ARGUS® MOVING MAP DISPLAY FAQ

Avionics sure changes fast! In 1987, Loran was the rage in navigation, GPS was just on the horizon, and the only way you could get a moving map in your aircraft was to pay hundreds of thousands of dollars to the military-industrial complex. Then, Eventide introduced the first affordable moving map display, the Argus 5000. Priced at $4995, the Argus made it possible for any aircraft owner to have situational awareness better than that of most airline pilots. It's just a few short years later, and not only has GPS been declared operational, but it seems that there are many more navigation receiver and display choices than one can find the time to evaluate. Eventide has added to the choices, by introducing the Argus 3000 and 7000 models, as well as adapters that allow the Argus models to display Stormscope and RMI data. Most recently we have announced the availability of a software option that allows you to use your Argus moving map display for flight planning functions.

With the original Argus introduction, we provided a "Q&A" that answered what were then novel questions about the technology. Now that most of pilots are familiar with the basic premise of the moving map, we have revised our Q&A to address some of the questions we've been asked most frequently, and to provide an insight into the manifold advantages of having an Argus in your airplane. We hope this revision of the original Q&A provides you with a thorough understanding of our product and how it interfaces with other instruments in your panel. If you have additional questions, please call us at (201) 641-1200.

Q: What are the differences among the three Argus moving map displays?

A: The Argus 5000 and Argus 3000 both fit in the standard 3-inch square instrument cutout as do other common flight instruments such as RMIs and HSIs. Each Argus requires 11 inches behind the panel and weighs about four pounds when installed. The Argus 7000 is nearly identical in weight and length to the 3000 and 5000, but has a much larger screen area even though it requires only an additional 1 3/4" higher panel cutout.

The Argus 5000 and Argus 7000 can interface to an HSI or remote DG for a heading- oriented screen display. They can also connect to an ADF for display of ADF bearing on the Argus screen. If panel space is a problem, the Argus can actually take the place of the ADF indicator. (More on that later.)

Q. What are the installation requirements?

A: The Argus is easily installed. While the FAA does require that the Argus be installed by a certified repair station or other licensed individual, installation is still quite simple:

1.) Identify a 3-inch square area (or 3" x 4 3/4" area for the Argus 7000) within the pilot's field of view (if possible).
2.) Connect the data output from your GPS, Loran C, or multisensor navigation system to the

Argus with two wires.
3.) Connect power and ground. The Argus will work on any normal aircraft voltage between 11 and 33 volts DC without converters or external power supplies.

Optional features of the Argus 5000 and Argus 7000 allow for an ADF and/or remote DG or HSI with "bootstrap" to be connected to increase the display features performance.

Q: Can I connect any Loran C, GPS or multisensor navigation system?

A: Almost. You must have one that is compatible, and almost all of the popular models are. In order to be compatible, the long range navigation system must have an "RS-232" data output, and must send navigational information such as current latitude and longitude, ground speed, track, distance, bearing, cross track distance, and certain waypoint information to the Argus.

Because the characteristics and availability of navigation receivers are constantly changing, we continually update our Loran/GPS Status Bulletin. If you did not receive one with this package, or you do not have a current one, please request one from Eventide.

Q: What GPS, Loran C, or multisensor navigation system does Eventide recommend?

A: We do not officially recommend any model. As long as a unit is compatible, you should select one based on your perception of that model/manufacturer's benefits. Because the Argus is strictly a display unit, its accuracy is completely dependent upon the latitude and longitude information transmitted from the Loran C, GPS or multisensor navigation system. Therefore, you should select the unit which you feel gives the best position accuracy, other factors being secondary.

Q: Should I buy a Loran C, GPS or multisensor navigation system with a built-in database?

A: The Argus' database is more comprehensive than those of almost any Loran and/or GPS. Thus, you will probably find that you never refer to the Loran and/or GPS data. However, there can be occasions when the navigation system's database will be useful:

1.) If you are not using the optional Argus software for designating waypoints or flightplans, you may select a destination waypoint or flightplan on the Loran or GPS. It is convenient to be able to enter it by identifier rather than by latitude and longitude.

2.) Without the optional Argus flightplanning software, the Argus will only give you information about facilities that are displayed on the screen. Therefore, it will be impossible to access data about facilities which do not appear in either the DEParture, ENRoute and EMERgency modes, or when such facilities are too far from the destination waypoint in the ARRival mode.

If you feel these applications of the Loran C, GPS or multisensor navigation system database make it worth the expense, or if your long range navigation system of choice comes with a database, by all means get it. But it is not necessary for Argus operation.

Q. Speaking of databases, how is the Argus' database updated?

A: The Argus 3000 database is contained on four EPROMs and must be updated by a shop or at Eventide. Subscriptions are not available.

The databases used in the Argus 5000 and Argus 7000 are contained on printed circuit cards and can be easily replaced in minutes by you or your avionics dealer. They are available by subscription, or on a one-time basis. Of course, we strongly recommend that you order a subscription, for reasons of both safety and convenience. (If you are flying with an IFR-approved long range navigation system and the Argus is approved for IFR use, the FAA requires that the Argus database meet IFR requirements.)

If you fly VFR in a limited area, you might want to update the Argus on an as-needed basis, such

as when a local airport opens or closes, when a navaid is relocated or as airspace is reclassified.

Q. I live in Canada. What about a Canadian database?

A: The standard Argus database contains prominent airports (approximately 118) and some NAVAIDS in Canada. Information about these airports is not given to us by the FAA and must therefore be selected and carefully entered by hand. For this reason we choose not to put all Canadian airports in the database. If having all Canadian airports and facilities is important to you, you may wish to order the Jeppesen international database available from Eventide.

Q. I didn't know Eventide had an international database. What geographic regions does it cover?

A. The international database is a worldwide database. We do not sell regional databases, but rather offer one database that contains information for airports, navaids, special use airspace, etc., for all areas of operation throughout the world.

Q. How often do I need to update an international database?

A: Eventide publishes international database updates every 28 days and standard databases every 56 days. Yearly subscriptions are offered for 28-day, 56-day or semi-annual updates. One-time updates are also available. To keep an Argus 5000 or Argus 7000 IFR qualified, the database must be updated at least every 56 days.

Q: What about user defined waypoints in my Loran C, GPS or multisensor navigation system? Will they be displayed on the Argus?

A: Any user-defined facility designated as a destination waypoint in the long range navigation system can be displayed on the Argus. Waypoints will be represented by a waypoint symbol (a star) along with their identifiers if transmitted by the long range navigation system.

Q: Does the Argus have any facility for storing user- defined waypoints?

A: Yes, with the new, optional flight planning software, up to 150 user-defined waypoints can be stored, and integrated in flightplans. In addition, you can select these waypoints (as a group) to show up on the display even if they're not part of your current flightplan.

Q: What are the benefits of connecting the Argus to an HSI, remote DG or slaved compass?

A: The Argus obtains all its position information from the Loran C, GPS or multisensor navigation system. The navigation system computes its ground track by calculating the difference between successive position fixes. Because the successive fixes are "filtered" by the long range navigation system, a change in the aircraft's direction normally requires computing several position fixes before the system's ground track corresponds to the aircraft's new direction of travel or movement. We have found by experiment that GPS provides a much faster track update than does Loran.

While maneuvering in a traffic pattern or making rapid heading changes, the processing lag of the long range navigation system may delay map orientation. By connecting the Argus to an HSI or remote DG, the orientation of the moving map can be corrected almost instantaneously. If you already have an HSI or remote DG, chances are that it is compatible or can be modified to be compatible with the Argus. If you do not have a compatible or modifiable unit, consider whether the additional expense is worthwhile for your kind of flying. We have found that instantaneous heading orientation is a real benefit.

We especially recommend heading orientation for Argus installations in rotary-wing aircraft, since they frequently perform maneuvers while travelling too slowly to obtain a reliable ground track.

Q: Can the Argus 3000 be connected to a heading source?

A: No. The Argus 3000 will only obtain map orientation from the long range navigation system. It cannot interface with an HSI or remote DG for heading orientation and it cannot interface with an ADF. The Argus 3000 was essentially designed for the pilot who does not need all the features and added functions available in the Argus 5000 or Argus 7000.

Q: How accurate is the Argus?

A: No more, no less, than the long range navigation system supplying the data to the Argus.

For example, Loran C accuracy is determined by the quality of reception (signal propagation), and the geometry between the receiver (you) and the transmitters. A full description of these factors can usually be found in a Loran C user's manual. Under normally favorable circumstances, Loran C can give accuracy to 600 feet, and repeatability to 60 feet. Under less than favorable circumstances, it can degrade to a mile or so. GPS is typically much more accurate, but government-imposed "selective availability" can reduce its accuracy to 300 feet on a random basis. With typical navigation system accuracies the Argus can not only help you find the airport, it can even be useful for directional guidance while on the ground.

Far more important, however, is what it can not do. Because of the error potential of the Loran C or GPS, you can not simply fly an approach using the Argus as a reference. Although the Argus display shows you aligned with the runway, Loran C and GPS equipment is generally not approved for approaches. Present technical limitations prevent those navigation systems from meeting approach integrity requirements.

Q. I do not have any panel space for an Argus.

A: Surprisingly, you probably do have panel space. You probably have an ADF indicator. The Argus 5000 fits into the same size instrument cutout as an ADF indicator, and can duplicate (or improve on) its functions. (The Argus 7000 also displays ADF information.) You can replace an ADF indicator with an Argus to display moving map and ADF indications independently or simultaneously.

Q: If I replace the ADF indicator with the Argus, what will the display look like?

A: For detailed descriptions and example screen displays, refer to the Argus brochure. In the ARRival mode a line extending from the nose of the aircraft in the direction of the tuned and received NDB station (depending on the accuracy of the ADF and long range navigation systems) is added to the display. This line will normally intersect the NDB. It points toward the beacon regardless of the heading of the aircraft and thus shows your heading in relation to the beacon.

In the DEParture mode, the pointer and tail are depicted conventionally in reference to the range ring (or the compass rose if heading is furnished to the Argus by a compass system).

The ENRoute mode has a similar display. Because of the extended forward viewing area in this mode, the pointer or tail may be missing in some directions.

Q: Is the Argus approved for use in conducting NDB approaches?

A: Yes. The Argus 5000 and Argus 7000 have a separate ADF Mode for conducting IFR NDB Approaches which are approved by the FAA.

In all cases, if the ADF Mode is selected in AMEND, the T/E (track error) display will be replaced by the digital bearing. Thus, if the NDB is 20 degrees to the right of the nose, it will read 020. If you then turn right 40 degrees, the NDB will be to the left, and the box will show 340.

Q. I do not have an ADF indicator, but I do have an RMI. Can the Argus replace my RMI?

A: As a matter of fact, YES! An optional RMI adapter which can display either two ADF pointers, two VOR pointers, or one of each either in a map mode, or in a separate "RMI Mode" (which may be used for conducting IFR NDB or VOR approaches) is available from Eventide.

Q: What other instruments can the Argus replace?

A: With an Eventide Weather Display Adapter you can replace a WX-10/(A) or WX-11 Stormscope indicator and display weather information, in a separate mode, on the Argus display. A different version of the adapter works with the WX1000e. The Argus CE models have optional software available that works with the WX500. No adapter is required for use with the WX500 providing the input data channel is not otherwise in use. This software will also be available for the monochrome Argus, pending approval.

Q: How about combining the Argus and radar (or EFIS) display on one CRT?

A: Almost all cockpit displays, including the Argus and other vendors' radar and EFIS units, have regrettably incompatible CRT drive formats. At this time, there is no technical way to combine them on a single CRT.

Q: How do I know if my HSI, slaved compass, remote DG, or ADF receiver is compatible with the Argus?

A: The vast majority of them are. If your HSI or remote DG provides ARINC 407 Synchro, or your ADF provides ARINC 407 Synchro, AC Sine/Cosine, or DC Sine/Cosine, then the Argus should be compatible.

For your information, the following ADF receivers are NOT compatible:

Bendix T12B, T12C, T12D
King KR86
Narco ADF 140

If your receiver is not listed above, it is probably compatible. Nonetheless, we recommend you check with your avionics dealer to make sure.

Q. I have an Autopilot gyro with a conventional Heading Bug. Can I get Heading Info from it?

A: NO. The heading bug only furnishes information to direct the autopilot or flight director. It does not provide the absolute heading information needed by the Argus.

Q: How much drive power does the Argus require from the heading synchro source?

A: The Argus does not require any significant power. Unlike mechanical displays which must be physically turned by the receiver or compass repeater, the Argus is electronic. Connecting it across the output of a synchro presents a negligible load and requires only milliamps of current. (It is like connecting a nightlight to the same circuit that is already driving an electric range -- there is hardly any additional current required.)

Q: How do I know if I can use your RMI adapter to give me an RMI display?

A: Refer to the above compatibility question for ADF interface. For VOR compatibility the adapter requires ARINC 407 AC synchro, AC Sine and Cosine or composite VOR voltages. Check with your dealer for exact specifications.

Q: I notice that the Argus has a CDI Display. Do I have to connect this to anything?

A: The Argus creates a CDI display from the same data stream from which the other Loran C, GPS or multisensor navigation system data is derived, via the data bus connector. If the long

range navigation system sends the cross-track distance (or XTK), the Argus will display it. This feature is convenient because it prevents you from having to look at the CDI display on the Loran C, GPS or multisensor navigation system. On the Argus you can choose an automatic full-scale XTD display of ñ5 nautical miles (useful while ENRoute), in which case the CDI will switch to the ñ1.25 nautical range scale in APProach. Other fixed scale sensitivities are available upon selection including a digital crosstrack display. With the optional flight planning software, the Argus itself determines XTK error and displays it.

Q. The Argus 5000 and 7000 have Real-Time Clocks. What purposes do they serve?

A: The clock (which includes calendar functions) serves two purposes. It keeps track of the date so you can be notified when your database expires. It also reports the time of day (either UTC or Local depending upon how you set it). This time information is used to calculate your ETA to the waypoint. Because the Argus 3000 does not have a real-time clock, it instead calculates ETEm as do many long-range navigation systems.

Q: I do not have a Loran C or GPS. I do, however, have a Flight Navigation Management System. Can I use the Argus?

A: The Argus is a display unit which shows a map in response to compatible long-range systems offering ARINC 419 or ARINC 429 outputs. Eventide offers an optional ARINC Adapter which converts the complex ARINC data format to RS-232C compatible inputs to either an Argus 5000 or Argus 7000.

Q: I do not see how a unit with such a small screen can be useful!

A: The screen is small, but it is VERY sharp. In fact, it has a resolution of 256 pixels horizontally, and 512 vertical, which is the direction of travel. Even with its small screen size, the resolution of the Argus is equivalent to that of a typical computer screen.

If you have normal eyesight, i.e. 20-20 or corrected to 20-20, and you place the display within arm's reach (almost anywhere on the panel), you will not have a problem. You should, of course, try to place the Argus in the best available position since it will quickly become one of your most resourceful navigation tools.

The best way to judge the readability of the Argus screen is to see it for yourself. Ask your dealer if he knows of an Argus owner on the field or contact Eventide for the name of an owner in your area. (Argus owners jump at the opportunity to brag and show off their Argus Moving Map Display.) If you still prefer a larger screen, consider the Argus 7000. It is an additional 1 3/4 inches taller. If you have the room in your panel, you will love it.

Q: Can I select the features and facilities I wish to display?

A: Yes you can. The process is quite simple. You can select or deselect airports by runway length, fuel availability, precision approach categories or surface types. VOR, NDB and Marker/locator facilities and Special Use Airspace classes are also user-selectable. Airspace Fix classifications and Heliports are selectable with optional databases containing those facilities. For convenience, the selections are stored innon-volatile memory and remembered even if power is removed.

Q: You mentioned "optional flight planning software" in a few answers. Tell me about it.

A: When the Argus was introduced, its sole job was to act as a display for the navigation receiver. In response to many requests from users, we have created software for the Argus that allows it to use its database and memory for the storage of waypoints and flightplans. Since these functions are available in the Argus, the pilot has the option of selecting a navigation receiver for navigation alone, rather than being concerned about the database in the nav receiver as well. It also relieves him of the concern of having to update two databases to be IFR current. This feature is available

as an upgrade to current Argus owners as well as in new units.

Q: I already have an Argus. Tell me how I can update to the flight planning feature.

A: In order to take advantage of the FP software option, you will probably need a hardware (CPU board) upgrade as well. The original CPU didn't have any "non-volatile RAM" except for the few bytes necessary to store the AMEND and SETUP settings, and this was battery- backed. The new CPU does have this memory, sufficient to store up to 150 user waypoints. As a bonus, the AMEND and SETUP values are stored in this memory as well, so that they don't have to be re-entered if the battery has to be replaced.

While the CPU board is an expensive assembly, some of the most expensive parts can be transferred from an old board to a new one, and we have been able to take advantage of this fact to arrange for an inexpensive upgrade for owners who return their units to Eventide to have the upgrade performed. If you haven't already received a letter from us explaining the upgrade program in detail, please give us a call.

Q: To whom do you recommend this flight planning software option/upgrade?

A: Most customers will benefit from it. Our FP software has a few features that are rendered possible by our CRT display, hence unavailable on nav receivers with two- or three- line displays. Flight plans are easier to enter and to edit since the entire plan is visible on the screen. Also, we have a unique screen that displays various distances and compares them with the distances if you fly direct.

You will especially benefit if your nav receiver has no flight planning or waypoint output capability, or if you have an older Loran and want to upgrade to GPS. You now have the option of selecting a GPS receiver with no database at, perhaps, substantially reduced cost. If your radio stack space is extremely limited, the FP software will allow you to put the nav receiver elsewhere, even where it is difficult to see, since you will probably never have to do more than turn it on and off.

If you already have a top-of-the-line GPS with flight planning software, user waypoint storage, and the ability to transmit it to the Argus display, our FP software will be relatively less attractive.

Q: Why would I buy an Argus when I could by a less expensive hand-held moving map?

A: That's a real good question. Hand-held moving maps do indeed have their place, largely in non-owned aircraft. The same holds true for hand-held GPS units, altimeters built into wristwatches, etc. While they do serve their purposes, it can be terribly cumbersome to manage an aircraft with all those wires (and all those charts) sprawled out over your lap.

There are performance issues as well. Because the antenna of a hand-held GPS is situated inside the aircraft, satellite reception is compromised. Panel-mount primary instruments, which are much preferred by the FAA, will provide you with more accurate readings. Since the Argus mounts directly into your panel (ideally, in your line of sight), you can get back to "heads up" flying -- with your hands left free to manage the aircraft. The Argus's exceptionally sharp resolution and substantial screen size make it easy to read, even in bright sunlight.

And remember, the Argus is more than a moving map display. An Argus 5000/7000 can be used to display an ADF. With the aid of adapters, each of the three models can display thunderstorm information or even be used as an RMI. So, you can see that comparing a hand-held unit to an Argus is like comparing, as the cliche goes, "apples to oranges."

Q: What sort of Altitude information is displayed on the Argus?

A: "MSL" or mean sea level is displayed in the lower left- hand corner of the screen and is labeled in the familiar sectional format. The large digits show the thousands of feet and the small digit shows the hundreds. Altitude information is obtained from sectional chart grid squares and the

Argus is programmed to add 1000 feet to the charted figures.

The MSL legend may appear in normal or reverse video. The display readings correspond to different meanings in each mode. The following table shows how the MSA number is computed in each:

MODE-DISPLAY CHARACTERISTICS

DEParture The MSL number represents the highest altitude (plus 1000 feet) of any sectional grid square displayed (even partially) on the screen in any given range. If MSL is in reverse video, it means that within 40 miles (the maximum screen range) there is at least part of a grid square whose number exceeds the number on screen by at least 1000 feet.

ENRoute This MSL display in the ENRoute mode is similar to that in DEParture, however if MSL appears in reverse video, it means that at least part of a grid square whose number exceeds the number on screen by at least 1000 feet is within a 240 mile circle around the aircraft. (Thus, even on the 240 mile range, a much larger area beyond the screen is incorporated in the reverse video calculation.)

ARRival The number display is calculated in the same manner as it is done in DEParture or ENRoute. Reverse video is calculated as follows: If the aircraft is on the screen, then no reverse video is used as it is assumed that the aircraft will be travelling from its present position to the waypoint (which is also on the screen).

If the aircraft is not shown on the screen, then a square area is checked for higher grid squares. This square is centered on the aircraft with the waypoint at the middle of one edge. The square decreases in size as the aircraft gets closer to the waypoint. As usual, if any grid square in the square area checked is 1000 feet higher than the displayed number, reverse video is activated.

EMERgency In this mode the MSL is displayed in the same manner as it is in the ENRoute mode.

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