crowds, and everyone said we had one of the most professional exhibits of the event. Halfway through the week, we sold out all the FMs that we brought with us and had to have more rushed to Oshkosh by Federal Express.

Even the weather cooperated. Oshkosh is famous for its 100°/100% days, but this year there was only one day that was uncomfortably hot and humid. We all had a terrific time. By the end of the week we were feeling pretty worn out, but we all agreed that we can't wait for next year's Oshkosh.

NBAA—New Orleans

The annual convention and exhibition of the National Business Aircraft Association was held in early October in New Orleans, Louisiana. The NBAA event is attended primarily by corporate operators of bizjets and turboprops. Although the attendance (about 15,000 people) is far less than at Oshkosh, the NBAA exhibition is very big and truly impressive. This year, it filled the gigantic New Orleans Convention Center. Many of the exhibits are huge, two-story-high affairs. Beech had an actual Beechjet on display in the Convention Center exhibit hall (they brought it in with great fanfare by barge and crane), and there were several other aircraft and full-size aircraft mockups in the hall. All in all, the NBAA exhibit is a sight to behold.

We were rather apprehensive about exhibiting at NBAA. After all, who is even going to notice Flightmaster's tiny 10'-by-10' booth in the midst of all those million-dollar behemoth exhibits? Boy, were we ever surprised! There was intense interest in the FM on the part of bizjet and turboprop pilots, and we discovered that lots of them came to NBAA with the specific intention of looking us up and getting a demonstration. Although NBAA is an exhibit where people generally come to look rather than to buy, we wound up selling out all the FMs we brought to New Orleans. Needless to say, we will be exhibiting at NBAA next year.

Apart from the exhibit itself, the New Orleans nightlife was fabulous. We wound up spending every night exploring Bourbon Street and the Old Quarter on foot, listening to music coming

from every direction, and gorging ourselves on wonderfully spicy cajun and creole food. The weather was hot and humid, but who cared?

AOPA—Palm Springs

The Aircraft Owner and Pilots Association held its annual convention this year at Palm Springs, California, in late October. Flying weather was absolutely perfect, and the convention drew 750 airplanes and 5,500 attendees.

This was a rather special AOPA convention. AOPA president John Baker is retiring after 14 years in AOPA's top spot, so this convention was the chance for many of John's colleagues and fans to bid him farewell and pay tribute to his remarkable accomplishments. Our friend and long-time FM enthusiast Phil Boyer has been named by the AOPA board to succeed Baker (see related story on page 2), and was introduced to the membership at this convention. Another close friend and FM beta-tester Barry Schiff was awarded the prestigious Sharples Award (AOPA's highest honor) and made a very moving acceptance speech.

Traffic at our Flightmaster booth during exhibit hours was so intense that we didn't even have the opportunity to ogle the other vendors' exhibits. We gave non-stop FM demonstrations (sometimes two in parallel), sold out all the FMs we brought, and met dozens of enthusiastic FM owners who came to our booth to let us know just how much they valued their FMs. (There is absolutely no truth to the rumor that these were paid shills!)

Just days before the AOPA convention started, Flightmaster president Richard Wilkes took and passed his instrument rating checkride. (His CFII was FM developer Mike Busch, who aged at least 10 years in the process.) During the convention itself, two non-pilot members of the Flightmaster staff, Dee Lewis and Sandy Wilkes, signed up for the AOPA pinch-hitter course and graduated with flying colors. Congratulations Dee, Sandy, and Rick!

Saturday brought some difficulties at Palm Springs airport. The control tower was totally overwhelmed by the rush of departing aircraft Saturday afternoon and evening, and departure delays reached four hours at one point. In the midst of this chaos, the FAA Administrator's Gulfstream IV ("November One") got involved in a taxi accident that damaged four light aircraft parked beside the taxiway and even grounded the Gulfstream for 24 hours. The rumor that this was the Administrator's parting editorial comment on general aviation has been vigorously denied by official Washington sources.

Next year, the AOPA convention is being held in New Orleans. You better believe Flightmaster will be there!

Next Stop: Sun 'N Fun—Lakeland, Florida!

We're snowbound for the winter, but Flightmaster's next scheduled exhibit is at EAA's Sun 'N Fun fly-in at Lakeland, Florida, on April 7-13, 1991. We look forward to meeting many of you there. Be sure to look us up at the Flightmaster booth.

New FM Products

The technical crew at Flightmaster, has been working dilligently on two new software products for the IBM PC and compatible MSDOS-based personal computers. Both are of special interest to FM users.

FMSETUP

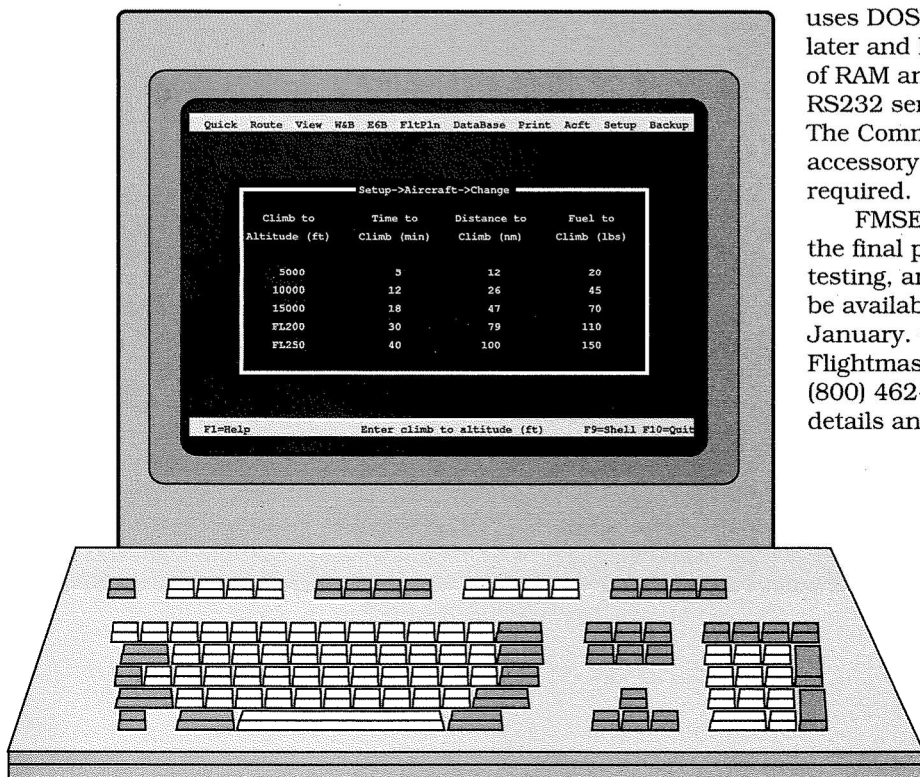
Although pilots have consistently raved about how easy FM is to use overall, many users have had difficulty using the Setup function to define or change aircraft performance profiles, weight-and-balance templates, and custom checklists. It would be a lot easier to enter and edit such data using a personal computer with a full-size keyboard and 25x80 character display.

FMSETUP allows you to do precisely that. It is a DOS program that enables you to enter and edit aircraft-specific data on your PC. The resultant data can then be transferred quickly between the PC and the FM using the FM's CommsLink accessory hooked to the PC's RS232 port.

FMSETUP makes use of pull-down menus and on-screen windows to make data entry and editing of aircraft performance, W&B, and checklist data easy and natural. It incorporates an on-line context-sensitive help facility, and takes full advantage of your PC's color display (if you have one).

FMSETUP runs on any PC-compatible machine that uses DOS 2.0 or later and has 640K of RAM and an RS232 serial port. The CommsLink accessory is also required.

FMSETUP is in the final phases of testing, and should be available in January. Call Flightmaster at (800) 462-6669 for details and pricing.



Flightmaster PC

On a broader scope, we have had many requests for a PC-based flight planning package with the same sophisticated capabilities and pilot-oriented user interface of the Flightmaster. We started serious development work on such a software product last summer, and dubbed it "Flightmaster-PC" (or "FMPC" for short).

FMPC provides all of the capability of the Flightmaster handheld flight management system, plus a number of additional features that could not fit into the handheld FM. The FMPC user interface is virtually keystroke-for-keystroke identical to the handheld FM, making it very easy for FM users to transition back and forth between FM and FMPC.

Hardware-wise, FMPC runs on any MSDOS-based machine with 640K of RAM and at least two 720K or one 1.44Mb disk drives. Performance is quite acceptable on a diskette-only laptop computer, although FMPC runs faster on a hard-disk-equipped machine. Graphics displays require either

an EGA or VGA display, but FMPC can be used very effectively without graphics capability.

FMPC provides 100% of the functionality of the handheld FM. In addition, the navigation database is expanded to include more airports and intersections, more frequencies, minimum enroute altitudes (MEAs) on airways, SIDs, STARs, and other items that will not fit in the difficult memory space constraints of the handheld FM. Map-like graphical route displays are provided on EGA/VGA-quipped computers.

FMPC is completely interoperable with the handheld FM via the CommsLink RS232 communications accessory. This means that flights planned on the PC can be transferred to the handheld, and vice-versa. Also, FMPC can be used to create and maintain aircraft performance profiles, W&B templates, checklists, and other aircraft-specific information, which can then be transferred to the handheld FM via the CommsLink. (FMPC incorporates FMSETUP as a subset.) Although FMPC can be used as a stand-alone PC-based flight planning system, the combination of FMPC and FM provides an exceptionally flexible capability the likes of which pilots have never experienced before.

By the time you read this, FMPC will have started an intensive period of field-testing. We expect first commercial release to occur next Spring. More details should be available in the next issue of *Flying with Flightmaster*.



Tips & Techniques

More usage tips from the experts to help you get the most from your Flightmaster.

Mastering the FM Keyboard

Flightmaster uses a set of consistently-applied rules for using the keyboard. For example, the arrow keys are used for navigating menus, lists and tables; the **EXE** key is used to select a menu or list item or to enter a just-typed data item; the **DEL** key is used to backspace over an error; and so forth.

In addition, certain Flightmaster functions support special keyboard shortcuts that help save keystrokes during commonly-performed operations. Although the use of such shortcuts is never required, mastering them will save you time and help make you a true FM expert.

View

The **View** function displays a detailed trip log in the form of a spreadsheet, with six columns (labelled A, B, ..., F) and a variable number of rows (labelled 0, 1, 2, ..., n) depending on the number of legs in the trip. When the trip log is first calculated, its top-left cell (row 0, column A) is displayed initially. You can move to other cells of the spreadsheet using the four arrow keys. In addition, there are a number of keyboard shortcuts that let you move around the spreadsheet more quickly.

Pressing one of the top row of letter keys (**A**, ..., **F**) moves you directly to the corresponding column of the trip log. You remain in the same row as before.

Pressing **SHIFT** plus one of the digit keys **1**, ..., **9** moves you directly to the corresponding leg (row) of the trip log. You remain in the same column as before. Pressing **SHIFT** plus the digit key **0** (zero) moves you to leg 10.

Pressing the letter key **Z** moves you directly to the last leg of the trip...the destination row. Pressing the letter key **Y** moves you directly to the current trip leg...the first row that still has an ETA rather than an ATA in column F. To jog your memory, note that these shortcut keys (**Y** and **Z**) are the only letter keys in the bottom row of the keyboard.

Pressing the letter key **H** (think "home") moves you directly to the top-left cell of the trip log. Pressing the **DEL** key does exactly the same thing.

Pressing the letter key **O** (think "off") switches the Flightmaster off. You do not need to exit the **View** function in order to turn the machine off!

Pressing the letter key **R** (think "route") allows you to see the entire current route. Return to the normal trip log display by pressing **ON/CLEAR**.

Pressing the letter key **T** (think "time") lets you view the current UTC time and access the trip, tank, and approach timers. You do not need to exit the **View** function in order to do this! Return to the normal trip log display by pressing **ON/CLEAR**.

Flight Plan

When editing a 16-block FAA flight plan form, you can move from one block to another using the up-arrow and down-arrow keys in the usual fashion. However, there are also some keyboard shortcuts.

Pressing one of the digit keys **1**, ..., **9** moves you directly to the correspondingly numbered block of the flight plan form. Pressing the digit key **0** (zero) moves you to block 10. You do not need to hold the **SHIFT** key.

There is no shortcut for moving directly to blocks 11, ..., 16.

Horizontal Scrolling

When viewing the route in block 8 of a flight plan form, the route will scroll horizontally (like a Times Square electric billboard) if it exceeds the maximum 16-character display width of the Flightmaster. The same thing happens when viewing the route from within the **View** trip log by means of the **R** key shortcut.

If this horizontal scrolling is too rapid for you to read comfortably, you can control it easily from the keyboard. Pressing the left-arrow key once will stop the scrolling, and pressing the right-arrow key once will start it again. Pressing the arrow keys twice will reverse the direction of the scrolling. This is much easier to experience than to explain...try it!

CLEAR ON	MODE	CAP ↑	NUM ↓	←	→
<	>	()	%	/
A	B	C	D	E	F
=	"	7	8	9	*
G	H	I	J	K	L
,	\$	4	5	6	-
M	N	O	P	Q	R
;	:	1	2	3	+
S	T	U	V	W	X
SHIFT	DEL	0 Y	· Z	SPACE	EXE

Knowing When to Shift

Because the FM keyboard has only 36 keys (compared to 101 keys on a typical PC keyboard), most of the keys must do double duty. The 26 letter keys produce a letter A...Z if the keyboard is in alphabetic mode, and a digit 0...9 or a punctuation symbol if the keyboard is in numeric mode.

FM always tries to put the keyboard into the appropriate mode for the data you are entering. For example, it selects alphabetic mode when it prompts you to enter a fix identifier or a route, and numeric mode when it prompts you to enter an altitude or winds aloft.

You can tell which mode the keyboard is in by looking at the shape of the cursor on FM's display. A flashing block cursor indicates that the keyboard is in alphabetic mode, while a steady underline cursor denotes numeric mode.

Some data that you enter into the FM involves a combination of letters and digits. Examples include airport identifiers like "T41" and "54TX" and multiple winds aloft forecasts like "LAX 3128 SBA 2825 SFO 2519". To enter such mixed alphabetic/numeric data, you must hold down the **SHIFT** key to temporarily shift the keyboard to the opposite mode. When you depress or release the **SHIFT** key, you will see the cursor shape change accordingly.

Don't Install the Battery Backwards!

Some Flightmaster owners are really paranoid about losing data when they change the battery in their FM. They are in such a hurry to get the new battery installed that once in awhile they wind up inserting it into the machine *backwards*. This is definitely bad!

The battery must be inserted with the smaller (positive) snap-contact going in first. This is so important that there is a small picture inside the FM battery compartment illustrating graphically which way the battery must be installed.

This side goes in first! 



Installing the battery backwards (polarity reversed) will not generally harm the FM, but it will almost certainly result in the loss of all user-entered data stored in the machine. However, if your FM is hooked up to an AC power adapter at the time that you install the battery backwards, you may damage the hardware (you'll probably smell something burning) and will have to send it in for repair.

There is no reason to be in a big hurry when replacing your FM battery. Take your time! Make absolutely sure you have the battery oriented correctly (look at the picture in the battery compartment) before you insert it into the machine. Remember, you have at least one full minute of batteryless operation before the FM's clock will start losing time, even more before you run the risk of any data loss. Since it typically takes about five seconds to change a battery, you have plenty of time. So take it slow and do it correctly.

When "Quick" Is Not Enough

For most FM owners, the **Quick** function is easily the most often-used function of the Flightmaster. It provides the course, distance, and estimated flying time between any two points in about one second flat. Some people find the **Quick** function so useful that it alone justifies their FM purchase.

But sometimes, **Quick** is not quite enough. It provides only quick-and-dirty flying-time estimates. It doesn't consult aircraft performance charts, nor compensate for wind or non-standard temperature or climb. And it doesn't compute fuel requirements.

What if you need a more refined estimate of flying time or a fuel-burn estimate, but you don't want to go to the trouble of planning out the entire route? Consider asking Flightmaster to calculate a *one leg trip log*.

Simply select **Route**→**New**. At the **Route**: prompt, enter just the identifiers of the departure and destination airports with no intermediate fixes or route specifications. (E.g., "**LAX ABQ**".) Enter the cruising altitude, OAT, and an estimated average winds aloft figure. Then select the **View** function to calculate the trip log.

A one-leg trip log takes Flightmaster 10–15 seconds to calculate. This isn't quite as fast as **Quick**, but it's quite a bit faster than a full trip planning exercise. And it gives estimated flying time corrected for altitude, temperature, winds, climb and descent, plus an estimated fuel burn.

Which may just be exactly what you need.

Questions & Answers

Every day, we answer lots of technical questions that come in by phone, electronic mail, and "snail mail" from Flightmaster users. Here are some of the most interesting ones we've received recently.

Routing Around "Black Holes"

"I am planning to take a trip from my new home base of N87 (Robbinsville NJ) to TRI (Bristol TN). I specified an automatic airways route N87 RBV A HMV TRI and my FM came up with N87 RBV V252 DQO V469 LYH V16 HMV KTRI. This route is pretty awful: it totals 631 nm, +201 more than the great-circle distance of 430 nm. What the heck is going on here?"

Look at your Jeppesen planning chart and you'll see the problem. The great-circle route from RBV to HMV takes you right over the Washington DC area. Washington DC is a virtual "black hole" in the airway structure... no airways pass through. (Incidentally, Chicago is the same way...take a look.)

FM's auto-airway routing algorithm gamely launches off on an airway route from RBV, gets as far as DQO, discovers that there is only one airway that goes from there towards HMV (V469) and uses it. Unfortunately, V469 makes a gigantic detour to the west to circumnavigate the black hole...a much bigger detour than necessary.

This illustrates why it's so important to check the "excess mileage" figure to see whether any automatically-derived route is reasonable or not. If it is not (as in this case), it's probably time to pull out the chart and see why. Usually, the reason is that the great-circle route crosses (1) a large body of water (such as the Gulf of Mexico or the Great Lakes) with no nav aids avail-

able; (2) an FAA-created black hole in the airway structure (such as Washington or Chicago); or (3) a large block of special-use airspace through which you cannot fly (such as the Nellis/Edwards complex in Nevada and California).

In such cases, you need to give FM a little help. In this case, you could ask FM for "N87 RBV A MRB A HMV TRI." In other words, "plot an auto-airways route but be sure to go over Martinsburg WV." (You know from experience or from looking at the map that MRB keeps you just west of the Washington DC black hole.) FM comes back with a decent route: RBV V252 DQO V166 MRB V143 MOL V473 ROA V16 HMV. The distance, 463 nm, is +33 over great-circle. You probably can't do much better than that better while staying 100% on Victor airways.

Incidentally, "N87 RBV V HMV TRI" gives you an auto-VOR routing that's virtually a straight shot: RBV DQO CSN MOL PSK HMV (443 nm, great-circle +13). Of course, ATC might not let you fly the DQO-to-CSN leg since it passes right through the Washington DC area. But if you're adventurous, you could try filing it and see what happens.

Great-Circle Routes

"The Quick function tells me that SFO→BOS is course 049°, but BOS→SFO is course 297°. These aren't even close to being reciprocals of one another. How come?"

Two reasons. First, the 049° is a magnetic course out of SFO (declination E17°), which corresponds to a true course of 49°+17° or 66° true. The 297° is a magnetic course out of BOS (declination W16°), which corresponds to a true course of 297°-16° or 281°. Now 66° and 281° are still not reciprocals of

one another, but they're a lot closer.

The other reason is that FM always calculates great-circle routes, and great-circle routes generally have constantly changing course as you traverse the route. In this case, the great-circle route SFO→BOS starts out on a true course of 66°, but the course gradually changes to 101° as it approaches BOS. Of course, 101° is the reciprocal of 281°.

If it is not clear why the true course changes constantly along a great-circle route, consider an extreme case: San Francisco to Moscow. This is a polar route (any other route would be longer). You depart San Francisco heading almost true north and arrive Moscow heading almost true south. If this is still not clear, grab a globe and stretch a rubber band from San Francisco to Moscow (or from San Francisco to Boston for that matter).

The only great-circle routes on which there is no course change at all are those that proceed precisely north-south along a single line of longitude, and those that proceed precisely east-west along the equator. However, the heading change is negligible for very short routes (say, 100 nm or less).

RNAV Reception Problems

"I asked FM to plan an RNAV-direct flight from San Luis Obispo to Mojave (Calif.) at 9500'. It came up with KSBP MQO083006 FLW350006 GMN350018 PMD335026 KMHV. The route looked fine on the map, but when I actually flew the trip I discovered that I couldn't receive the Gorman VORTAC until I was almost at the GMN350018 waypoint. How can I get FM to give me a more usable waypoint?"

It turns out that reception of the Gorman VORTAC is blocked by high

terrain just to the west of the station. Of course FM has no way of knowing that. There are two techniques for getting around a problem like this.

One thing you could do is to use the **Database→Inop** function to mark GMN inoperative. Then select **View** and FM will come up with a new route that doesn't use GMN. In this case, the GMN350018 waypoint is replaced with EHF170021, which can be received much more easily (EHF has no high terrain nearby).

If you'd rather not recompute the entire trip log, you can simply use the **Database→Wpt** function to come up with equivalents to the GMN350018 waypoint. In response to the **Waypoint:** prompt, simply enter **GMN350018**. FM will give you an entire series of equivalent waypoints, including: EHF136026, LHS320028, FIM349045, PMD293047, and PTV153050. Simply use whichever of these provides good nav reception.

Changing Cruise Altitude Enroute

"How do I change my cruising altitude while enroute? For example, my VFR route may require that I start at a cruising altitude of 7,500', then climb to 11,500' to clear high terrain, and finally descend to 5,500' for the balance of the flight."

Flightmaster does not permit you to specify multiple cruising altitudes when planning a flight. There is not enough room in the datapaks for the complex software that would be required to handle that.

For pre-flight planning in a non-turbocharged airplane, plan the flight on the FM using the highest cruising altitude (in your example, 11,500') so that the computed flight time and fuel burn account for all of the anticipated climb and descent. The result may not be precisely correct, but will tend to err

on the conservative side.

For in-flight progress monitoring, recalculate the trip using the initial cruising altitude (7,500') and winds aloft, and enter your takeoff and fix-crossing times as you fly. When the time comes to climb to a higher altitude (11,500'), exit the trip log and use **Route→Change** to change the altitude and winds aloft to those appropriate for the higher altitude. Then recalculate by selecting **View**. Repeat this each time you make a significant altitude change.

Changing Winds Aloft While Enroute

"Is it possible to determine and enter a wind-correction angle or groundspeed while enroute?"

If FM's estimated WCA doesn't agree with the wind correction you are actually using, or if FM's groundspeed estimate differs substantially from the groundspeed you are actually seeing, then the forecast winds aloft that you gave FM are probably erroneous. This is not unusual, particularly at lower altitudes.

What you can do in this case is to use the FM's **E6B→UnknownWind** function to calculate the actual (as opposed to forecast) winds aloft in-flight. Then use **Route→Change** to enter those actual winds aloft and recalculate the trip log using **View**.

Latitude/Longitude Precision

"The lack of ability to enter or display seconds or tenths-of-minutes seems to cause discrepancies when using FM with my LORAN database."

In order to fit FM's full-US database into a handheld device, it was necessary to limit latitude/longitude data to 16-bit precision. This means FM maintains latitudes to the nearest 1/6 of a minute, and longitudes to the nearest 1/3 of a minute.

The errors introduced by this limited precision do not exceed a few tenths of a nautical mile, and are consequently too small to be significant. If you are seeing significant discrepancies, they probably are being caused by something else.

Starting with FM v2.05, you will be able to enter user-defined fixes and other lat/lon entries to tenths of minutes (e.g., **N3415.5/W12040.1**) and they will be rounded internally to 16-bit precision.

Recalculating Fuel Consumption

"How can I figure fuel consumption when it is taking longer to reach a fix than was planned because of unforecast headwind or ATC delay?"

When you use the FM for in-flight progress monitoring and enter actual fix-crossing times that are earlier or later than planned ETAs, FM automatically recomputes all fuel consumption figures in the trip log to reflect the fact that you are running early or late. Both the total fuel burn in the trip summary and the fuel-to-complete figures in the individual trip legs are recalculated every time you enter a fix-crossing.

Common Conversions

"When using the E6B program, is it possible to perform common E6B-type calculations such as time-speed-distance, Celsius to Fahrenheit, nautical to statute, etc.?"

There wasn't enough room in the FM datapaks to include software for these conversions, but you can use the **E6B→Calc** function (four-function calculator) if you remember the formulas. For example:

$$\text{Time} = 60 * \text{Distance} / \text{Speed}$$

$$\text{Statute} = \text{Nautical} * 1.15$$

$$\text{Fahrenheit} = (\text{Celsius} * 1.8) + 32$$

$$\text{AvgasLbs} = \text{Gallons} * 6$$

Name: _____

Company: _____

Address: _____

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Daytime telephone: _____

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