

Flying with Flightmaster™

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



In this issue...

- What's New? 2**
Newsletter
Trial Period Extended to 90 Days
Version 2.00 Now Available
DUAT Interface Now in Field Test
Videotape
New Brochure
Update Schedule for 1990
- FM Owners Talk About FM 4**
FM Skeptic Becomes True Believer
FM Goes Along on an ATP Checkride
- New Features in Version 2.00 6**
Major enhancements to Flightmaster software. Here are all the details.
- How Big Can My Database Be? 9**
How much data can your Flightmaster hold before it runs out of memory?
- How Auto-Routing Works 10**
The inside story of Flightmaster's most sophisticated feature.
- Tips and Techniques 12**
Tips from the experts to help you get the most from your Flightmaster.
- Flightmaster vs. LORAN 13**
"Is it really worthwhile having both?"
You bet it is!
- Software Revisions 14**
What changed in which version?
- Ordering Information 15**

What's New?

Late-breaking news items of interest to Flightmaster owners...

Newsletter

This is the second issue of *Flying with Flightmaster*. Frankly, we have been overwhelmed by the positive response to *FwF* issue #1, and we're doing our best to keep the "good stuff" coming.

Everyone has been asking us "when is the next issue of *FwF* coming out?" Well, this issue (#2) was originally scheduled for January, but we decided to delay it a month in order to be able to include a complete description of the new and rather substantial enhancements to the Flightmaster software in version 2.00. These new changes are completed and in field-testing as this is being written, and are scheduled for inclusion starting with the 08-Mar-90 FAA database revision.

We want to make sure that every Flightmaster owner receives every issue of *FwF*. Please be sure to keep us apprised of your current mailing address.

Trial Period Extended to 90 Days

We have now lengthened the trial period on Flightmasters from 30 to 90 days. We felt it was only fair to give new purchasers a reasonable period in which to evaluate their purchase. But Flightmaster has so many features that most purchasers find it difficult to give it a full workout in just 30 days.

So now Flightmaster is sold with an extraordinary 90-day no-risk satisfaction guarantee. Pilots who purchase a new Flightmaster may return it in original condition within 90 days for a full refund...no questions asked.

Version 2.00 Now Available

The latest version of the Flightmaster software and database at this writing is version 2.00. This update includes the FAA Flight Data Center database revision effective March 8, 1990. It incorporates a number of major enhancements that are described in detail starting on page 6 of this newsletter. It also includes a number of cosmetic enhancements and bug-fixes to the software. *If your Flightmaster is using an earlier version, we urge you to get it updated.*

Updates are available on either a one-time or annual-subscription basis. Each update always includes both the latest software revision and the latest FAA database revision.

If you plan on updating your Flightmaster at least twice a year (and we strongly recommend that you do), the annual subscription is a very attractive deal. You'll find full details and prices at the end of this (and every) issue of *Flying with Flightmaster*.

If you have questions about updates, or wish to order a one-time update or an update subscription, call us at (800) 462-6669.



DUAT Interface Now in Field-Test

We have developed a sophisticated script-driven communications package as an accessory for the Flightmaster. This product, dubbed "FM Link", is primarily intended to allow the Flightmaster to be used as a terminal to access DUAT, but its flexible design makes it possible for sophisticated users to write their own scripts to access almost any host computer system.

Because FAA's rollout of DUAT was delayed by many months, we were not able to start our field testing of this product as early as we intended. But DUAT is finally here, and we have at long last begun the field test.

If testing goes smoothly, we hope to be able to announce the availability of FM Link in the next issue of *FwF*.

Videotape

The response to our 30-minute Flightmaster videotape has been terrific. If you own a Flightmaster and you'd like a copy of this VHS videotape to show to your flying club, safety seminar, or your pilot friends, call us at (800) 462-6669. (For non-owners, there's a \$15.00 charge for the tape, credited against subsequent purchase of a Flightmaster.)

New Brochure

We now have a new 20-page Flightmaster brochure. We've tried to mail one to everyone who's ever called or written us and expressed interest in the Flightmaster.

If you'd like one for yourself, or better yet if you'd like a stack of them to put on display at your home FBO or to pass out at your next flying club meeting, call (800) 462-6669 and we'll be glad to send them free of charge.

Update Schedule for 1990

Here's the calendar of FAA database revision dates for 1990: Jan 11, Mar 8, May 3, Jun 28, Aug 23, Oct 18, Dec 13. Please allow up to one week after these dates for the Flightmaster revision to be available. We recommend that VFR pilots update at least twice a year, and that IFR pilots update every eight weeks.

Before we can update your Flightmaster, you must send us the two datapaks from the back slots of the machine. These datapaks contain the FAA data and the Flightmaster software. They do not contain any of the information you have entered into your Flightmaster...all user-entered data is stored in memory inside the main unit.

Unless you have purchased the "zero downtime" spare set of datapaks, returning your datapaks for updating means that you will be without the use of your Flightmaster while your datapaks are in-transit. We understand that you don't want to be "down" for long, so we try our best to turn around all updates within 24 hours...and we often get them out the day they arrive. We ship the datapaks back to you via UPS air, either 2nd-day or overnight.

Just so you know: your datapaks must be put through an ultraviolet eraser for 20-30 minutes before they can be reprogrammed. Then reprogramming takes 20 minutes for each datapak.

When you ship us your datapaks for updating, be sure to package them securely (preferably in bubble wrap) and insure them for \$300. Be sure to include your full name, address, daytime phone, and *Flightmaster serial number*. If you are not an update subscriber, include a check or credit card to cover your one-time update.

FM Owners Talk About FM

We've been receiving lots of interesting feedback from Flightmaster owners, and we thought you'd enjoy hearing what some of them have to say...

FM Skeptic Becomes True Believer

John Frank is well known in the general aviation community. He started flying as a teenager, flew two tours as a helicopter pilot in the Vietnam war, worked as a test-pilot for Beech Aircraft, ran the American Bonanza Society for years, and is presently the Executive Director of the 15,000-member Cessna Pilots Association. John has some 14,000+ hours logged, has flown most everything that flies, and holds an ATP, CFIA/I/ME, A&P, IA, plus a bunch of type ratings.

John bought a Flightmaster last October at the AOPA convention in Orlando. Here's what he had to say about it in the most recent issue of the Cessna Pilots Association magazine (reprinted by permission)...

I am not much for aviation gimmicks or nicknacks. I don't have a big watch that can tell time in every time zone around the world, nor a flight bag that has more conveniences than a room at the Hilton, nor a "I'd Rather Be Flying" frame around the license plate on my car. I'm just not into that stuff, and that's what I thought the Flightmaster would be when I first heard about it...a "Gee Whiz, ain't that neat!" toy. However, I knew the guy that developed the Flightmaster and felt obligated to give it a try, especially since they offered a 90-day money-back guarantee.

Well, one evening of using the Flightmaster changed my mind. This is a very useful tool for the cross-country

pilot, and it can quite easily pay for itself. For example, with the work going on getting the CPA Educational & Technical Center up and running, I have had to make several trips between Wichita KS and Santa Maria CA. By spending about 30 minutes trying different routes and route segments in the Flightmaster, I have gotten the route I fly under most conditions down to where it is within 28 nautical miles of the great-circle distance between the two points. (Great-circle distance is the shortest air route between two points, and takes into account the curvature of the earth.)

28 nautical miles on a total trip distance of over 1,100 nautical miles is a very small margin, and represents a distance savings of over 100 nautical miles from the old route I used to fly. I had picked the old route the same way most pilots do: I drew a line between the two points on a map and tried to pick a route that stayed as close to that line as possible. This is fine for short flights, but on long flights it leaves room for error due to the curvature of the earth. This 100 nautical mile savings equates to about 35 minutes in my T210 or a little better than an hour on a round-trip. At \$70 an hour to operate my airplane, the savings can add up pretty quick.

This is just one example of how I have found the Flightmaster very useful...there are many more. In a very short time, I have gone from being very skeptical about its practicality to becoming a firm believer, and I am one very hard person to sell on anything.

And I find it kind of fun to do "Gee Whiz" stuff on it, too, and totally boggle the minds of other pilots at the airport!

—John Frank, Executive Director, Cessna Pilots Association.

Flightmaster Goes Along on an ATP Checkride

Doug Smart is a Flightmaster owner based in Addison, Texas, (near Dallas). Recently, Doug had the experience of taking his ATP checkride with a Designated ATP Examiner. Naturally, he brought his Flightmaster along. As Doug tells the story...

The checkride began with an intensive oral exam. The examiner asked me to do a Weight-and-Balance calculation using a really outlandish loading. I asked whether I could use any kind of calculator or computer, and the examiner said yes.

So I pulled my Flightmaster out of my flight bag, punched in the numbers, and a few moments later told the examiner that the specified loading would result in a severe aft-CG condition. I showed the examiner both the graphic CG display and the exact CG location and envelope limits. Then, using the Flightmaster, I showed him how we could relocate some of the weight to put the airplane within envelope.

The examiner next asked me to plan a flight from Denton to Amarillo. He specified the cruising altitude and winds aloft, and gave me 30 minutes to determine a suitable route and to come up with detailed information on fuel burns, leg times, wind correction angles, etc. The examiner also asked me to work a landing-weight W&B once I had computed the fuel burn. He then walked out of the room and told me to call him when I was done with my calculations.

I punched in "DTO SPS A AMA" and the specified altitude and winds, and selected "View". In less than a minute, I had a detailed trip log for a route via V114 that was only 9 nm excess over great-circle.

I jotted down the total trip fuel burn from the trip-summary row of the trip log spreadsheet, and entered that into the W&B...by now, I'd used up a whole two minutes!

Finally, I unfolded my charts and verified that the route and cruising altitude looked OK. They did.

Less than five minutes after the examiner left the room, I went outside to tell him that I was ready for him to review my flight planning. "How'd you do that so fast?" He hadn't even had time to pour himself a cup of coffee, much less drink it!

"How much fuel is required for the trip? What's the leg time from SPS to CDS? When do you start your descent into AMA? What's the CG location upon landing?" The examiner rattled off his questions, and I read the answers right off the Flightmaster display.

A strange look came over the examiner's face. "That's a pretty neat gadget you've got there. I've never seen one before. Can I borrow it for a few minutes?"

When I first viewed the Flightmaster video, I thought the business about the instructor borrowing the student's Flightmaster was rather corny. And now I'm taking my ATP checkride and it sounds like the examiner is reading verbatim from the video's script!

The examiner asked me to demonstrate that I could do some of the planning calculations "by hand" but then allowed me to use my Flightmaster during the remainder of the oral and the flight test.

Oh, by the way...I passed!

—Doug Smart, Addison, Texas.

◆
If you have an interesting Flightmaster story, please send it to us and we'll include it in an upcoming issue of FwF!

New Features, Version 2.00

Major changes and enhancements have been made to the Flightmaster software, starting with v2.00 which is scheduled for release together with the 08-Mar-90 database revision. Here is a detailed description of the changes.

Specifying Locations

There are a number of contexts in which Flightmaster expects you to enter a geographic location:

- within a **Route**: specification
- **Quick** (from- and to-fixes)
- **Database**→**Search** (center)
- **Database**→**Wpt** (waypoint)
- **Database**→**Def** (loc. being defined)

In all of these contexts, Flightmaster now accepts the following six kinds of location specifications:

- 1) a fix identifier 1-5 characters long.
Examples:

JFK	(VORTAC)
2G4	(minor airport)
KLAX	(major airport)
HERMO	(intersection)
- 2) a fix-radial-distance.
Examples:

JFK330012	(JFK 330° 12 nm)
LAX316018.5	(LAX 316° 18.5 nm)
- 3) the intersection of two radials.
Example:
LAX316/VNY220
- 4) a latitude/longitude.
Examples:

N3421/W07752	(N34°21', W77°52')
3421/07752	(N/W assumed)
S0800/E05000	(S08°00', E50°00')

- 5) facility name fragment, prefixed by an asterisk.
Examples:

*PITTSB
*LOS ANGELES
*LOS*ANGELES

- 6) estimated present position, denoted by the reserved identifier "PP".
Example:
PP

The ability to define a location as the intersection of two radials is completely new. Both the fix-radial-distance and latitude/longitude notations were previously allowed only in route specifications, but now can be used in other contexts as well (in the **Quick** function, for example).

Also new is the capability to use an asterisk-prefixed name fragment in lieu of an identifier. When you do, Flightmaster displays all the fixes that match the specified fragment and lets you choose which one you want. Press ↓ and ↑ to scan through the alternatives, and press EXE to select the one you want or ON/CLEAR if you don't like any of them.

Present Position

Anytime you have activated Flightmaster's inflight-monitoring facility (by entering a takeoff time or fix-crossing time into the trip log), you can use the reserved identifier "PP" to refer to your estimated present position. Flightmaster uses dead-reckoning methods to calculate your present position based upon the last fix-crossing time you entered, the amount of time that has elapsed since then, and the projected groundspeed and planned course from the last-crossed fix.

You can exit the spreadsheet using ON/CLEAR and do a **Quick** function from PP to any fix. You can search for nearby airports within a given radius of PP. Or create a user-defined fix located at PP.

Or suppose you get an inflight ATC re-route such as "cleared present position direct to XYZ, then V123 to ABC, rest of route unchanged." You can use **Route**→**Change** to amend your route accordingly, putting PP in your revised route specification at the appropriate place.

Incidentally, whenever PP appears within a **Route**: specification, Flightmaster automatically replaces it with an equivalent **Ndddmm/Wdddmm** lat/lon notation. Consequently, there's no problem if ATC gives you another "present position direct" amendment later on in the flight.

Reorganization of the Trip Log

The trip log spreadsheet (**View**) has been reorganized and simplified to six columns (from twelve). At the same time, additional data items have been added, including distance-to-fix, airway designator, and field/facility elevation.

This is accomplished by displaying only the most frequently-used data items in each column, but allowing you to view less-frequently-used items by pressing the **MODE** key (you can think of it as the "more" key). The new trip log layout is shown at right.

For inflight progress monitoring, the **EXE** key is used to indicate that you wish to enter a takeoff or fix-crossing time. (Previously, the **MODE** key was used for this function.)

While viewing the trip log, pressing the **R** key brings up a full display of the current (expanded) route. Pressing the **ON/CLEAR** or **EXE** key returns you to the trip-log spreadsheet.

Trip Summary Row

Column A distance MODE	Trip ILMa→CLWa 498 nm 3:32 GC 452 nm +46
Column B profile MODE MODE	Trip ILMa→CLWa Climb 0:09 Cruise 3:10 Descent 0:13
Column C speed MODE	Trip ILMa→CLWa Avg GS 141 K Cruise 145 KTAS
Column D fuel MODE	Trip ILMa→CLWa Fuel 53.1 gal Flow 13.6 gph
Column E altitude MODE	Trip ILMa→CLWa Cruise alt 6500 Dnsity alt 7200
Column F takeoff time	Trip ILMa→CLWa Off ILMa 13:45

Trip Leg Rows

Column A leg summary MODE	2a) ILM→CRE V70 53nm 0:24 240° F 53nm 0:24
Column B from-fix info MODE MODE MODE	2b) ILM 240° F Freq 117.0 WILMINGTON NC N34-21 W077-52 20' MSL HVTC
Column C to-fix info MODE MODE MODE	2c) CRE 235° T Freq 117.6 GRAND STRAND SC N33-49 W078-43 21' MSL LVTC
Column D wind effects MODE	2d) ILM→CRE GS 132K WCA +4° Wind 270° 27K
Column E time & fuel MODE	2e) At CRE TTE 0:28 (3:04) Fuel 10.4 (42.7)
Column F present position MODE	2f) To CRE Est 36nm +16 ETA 14:15 +16

Correction for Nonstandard OAT

Whenever you enter a cruising altitude in **Route→New** or **Route→Change**, Flightmaster now prompts you to enter an OAT temperature value for your cruising altitude. It expects Celsius, but you can also enter a Fahrenheit value with the suffix "F". The value defaults to standard temperature (ISA) for the altitude.

Flightmaster calculates a corrected (density) altitude from the cruising altitude and OAT, and uses aircraft performance figures corresponding to that density altitude.

4- or 5-Digit Winds-Aloft Format

When you enter winds aloft in **Route→New** or **Route→Change**, Flightmaster now accepts either the 4-digit format used by the National Weather Service, or the 5-digit ICAO format used by most airlines.

Remember that in 4-digit NWS format, wind speeds greater than 99 knots are denoted by adding 5 to the leftmost digit.

For example, you can enter a wind of 230° at 123 knots as either 23123 (ICAO format) or 7323 (NWS format).

Runway Length & ILS Info

Flightmaster's airport database now includes information on the approximate length of the longest runway at each airport, and whether or not the airport has an ILS approach. This information can be viewed using the **Database→Find** or **Database→Search** functions, and also appears in columns B & C of the **View** spreadsheet.

For airports with field elevations below 4,000' MSL, the length of the longest runway is coded as:

<3 0-2999'
3+ 3000-3999'
4+ 4000-5999'
6+ 6000' or more

while for airports at 4,000' MSL or above, the categories are:

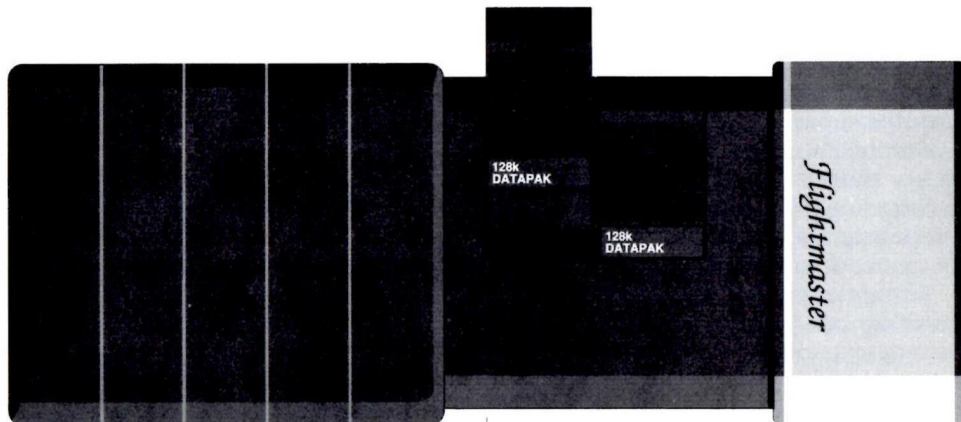
<4 0-3999'
4+ 4000-4999'
5+ 5000-6999'
7+ 7000' or more

Airports with an ILS approach are additionally flagged with the letter I.

Example:

SNAa 126.8 I 4+
SANTA ANA JOH CA

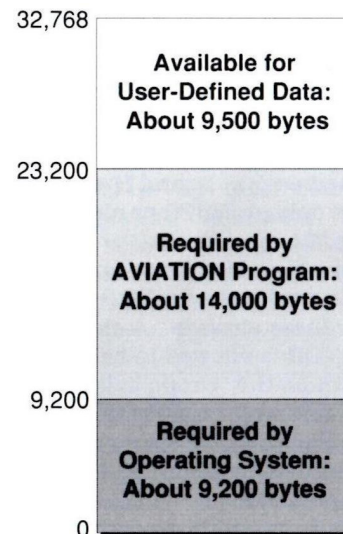
Santa Ana (John Wayne) airport has an ILS approach, and its longest runway is 4000'-5999' long.



How Big Can My Database Be?

One of the questions that users ask us most frequently is "how many different aircraft can I set up before my Flightmaster runs out of memory?" Or "my Flightmaster just said OUT OF MEMORY and quit...what's wrong?"

There are no simple answers to such questions, but this article explains how Flightmaster manages its internal memory and gives some guidelines for estimating memory requirements.



How Flightmaster Uses Memory

The Flightmaster has 32,768 bytes (32K) of internal RAM memory. About 9,200 bytes are consumed by the basic operating system, leaving about 23,500 bytes for use by application programs (such as AVIATION). If you execute the INFO command from the top-level menu, you can see the exact amount of memory remaining.

The AVIATION application requires varying amounts of memory space to operate, depending upon which functions you are doing. The functions that take up the most memory are W&B and Checklist—each requires about 14,000 bytes to run, leaving about 9,500 bytes for user-defined data. If your user-defined data exceeds 9,500 bytes, you will probably get an OUT OF MEMORY error when you execute the W&B or Checklist functions.

Rules-of-Thumb

Here are some rules-of-thumb for estimating how much of that 9,500 bytes is consumed by various kinds of user-defined data items:

- A/C performance.....500 bytes
- A/C W&B template 1,000 bytes
- A/C checklists 2,000 bytes
- Saved route 50 bytes
- User-defined intxn 25 bytes
- User-defined VOR/arppt ... 50 bytes

These are very rough estimates. The exact figures are highly variable, depending upon how many performance altitudes, W&B load stations, checklist items, or route segments are involved. But they give you some idea for estimation purposes.

In general, user-defined fixes and saved routes are cheap...but checklists are expensive!

How Much Memory is Left?

To see exactly how much memory space you have left, execute the function **Setup**→**Checklist**→**Change** (or, if you don't have any checklists defined, **Setup**→**Checklist**→**Define**). You will see a message flashed up for a couple of seconds:

Free memory: 1234 bytes

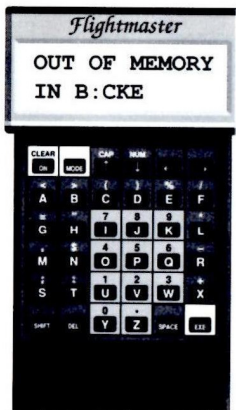
Then press **ON/CLEAR** to abort the function and return to the menu.

If this free-memory figure drops below about 1,000 bytes, you're starting to skate on thin ice.

If You Run Out of Memory...

If your Flightmaster displays an **OUT OF MEMORY** error message when you execute the **W&B** or **Checklist** functions, you will have to erase some of your user-defined data to make enough room for the **AVIATION** program to run properly. As you can see from the rules-of-thumb, erasing checklists or **W&B** templates will free up the most memory.

Use **Setup**→**Checklist**→**Erase** or **Setup**→**W&B**→**Erase** to free up some memory, then check the amount of free memory as previously described.

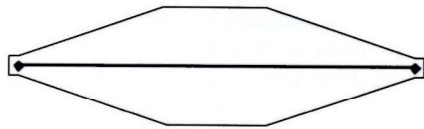


How Auto-Routing Works

Automatic routing is Flightmaster's most sophisticated feature. To help you make the most of it, here's the inside scoop on how auto-routing works.

Auto-VOR Routing

When you ask Flightmaster to create an automatic VOR-to-VOR route between fix A and fix B, it starts by plotting a *selection region* around the great-circle route connecting the two fixes. The region looks something like this:



The region extends a maximum of ± 60 nm from great-circle at mid-route, and tapers to a minimum of ± 10 nm at the endpoints. This taper includes $\pm 22^\circ$ either side of the great-circle course.

Flightmaster then searches its database to find all the VORs that lie within the selection region. In general, it is interested only in L- and H-class VORs (H-class only at FL180 or above unless you use **VL**).

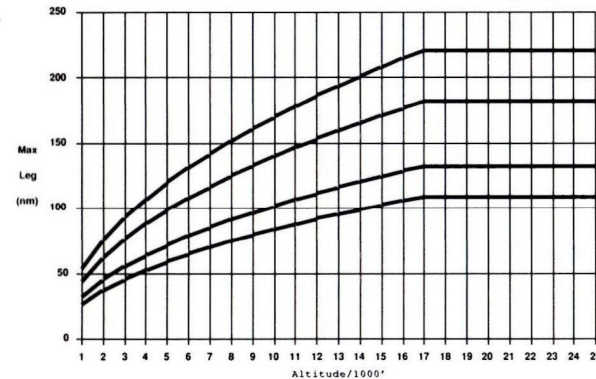
If fixes A and/or B are airports, the machine next looks for VORs that are close to these airports. A close-to-airport VOR is allowed to be as much as 10 nm on the "wrong side" of the airport, and may be a TVOR.

Now Flightmaster starts choosing enroute VORs by scanning its list of VOR candidates for one that is roughly mid-way between the endpoint fixes. If there are several to choose from, Flightmaster picks the one closest to the great-circle route.

The distances from the newly-chosen midpoint VOR to each of the endpoints is now calculated. If both legs

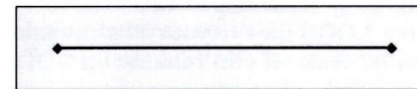
are short enough to assure good VOR reception, there's nothing more to be done! But if either leg is too long to be flown, Flightmaster looks for a VOR that is roughly in the middle of the too-long leg. It keeps subdividing each too-long leg until all the legs are of acceptable length, or until it can't find a suitable midpoint VOR.

Maximum leg length is a function of cruise altitude, as shown in the graph.



Auto-RNAV Routing

Flightmaster's algorithm for automatic RNAV-direct routing is very similar to the VOR-to-VOR case. But there are a few important differences. The shape of the *selection region* used to identify candidate VORs is quite different—rectangular, like this:



where the width of the region is a function of cruising altitude (up to ± 65 nm at FL180 or above, narrower at lower altitudes). Also, RNAV-direct routing requires that all candidate VORs must have DME capability.

After the endpoint and enroute VORs are chosen for an RNAV-direct route, Flightmaster calculates an appropriate radial and distance offset

from each VOR to provide a waypoint on the great-circle route. For enroute waypoints, the radial chosen is always a multiple of 5° and the distance is rounded to 1 nautical mile. Endpoint waypoints are located precisely over the airport, with the offset given to the nearest 1° and 0.1 nm.

Auto-Airway Routing

Flightmaster's automatic airway routing algorithm does *not* attempt to find the shortest possible airway route from fix A to fix B. Instead, it tries to find a *reasonable* airway route with the smallest possible number of airway changes. If there is a single airway that goes from A to B, Flightmaster *always* chooses that airway.

Otherwise, it follows every airway that passes through fix A, looking for the one that reaches a VOR as close as possible to fix B and within a tapered *selection region* (identical to the region described previously for Auto-VOR routing). Let's say the best it can do is to get to intermediate VOR CCC.

Now Flightmaster checks to see if there is an airway between CCC and B. If so, there's nothing more to be done.

Otherwise, it follows every airway that passes through fix B, looking for the one that reaches a VOR as close as possible to CCC and within the *selection region*.

It continues to search both forward and backwards until either the routes meet in the middle or it can't find an acceptable airway. In the latter case, it reverts to Auto-VOR routing to complete the route.

Note that transitions from one airway to another are made *only* at VORs within the selection region, and *never* at intersections. This limitation is imposed in order to achieve acceptably fast processing speed.

Tips & Techniques

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

Try Auto-Airways Routing First

When planning a trip at low altitudes, it's usually a good idea to try auto-airways routing first. Victor airways tend to circumvent special-use airspace, large bodies of water, and major terrain obstacles. Hence, they often result in more "flyable" routes, albeit somewhat longer ones, than RNAV or VOR-direct routes.

Always verify every automatic route against your current aviation charts to ensure that it is indeed flyable.

Closer-Spaced VORs/Waypoints

If a **V** or **R** route yields one or more uncomfortably-long legs, try again using **VL** or **RL**. This will generally yield a route with shorter legs and additional intermediate VORs or waypoints.

Of course, in the case of **VL** routes, this usually means extra zig-zags and more excess mileage over the optimum great-circle distance.

CTAF vs. Tower Frequency

Flightmaster's airport database includes the Common Traffic Advisory Frequency (CTAF) for each airport. At uncontrolled airports, the CTAF is commonly a Unicom frequency.

At airports with a part-time control tower, the CTAF is usually the same as the primary tower frequency...but not always!

For example, consider the airport at Elmira NY—identifier KELM. Flightmaster correctly shows the CTAF to be 122.4 MHz, which is the frequency for Elmira Radio. Tower frequency at Elmira is 121.1 MHz.

Latitude/Longitude Accuracy

Flightmaster displays latitudes and longitudes in degrees and minutes. However, it maintains latitudes and longitudes internally as 16-bit binary integers. Flightmaster's actual internal precision is to the nearest one-sixth of a minute of latitude and the nearest one-third of a minute of longitude.

Backup/Restore via CommsLink

Backup→**CommLink**→**Backup** backs up all of the user-defined data in your Flightmaster by creating a series of *.ODB files on your PC disk. The file names are self-explanatory: AC*.ODB are aircraft profiles, WB*.ODB are W&B templates, CK*.ODB are checklists, etc.

All *.ODB files are plain ASCII files. Records are separated by carriage-return/linefeed, and fields within records are separated by horizontal tab.

It is okay to edit these files on your PC with your favorite text editor. However, you must be sure that the editor you use doesn't convert tabs to spaces, insert other control characters, or pad the file with nulls. Most programming editors will work fine, as will many WP editors in *non-document mode*. Until you're sure about *your* editor, save a copy of the pre-edit *.ODB files just in case something goes wrong.

Backup→**CommLink**→**Restore** restores *.ODB files to your Flightmaster from PC disk. If you rename an *.ODB file to some other filename extension (say, *.XDB), it will not be restored.

Restoring does *not* delete existing files in your Flightmaster that are not overwritten by the restore. Suppose you backup your Flightmaster, rename CKN1234X.ODB to CKN1234X.XDB, and then do a restore. You'll find that the checklists for N1234X *will still exist* in your Flightmaster. The file was not restored, but the original remains.

Flightmaster vs. LORAN

A question we hear from prospective Flightmaster owners perhaps more than any other goes something like this: "I already have a fancy database LORAN in my airplane...what good will a Flightmaster do me? Is it really worthwhile having both?"

Apples and Oranges

Although the Flightmaster's database resembles the one in a LORAN receiver, that's about the extent of what the two devices have in common. Flightmaster and LORAN really don't compete with one another to any significant degree. The Flightmaster is designed for pre-flight planning and in-flight progress monitoring, while the LORAN is a navigation device.

Pre-Flight Planning

The lion's share of Flightmaster usage is in pre-flight planning. For the most part, this activity isn't done while in the cockpit...it's done at home or in the office or hotel room or in the FBO or at the FSS counter. A database LORAN doesn't help in these settings. But a Flightmaster is so tiny that you can slip it into your pocket or flight bag and use it wherever there's pre-flight planning to be done.

True, some LORANs have so-called "flight planning" functions. But these are typically awkward and tedious to use because the LORAN doesn't have a full keyboard. Even the very fanciest LORAN receiver won't tell you how much fuel to load, whether your W&B is okay, etc. Moreover, the LORAN is useful only in the airplane, and pre-flight planning isn't (and shouldn't be) done in the cockpit.

In-Flight Monitoring

As pilots, all of us were taught to keep meticulous flight-progress records (fix-crossing times, fuel status, deviations from planned estimates). We all did this during our student cross-countries and on our private checkride. But now that we're flying faster, more demanding aircraft in a complex ATC environment, a lot of us just don't take the time to keep such records anymore.

The in-flight monitoring features of the Flightmaster take all the work out of such record-keeping. It makes it trivial to keep track of the things we should be keeping track of manually but often don't. When a flight isn't going according to plan, Flightmaster brings this fact to our attention early.

Nav Cross-Check and Backup

The Flightmaster's dead-reckoning capabilities provide a valuable cross-check on the accuracy of LORAN, VOR/DME, and other navigation equipment. Everyone who has flown much with a Flightmaster is always surprised at just how closely the Flightmaster's time- and distance-to-fix readouts agree with the navigation radios.

In the event of an electrical failure, radio failure, or navaid failure, the Flightmaster provides the pilot with a completely independent means of maintaining positional awareness. It also is extremely helpful when flying in areas where LORAN and DME coverage is not available.

The Bottom Line

Most Flightmaster owners fly aircraft that are LORAN-equipped and find the two devices to be splendid companions. And most of them would be extremely unhappy if they had to give up either one!

Software Revisions

The following summarizes the various versions of Flightmaster software, and the bug-fixes, enhancements, and database revisions that have been made in each subsequent update. Watch future issues of FwF to keep apprised of software and database changes as they become available. (Update subscription customers automatically receive a reminder card whenever a new update is available.)

v2.00 15-Mar-90

Database updated to FAA 08-Mar-90 revision cycle. New universal location parser accepts 6 formats:

- Fix identifier: KLAX
- Fix radial-distance: ICT330018
- Intxn of two radials: LAX316/VNY240
- Lat/lon: 3530/12715 or N3530/W12715
- Asterisk-prefixed name fragment: *PITTS
- Estimated present position: PP

Estimated present position referenced by "PP".
View: spreadsheet reorganized into six columns.
View: added dist-to-fix, airway, elev., full-route.
Route→New/Change: correct performance for OAT.
Route→New/Change: accept 4- or 5-digit winds.
Airport database includes runway length & ILS info.

v1.06 24-Jan-90

Database updated to FAA 11-Jan-90 revision cycle.
Route→New/Change: diagnose "Too many winds".
View: diagnose "No route".

v1.05 24-Nov-89

Database updated to FAA 16-Nov-89 revision cycle. Enhanced VOR/RNAV auto-routing for longer legs. Changed VL and RL to use shorter legs. Fixed retention of trip ATAs after Route→Change. Added "Free Memory" display to Setup→Checklist. Enhanced precision of fuel figures on trip log. Fixed CommsLink→Restore bug affecting Macs. Fixed roundoff bug in lat/lon display. Fixed roundoff bug in fuel-remaining on printed log.

v1.04 29-Sep-89

Database updated to FAA 21-Sep-89 revision cycle. Deleted duplicate VORs: CDR, CRO, LIB, SYA, TAL. AVIATION does a device-boot at startup. AVIATION does an escape-off on way out. Warbling "beep" deleted...annoyed some users. Print changed to 60 chars/line (from 80). Fixed bug: divide-by-zero error on zero-length leg. Fixed bug in retrieval of NDBs with 2-letter ids. Fixed minor bug in checklist editor. Fixed minor bug in Database→Def. Fixed minor bug in route parsing. Fixed minor bug in Quick display. Enhanced FltPin error recovery.

v1.03 30-Jul-89

Database updated to FAA 27-Jul-89 revision cycle. Fixed AutoA bug affecting "fix A airport" routings. Fixed AutoA bug affecting "fix A userdef" routings. Fixed bug in Search involving roundoff of distance. Fixed bug in Search affecting battery longevity. Enhanced Route→Revs to reset fix-crossing times.

v1.02 19-Jul-89

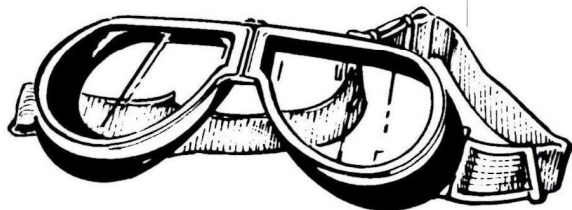
Re-fixed bug in AutoRNAV affecting N-S courses. Fixed trip log lat/lon display to show waypoint loc. Enhanced Route→Load to reset fix-crossing times. W&B setup, changed prompts from "Wt" to "Val". Enhanced W&B to add CG display for Part 135 ops. Backup to pak switches machine off to change paks. Editing checklist rewinds saved position.

v1.01 07-Jul-89

Fixed bug in AutoRNAV affecting N-S courses.

v1.00 30-Jun-89

First commercial release.
Database based on FAA 01-Jun-89 revision cycle.



Ordering Information

Flightmaster

- Flightmaster\$595
The complete handheld flight management system with battery, 75-page User's Guide, laminated quick-reference card, and a free subscription to the quarterly "Flying with Flightmaster" newsletter.

Flightmaster is sold with a rather extraordinary 90-DAY NO-RISK SATISFACTION GUARANTEE. Fly with Flightmaster. If you are not delighted with it, return it in original condition within 90 days for a full refund...no questions asked.

Updates

- Annual (6x) update subscription via 2nd-day air\$150
The Flightmaster database is updated every 8 weeks with revised airport, airway and navaid data from the FAA flight data center. This subscription covers your next six updates. We send you a reminder card when each update is available. You ship us your two datapaks, we reprogram them with the latest updated database and software revision, and ship them back to you via 2nd-day air. (You need not get every revision, as long as you take at least two per year.)
- Annual (6x) update subscription via next-day air\$180
Same as above, except we ship your updates by next-day air. This provides one less day of downtime.
- Zero-downtime update option\$200
We provide a pair of extra datapaks for you so that you can receive database updates without any downtime whatsoever. This one-time-only price covers only the two extra datapaks... you must also purchase an update subscription.
- One-time update via 2nd-day air\$50
Ship us your two datapaks at any time, we reprogram them with the latest updated database and software revision, and ship them back to you via 2nd-day air. Add \$5 more for shipment by next-day air.

Accessories

- RS232 comms link\$100
Enables your Flightmaster to communicate with a PCor Macintosh, modem, serial printer, or any other device with a serial port. Includes software to backup user-defined data to disk: specify MS-DOS or Mac.
- RS232 adapters\$20
Used with Comms Link to change its DB25F connector to whatever is necessary. Specify which of the following adapters you need: IBM AT, Mac+, Mac SE or II, serial printer, or modem.
- Fitted leather case\$30
Made of soft black glove leather with Velcro flap. Keeps your Flightmaster looking new.
- 32K RAMPACK\$90
The most convenient way to back up your Flightmaster data.
- AC adapter\$20
Lets you power your Flightmaster from a 120-volt AC electrical outlet.
- Printer II\$350
Compact "docking" thermal printer for your Flightmaster.
- Thermal paper for Printer II\$20
Package of four rolls.

Video Information Package

- Video information package with manual\$15
Detailed 30-minute VHS videocassette which demonstrates the many features of the Flightmaster, explains how it is used in a wide variety of pre-flight and in-flight situations, and shows the various accessories available. Also includes the complete 75-page Flightmaster User's Guide. The \$15 cost for this package is credited toward your purchase of a Flightmaster. 375.00

To order, call (800) 462-6669 toll-free, or FAX (301) 387-7322. We accept VISA, Mastercard, and American Express.

Name: _____

Company: _____

Address: _____

City, state, zip: _____

Daytime telephone: _____

Pilot ratings: _____

Total pilot hours: _____ Aircraft flown: _____

Payment by: Check VISA Mastercard American Express

Card number: _____ Expires: _____

Signature: _____

Choose shipping by: 2nd-day air (\$5) next-day air (\$10)

Maryland residents add 5% sales tax.

Total amount of order, including shipping and tax: \$ _____

Flightmaster, Inc.

Lake Technology Park
McHenry, MD 21541

FIRST CLASS
U.S. POSTAGE
PAID
McHENRY, MD
21541