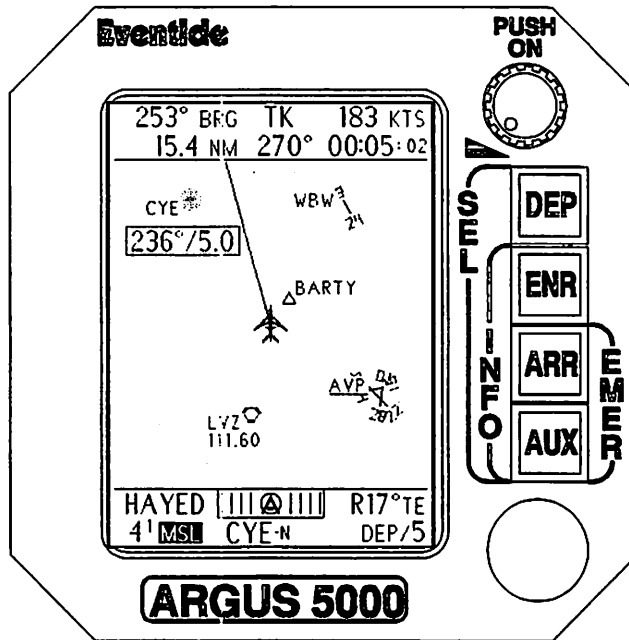


REFERENCE MANUAL

ARGUS 5000

ARGUS 7000

With Version 5.xx Software



First Printing: September 1997

Second Printing: July 1999

Argus® is a registered trademark of Eventide Inc.

Copyright 1987-1997, Eventide Inc., 1 Alsan Way, Little Ferry NJ 07643, USA

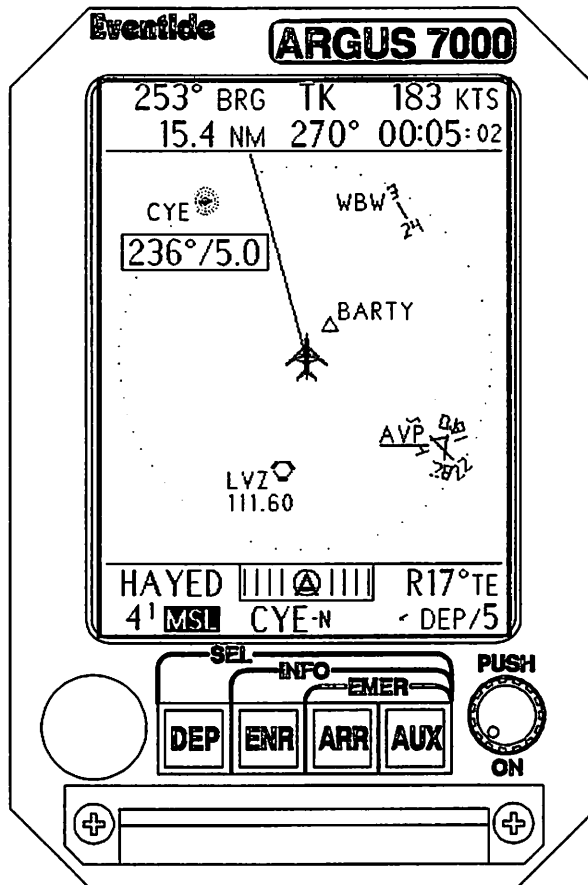
Phone: 201-641-1200

Fax: 201-641-1640

Email: argus@eventide.com

World Wide Web: <http://www.eventide.com>

ARGUS 7000 (actual size)



Reference Manual Revisions

The original date of printing of this reference manual appears on the cover page. The original Argus 5000/7000 software version covered by this manual is **VERSION 5.0x**. When this manual is reprinted in its entirety the cover date will change. The software revision **may** change, depending upon the current version.

Revisions will be issued for this manual as necessary, either to correct errors or to update it for new Argus software versions. Revisions are accomplished by sending the registered owner one or more revision pages to replace the corresponding manual page(s). This page is reserved to indicate the current revision of the manual. The balance of the sheets are placed in the appropriate portion of the manual according to the instructions supplied with the revision material.

Update Note

If you are re-installing your Argus after a factory or dealer software upgrade, it is important to review the **SETUP** pages to confirm, or, if necessary, reselect, the navigation receiver connected to the Argus. The **SETUP** section has an area for recording the installed setting on your Argus. Confirm that it is filled out before relinquishing your Argus.

Limitations

When the Argus is powered ON, the "LIMITATIONS" screen appears. Please note this important information. These limitations are discussed in detail later in the manual.

LIMITATIONS

ACCURACY OF THIS
DISPLAY IS AFFECTED
BY ITS ASSOCIATED
GPS OR LONG-RANGE
NAVIGATION SYSTEM,
AIRCRAFT HEADING AND
INTERNAL DATABASE.

ADF/VOR APPROACHES
MUST BE CONDUCTED
IN ADF/RMI MODE ONLY.

DEPRESS ANY BUTTON
TO MONITOR SELF-TEST

Argus Limitations

Database Expiration

If the Argus database has expired, two lines in reverse video appear at the bottom of the screen after selftest. Note that the database has expired and press any key to continue. **IFR flight using an expired database is not approved.**

ARGUS 5000 MOVING
MAP DISPLAY APPROVED
FOR VFR USE ONLY.
USE NOT PERMITTED
FOR IFR FLIGHT.
AERONAUTICAL CHARTS
MUST BE AVAILABLE
AS REQUIRED BY LAW.

18-DEC-97 17:08:55
ARGUS 5000 SN 001234
PROGRAM VER.05.00
DBASE CONFIG: 29

EXPIRED ON 01-JAN-97
PUSH KEY TO CONTINUE
©1987-96 EVENTIDE INC.

Database Expired

Approvals

The Argus is to be used only as a supplemental navigation instrument for VFR only except in accordance with the following approved uses.

NDB APPROACHES

The Argus 5000 and Argus 7000 are approved for NDB approaches when integrated with the aircraft heading system and ADF. The Argus **MUST** be used in ADF MODE when conducting an NDB approach.

VOR APPROACHES

The Argus 5000 and Argus 7000 are approved for VOR approaches when integrated with the aircraft heading system and VOR(s) using the optional Eventide RMI adapter. The Argus **MUST** be used in RMI MODE when conducting a VOR approach.

IFR ENROUTE NAVIGATION

The Argus 5000 and Argus 7000 are approved for IFR enroute navigation only when receiving navigation information from an IFR-approved GPS, Loran, or other long range navigation system, and the installation agency has received approval for the specific aircraft installation. The Argus database must be current (unexpired) when so used.

Approval Screens

After selftest is complete, one of three screens will appear, depending upon the connected long-range navigation system and the approval process undertaken by the installation agency. These screens also show the date, time of day, database expiration date, and Argus program version. Do not use the Argus in a capacity that exceeds the approval expressed on your Argus screen.

ARGUS 5000 MOVING
MAP DISPLAY APPROVED
FOR IFR USE WITH IFR
APPROVED LONG-RANGE
NAVIGATION SYSTEM.
AERONAUTICAL CHARTS
MUST BE AVAILABLE
AS REQUIRED BY LAW.
18-DEC-96 16:27:48
ARGUS 5000 SN 001234
PROGRAM VER.05.00
DBASE CONFIG: 29
EFF. DATE: 05-DEC-96
EXP. DATE: 01-JAN-97
©1987-96 EVENTIDE INC.

Argus IFR Approval

ARGUS 5000 MOVING
MAP DISPLAY APPROVED
FOR VFR USE ONLY.
USE NOT PERMITTED
FOR IFR FLIGHT.
AERONAUTICAL CHARTS
MUST BE AVAILABLE
AS REQUIRED BY LAW.
18-DEC-96 16:50:55
ARGUS 5000 SN 001234
PROGRAM VER.05.00
DBASE CONFIG: 29
EFF. DATE: 05-DEC-96
EXP. DATE: 01-JAN-97
©1987-96 EVENTIDE INC.

Argus VFR Approval

NAVIGATION NOT TO
BE PREDICATED ON
THE USE OF THIS
SYSTEM PENDING
FAA APPROVAL.
AERONAUTICAL CHARTS
MUST BE AVAILABLE
AS REQUIRED BY LAW.
18-DEC-96 16:46:06
ARGUS 5000 SN 001234
PROGRAM VER.05.00
DBASE CONFIG: 29
EFF. DATE: 05-DEC-96
EXP. DATE: 01-JAN-97
©1987-96 EVENTIDE INC.

Argus No Approval

Table of Contents

Reference Manual Revisions	1-iii
Approvals	1-v
Section 1:	
Introduction to the Argus Moving Map Display	1-1
GPS "Training" Modes and Argus Home Use	1-4
Section 2: The Basics	
Keeping your Argus in Good Condition	1-5
Argus Front Panel Controls and Indicators	1-6
Remote Switch Operation	1-7
The Argus Screen	1-8
A Sample First Flight with the Argus	1-9
Navigation Data Display . . . The Upper and Lower Windows	1-10
Minimum Safe Altitude Display	1-16
Heading and ADF Operation	1-21
Heading Display	1-23
ADF Display	1-26
Section 3: The MAP	
PLAN Mode	1-31
DEParture Mode	1-32
ENRoute Mode	1-34
ARRival Mode	1-36
Ground Navigation Ranges	1-39
PLAN VIEW Mode	1-42
True North Up	1-44
EMERgency Mode	1-44
Control Redefinition in EMERgency	1-46
Summary of Operation	1-47
Section 4: Map "Objects"	
	1-51

Waypoints, Courselines and the Simulated CDI	1-52
Courselines in "Direct To" Mode	1-52
Courselines in Flight Plan (LEG) Mode	1-52
Waypoint Display on the Argus	1-53
CDI and TO/FROM Indication	1-54
Special Use Airspace	1-57
Airways	1-61
Seaplane Bases	1-63
Heliports	1-64
Airspace Fixes (Intersections)	1-65
 Section 5: Flight Planning and Recording	 1-67
User Waypoints and Flight Planning	1-68
Overview of the Flight Planning Software	1-69
Waypoints	1-71
Selecting a Waypoint	1-72
Creating a User Waypoint	1-75
Navigating "DIRECT TO" Waypoints	1-77
Sorting and Storing Waypoints	1-78
Flightplans	1-79
Creating a Sample Flightplan	1-79
Entering Waypoints by Name	1-80
Copying Flightplans	1-84
Using a Flightplan	1-86
Flying The Demo Flightplan from TEB to SWF	1-88
In-Flight Changes to the Flightplan	1-89
RESET P.P. TO (CENTER CDI) function	1-94
User Waypoints	1-97
Accessing the Argus Database	1-99
Housekeeping	1-101
Efficient Non-Volatile Memory Use	1-102
The Flight Recorder	1-103
Displaying a Flight	1-105
 Section 6:	
Database Information and Pilot-Selectable Features	1-109

SElect and INfOrMation Modes	1-110
Airport Traffic Areas	1-118
Latitude/Longitude Display	1-118
AMEND Mode (Pilot Selectable Display Features)	1-119
Simulated Flight	1-128
Section 7: Option Information	1-131
Appendix 1: Database Update	1-155
Appendix 2: Navigation Receiver Information	1-158
Appendix 3: Differences Between The Argus 5/7000 and Argus 5/7000/CE	1-171
Appendix 4: Theory Of Operation	1-174
Appendix 5: In Case Of Trouble	1-176
Appendix 6: Obtaining Factory Service	1-181
Appendix 7: Warranty	1-183
Section 9: SETUP and INSTALLATION	1-185
SETUP Functions	1-186
SETUP mode	1-188
SELFTEST	1-194
Troubleshooting	1-194
Product Description, Limitations, and Specifications	1-198
Product Description and Limitations	1-198
Specifications	1-200
System Components	1-202
Installation Overview and Guidelines	1-205
Installation Drawings	1-210

Section 1:

Introduction to the Argus Moving Map Display

Congratulations! You have just purchased an Argus moving map display.

You're probably used to reading instruction manuals that begin with "Congratulations." Manufacturers frequently feel that their customers should be congratulated for their sagacity in buying whatever the manufacturer is flogging in preference to buying whatever inferior, more expensive, or downright useless product is being sold by the competition. That's not exactly why we're congratulating you, however. Here's why:

By adding a moving map display to your cockpit, you have immeasurably increased your awareness of the airspace and environment in which you fly. You will be free of the momentary, unsettling concern of not being exactly sure about where you are. Where's the boundary of that Class B airspace? Right *there*, a little to your right. No, you didn't accidentally go through it. Are the VOR/DME working correctly? Yes . . . they agree perfectly with the Argus. What is that controller doing, telling me to turn to a heading of 270°? Oh, I see where I am...OK. Did I set up that approach correctly? Are the instruments tuned to all the right frequencies? Yes, there's the airport ahead of me, right where it should be.

If you've never flown with the Argus before, it's a good bet that you're about to become a more confident, safer, and happier pilot. For *this* we congratulate you!

The Argus Philosophy

Just as there's a good reason for congratulations, there's a good reason why clichés are clichés. It's because, boring and tedious as they are, they're also *true*. The cliché in this case is "a picture is worth a thousand words." We have, and we are required to have, various charts with us when we fly. We are not required to carry the metric ton of printed documentation that would substitute for the simplest sectional even if there were some way that information could be accessed and used. Likewise, our other instruments present information in a pictorial format. The "ball" indicator moves to the left and right. There's no little legend that lights up and says "you're

skidding" or "you're slipping." And what would you do if there were? You do know to "step on the ball," however.

GPS navigation, popular and effective as it is, is the navigational equivalent of the metric ton of documentation. Many GPS receivers now have a database containing much of the information distributed among the Airport and Facilities Directory and the various NOS charts. Even so, the GPS itself can only display a tiny bit of the information at a given time. Many force you to switch several times just to get the range and bearing to your waypoint, as well your ground track, groundspeed, and estimated time enroute. The Argus, thanks to its bright, sharp CRT display shows this all at once, and that's even before we get to the map. When we do get to the map, we see that when the GPS says "WPT XYZ DIST 20NM BRG 170DEG," the Argus *shows* you the waypoint, draws a line that represents your course, and puts a symbolic airplane (your current position) on a map, all in the correct geometrical relationship. And if your waypoint happens to be an airport, it even draws the runways and shows you your relationship to them.

Special use airspace is today's cause celebre. When one of the newer GPSs warns you about an impending penetration, all it can do is extrapolate your present course, it cannot guess your intentions. So, you sit there continually telling the GPS that, no, you're not going to enter the Class B airspace and yes, you're aware of it. (But, you'd better not turn off that warning feature!) The Argus simply shows you where it is and where you are in relation to it. No questions, no problems, no inadvertent penetration.

The Argus does a lot more. It shows you minimum safe altitudes, it shows you airport information and frequencies, it even gives you a graphical depiction of your flight plan. And, we've got to say it somewhere, it's an incredibly sexy gadget to have in your airplane. We at Eventide have been flying with the Argus for several years. And we won't fly without it. More to the point, many of our customers say the same thing. You probably will, too.

The Argus Moving Map *Display*

Two more points and we'll leave this introduction and get on with operation. The first is a caveat . . .

The Argus is NOT a primary navigation instrument. It works in conjunction with a GPS (internal or external), which provides position and other useful information. The Argus is a **supplemental navigation display**. Your CDI doesn't know whether you're on a radial or not; it is driven by the VOR receiver. Likewise, the Argus has absolutely no knowledge of its present location. Whatever it is told by the GPS, it believes. Its job is to take the latitude and longitude given it, along with the rest of the data, and present it in pictorial form. Because of inherent inaccuracies in GPS reception, including Selective Availability (SA), your GPS-estimated position can be from tens to hundreds of meters in error. The GPS manufacturers tell you this, we tell you this, and even your GPS may tell you this, either by lighting the WARN light or by giving an accuracy estimate. The Argus faithfully depicts the precise position given it by the GPS. It is your job to understand that, despite this apparent precision, there is the possibility of error, possibly significant, in your position.

Therefore, **NEVER** attempt to conduct an approach solely by reference to the Argus (or the GPS) unless the GPS/Argus combination is approved for approaches, and do not attempt to use the information on the Argus screen to a greater degree of precision than is warranted by the accuracy of the GPS navigation sensor.

The second point should be more comforting . . .

While you look at the rest of this manual, you will see that you have many pages yet to go. If you read them dutifully and thoroughly, you will know essentially everything there is to know about the unit. We have incorporated many illustrations that depict the subjects discussed in the text. Because almost all of the illustrations are complete Argus "screen dumps," feel free to browse through them as necessary to make a particular point clear. There is a lot of information here, because the Argus is a very versatile instrument and there is a lot you can do with it.

So, don't be daunted by the manual. Instead, consider the Argus itself. It's not just versatile; it's friendly! Look at its picture; note that it has, not counting the ON-OFF-

Brightness control, exactly *four buttons*. That's about 1/10 as many as a basic VCR, and even fewer than your microwave oven. Despite the apparent initial complexity implied by the length of this manual, you will find it easy, and, ultimately, intuitive to operate. If you want to see farther ahead, press **ENR**route. If you want to see where you're going, press **ARR**ival. If you want to look around as you're taking off, press **DEP**arture. But we're getting ahead of ourselves. Please read on.

GPS "Training" Modes and Argus Home Use

Most GPS receivers have a "training" or demo mode. You can take them home, connect them to a small power supply, and actually operate them outside the aircraft using internally-generated courses. The Argus also has a "demo mode" that allows you to operate it and experiment with its features with no external connections other than a power source. By running the Argus with or without your GPS, in the comfort of your armchair and without the distractions of flying, you will be able to experiment more and learn faster. (Nothing you can do from the front panel can damage the Argus, so experiment all you want.) You can actually set up the same situations depicted in this manual and fly complete routes where we only show "snapshots."

To use the Argus at home, you need a power supply and a simple wiring harness that can be supplied by your installer or, if you're technically inclined, built at home. The Argus requires between 12 and 28 volts DC at less than 15 watts, and most modern panel-mount nav receivers have comparable requirements. A power supply and appropriate connectors can be purchased at your local Radio Shack store.

Other Navigation Receivers

Previous versions of this manual used the term LORAN throughout as a synonym for "navigation receiver." We recommend using GPS receivers with the Argus in preference to LORAN because their "dynamics," i.e., the speed at which they react to turns and other maneuvering, is about an order of magnitude better. However, the Argus is perfectly usable with LORAN, or with any other type of navigation receiver that provides the proper data. The Appendix gives a list of compatible units.

Section 2: The Basics

This section introduces Argus operation. Topics covered include:

- ! Keeping your Argus in good condition
- ! Front panel controls and display.
- ! Illustration of a typical Argus map screen
- ! Explanation of the items in the numerical navigation "windows"
- ! A sample "first flight" giving an overview of how the Argus is used
- ! Interfacing to other aircraft systems such as heading and ADF

Keeping your Argus in Good Condition

The Argus does not normally require preventive or corrective maintenance. However, you can damage it by not following certain commonsense precautions. Mechanical damage caused by improper handling is not covered under the warranty.

Cleaning the Screen

Using isopropyl alcohol or a mild glass cleaner, moisten a non-abrasive wipe (e.g., Baxter Cleanroom Wipes) and wipe the glass using short, smooth strokes. Do not use any abrasive material or aggressive cleaners. Acetone and other organic solvents should not be used. Replacing the screen is a time-consuming and expensive procedure.

Removing the Argus from the Aircraft Panel

The Argus is held in the panel by a clamp tray and connector contact pressure. To remove the Argus, loosen the upper two clamp tray screws, and pull the unit out of the panel using the slots machined in the left and right sides of the Argus panel as areas to apply force. Special tools are available for this purpose. **DO NOT PULL ON THE ON/OFF/BRT KNOB!**

Using the Front Panel Connector

The front panel connector (behind the removable cap) is used for exchanging data with and downloading data from a computer. Before inserting a plug in this connector, be sure the plug is clean. Getting an oil film or other grime in this connector can cause an intermittent contact which may result in selftest errors and other problems.

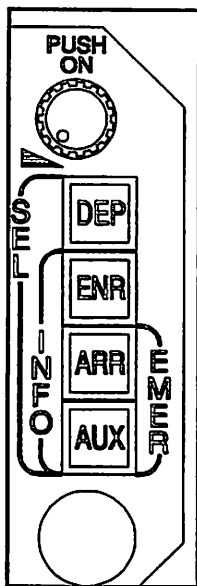
Argus Front Panel Controls and Indicators

The Argus Moving Map Display uses very few controls to accomplish quite a bit. This section covers the physical description of the controls and CRT. A detailed description of the display and of the function of each control is provided elsewhere in this manual.

The Argus CRT

The CRT presents the moving map and all other information to the pilot. It is a bright, high resolution display that can be viewed in direct sunlight or adjusted for comfortable night viewing. The Argus 5000 useable viewing area is 1.7 inches wide by 2.3 inches high; the 7000 is 2.1 by 3 inches. While this may seem small, its exquisite sharpness and the close viewing position make it perfect for use as a navigation display.

The Argus Operating Controls



Argus 5000
Control Layout

The **DEP** button places the Argus in the **DEP**arture mode. Additional strokes increase the display range. Holding the button in cycles the display through decreasing ranges.

The **ENR** button places the Argus in the **ENR**oute mode. Additional strokes increase the display range. Holding the button in cycles the display through decreasing ranges.

The **ARR** button places the Argus in the **ARR**ival mode. Additional strokes decrease the display range. Holding the button in cycles the display through increasing ranges.

The **AUX** button acts like a "shift" key. It redefines the operation of the other buttons:

Holding **AUX** while pressing **DEP**arture **SEL**ects facilities for range and bearing display, and for subsequent **IN**formation viewing.

Holding **AUX** while pressing **ENR** causes **INFORMATION** on the facility picked in the **SELECT** mode to be displayed in text form. Holding *both* keys for one second exits **INFO** and returns to the map.

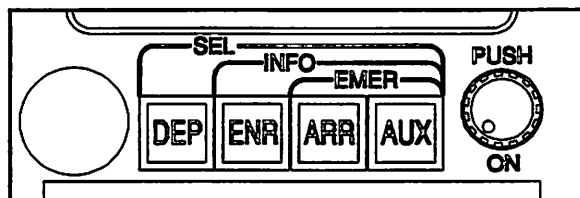
Holding **AUX** while pressing **ARR** places the Argus in the **EMERGENCY** mode. (Or if in **EMERGENCY**, back in normal operation.)

Pressing **AUX** quickly three times or holding it for five seconds places the Argus in the **AMEND/FP** menu. **AMEND** is exited by an **AUX** stroke.

Remote Switch Operation

In addition to the Argus front panel controls, there is provision for external switches to be connected. They individually perform the same functions as **AUX/DEP** and, **AUX/ENR**. They can also be used to enter alphanumeric data in waypoint and flight planning operations. These switches may be installed on the aircraft panel or on the control yoke. A major advantage of having them is that only one switch each need be activated to **SELECT** a facility for on-screen bearing or radial and distance data or for tabular **INFORMATION**. On a crowded screen this can take a while, and can be even more tricky in turbulence. Having individual switches to toggle, or a yoke-mounted two-position switch, makes the job a lot easier.

If you do not have remote switches for the **SELECT** and **INFORMATION** functions, they can probably be installed fairly easily. See your avionics shop or installation agency for details.



Argus 7000 Control Layout

The "PUSH ON" knob is the Argus' **ON-OFF** switch. Pushing this control **IN** applies power to the Argus. Rotating it adjusts the brightness of the Argus CRT and backlit buttons. Brightness is increased with clockwise rotation.

The Argus Screen

TOP WINDOW:

253° Bearing to HAYED intersection, Map oriented to TK, groundspeed is 183kts. 15.4NM to HAYED intersection, 270° ground track, 5 minutes and 2 seconds to HAYED at current speed.

WBW AIRPORT:

Runway 6 and 24 showing.

CYE NDB (selected waypoint):

Box shows aircraft 5.0NM away, at bearing of 236°

BARTY INTERSECTION:

To upper right of aircraft.

SYMBOLIC AIRCRAFT:

Departure mode screen centered on aircraft.

RANGE RING:

Sparse dotted line-indicates distance 5 NM from aircraft.

STAR AND LINE:

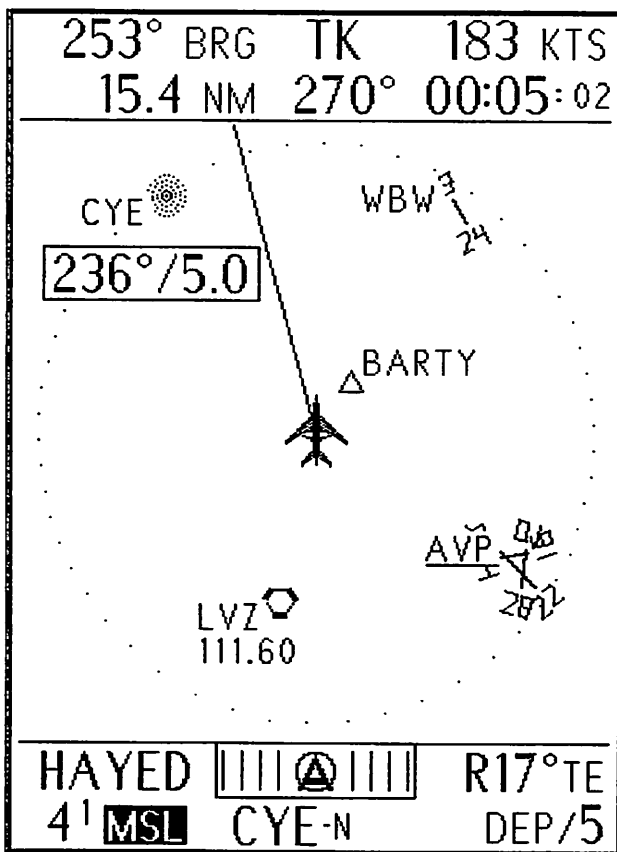
Courseline from aircraft going to (offscreen) HAYED intersection.

LVZ VOR:

VOR symbol with frequency, 111.6 Mhz showing.

AVP AIRPORT:

Multiple runways depicted. Underline indicates airport has tower.



BOTTOM WINDOW:

HAYED intersection is destination waypoint, CDI is showing Argus is navigating and on-course, and aircraft has a Right 17° Track Error. The minimum safe altitude for this area is 4100 feet and surrounding grid squares have obstructions at higher altitudes (reverse video). The selected waypoint is CYE-NDB, and the Argus is using the DEPARTure 5-mile range.

A Sample First Flight with the Argus

LIMITATIONS

ACCURACY OF THIS
DISPLAY IS AFFECTED
BY ITS ASSOCIATED
GPS OR LONG-RANGE
NAVIGATION SYSTEM,
AIRCRAFT HEADING AND
INTERNAL DATABASE.

ADF/VOR APPROACHES
MUST BE CONDUCTED
IN ADF/RMI MODE ONLY.

DEPRESS ANY BUTTON
TO MONITOR SELF-TEST

As an introduction to the Argus, let's take a short flight. Seat belts and shoulder harnesses fastened?

When you turn on the Argus, the first thing you see is the "LIMITATIONS" screen. Please read it now (upper left). After the Argus passes its self test, a second screen (lower left) giving information about the unit is displayed; it reminds you that you must have your charts with you to be legal. This screen also tells you the expiration date of the database. Once you have pressed any button, one of two messages that warn you of difficulties with the GPS may appear. If the GPS hasn't been turned ON, the **LRN DATA LOST** message will appear. If the GPS is ON but hasn't yet

"acquired," you will see the **LRN NAV INVALID** message. Normally these messages will disappear quickly, but they are vital to alert you to system problems and you should be aware of their existence.

ARGUS 5000 MOVING
MAP DISPLAY APPROVED
FOR IFR USE WITH IFR
APPROVED LONG-RANGE
NAVIGATION SYSTEM.
AERONAUTICAL CHARTS
MUST BE AVAILABLE
AS REQUIRED BY LAW.

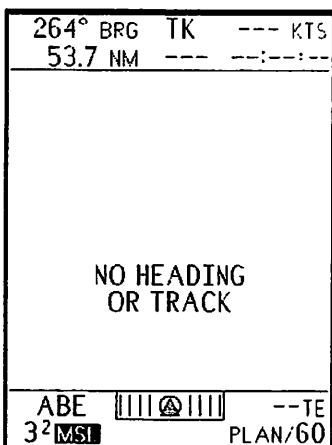
10-APR-96 15:32:29
ARGUS 5000 SN 000001
PROGRAM VER. 05.00
DBASE CONFIG: 29

EFF. DATE: 28-MAR-96
EXP. DATE: 24-APR-96
©1987-96 EVENTIDE INC.

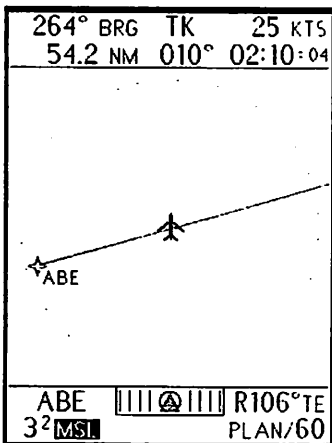
---	BRG	TK	---	KTS
---	---	NM	---	---
LRN DATA LOST				
<div style="display: flex; justify-content: space-between;"> ---MSL ○ ---TE </div> <div style="text-align: center;">PLAN/720</div>				

---	BRG	TK	---	KTS
---	---	NM	---	---
LRN NAV INVALID				
<div style="display: flex; justify-content: space-between;"> ---MSL ○ ---TE </div> <div style="text-align: center;">DEP/I</div>				

So much for the administrative stuff, let's go flying! Our trip today will be from N07 (Lincoln Park NJ) to ABE (Allentown-Bethlehem PA), a trip of some 54 nm. If you're following along with your GPS in training mode at home, set these up as departure and destination waypoints.

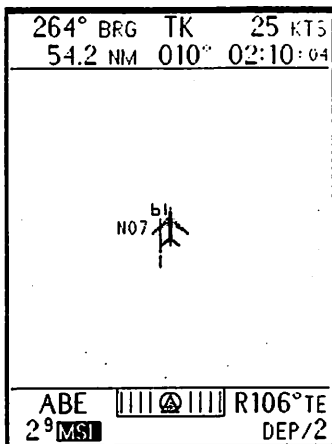


Assuming that the GPS is working and has acquired, the Argus may show a display like that at the left. Note that the bearing and distance to the waypoint (ABE) is given, but the graphic display area shows **NO HEADING OR TRACK**. That's because we're not moving, so there is no track or groundspeed. The mode shown is **PLAN**, because that's always the first display seen. This mode "autoranges" so that the most distant waypoint is always shown at the edge of the screen. Some GPS models will give incorrect position and track information before acquisition. If the Argus is connected to the aircraft compass system, the map will be displayed and oriented correctly even if the aircraft isn't moving.



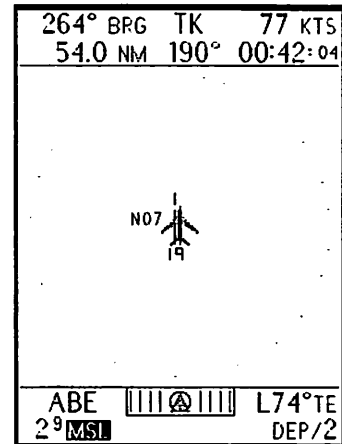
As we begin taxiing to runway 19 (ground TK 010°), the **PLAN** display appears, showing the destination to our left. Depending on the GPS, this display may appear sooner or later during taxiing. It may also appear somewhat erratic while we're on the ground since our speed will be low and the GPS may have difficulty following our tight turns while taxiing. From the **PLAN** mode we can determine how to proceed. We'll be taking off on runway 19, so it would seem that a right turnout would be the best procedure. Note that special use airspace is not shown in **PLAN** mode. When we go to **DEParture**, we'll see that we're under the floor of the New York Class B airspace and near two controlled airports. This will slightly affect the

departure route.

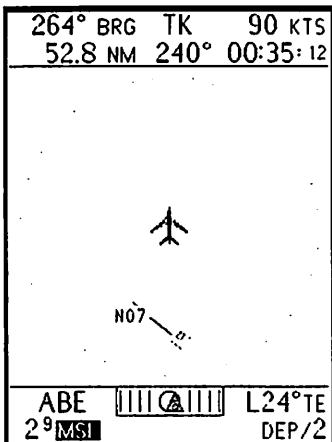


As we switch to **DEPARTure**, we're on the parallel taxiway heading for the threshold of runway 19. The upper left figure depicts us heading for the threshold of runway 19. Note that at our current groundspeed (25 kts) we will arrive at our destination in 2 hours and 10 minutes. Fortunately we won't be taxiing all the way. The CDI shows that we're on-course.

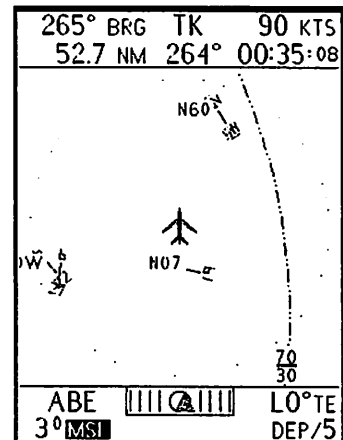
The next illustration shows us just becoming airborne on 19. Our speed has increased to 77Kts and our ETA is a more reasonable 42 minutes. We're still on-course.

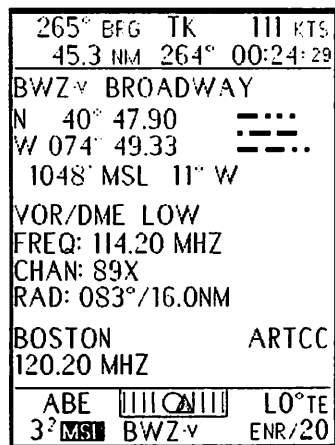
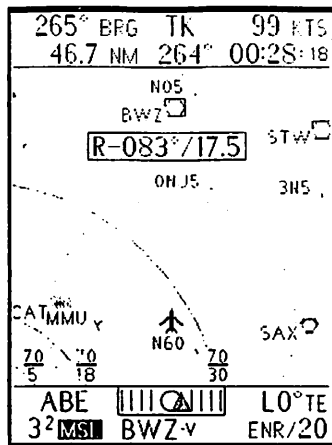
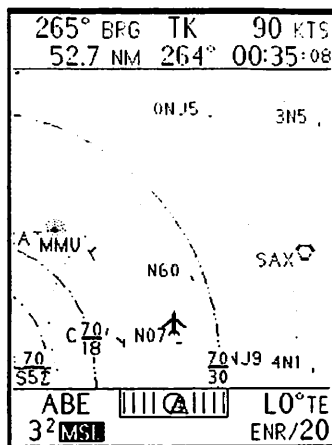


Next, we see the airport behind us as we leave the local traffic area. Note that we're slightly off-course because of the 45 degree turnout, and our speed is up to 90Kts. Also, note that our track error has decreased from 74 degrees to 24 degrees since we made our right turn.

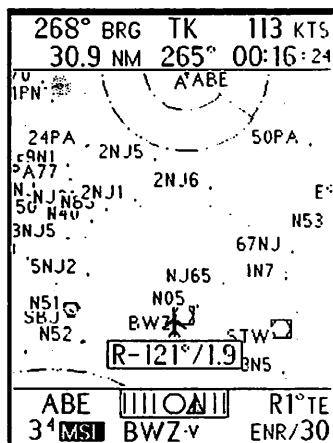


At the right, we've left the airport and switched to the 5 mile **DEPARTure** range. To our left is CDW, a controlled airport we want to avoid. To our right is the New York Class B airspace outer boundary. The legend shows us we must avoid altitudes between 7000 and 3000 feet. We are now heading on-course.



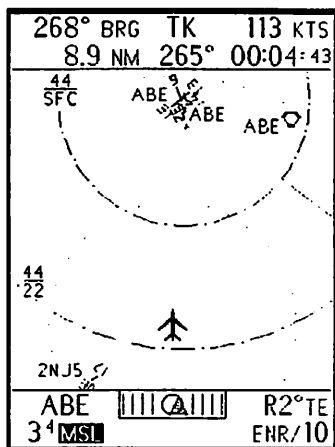
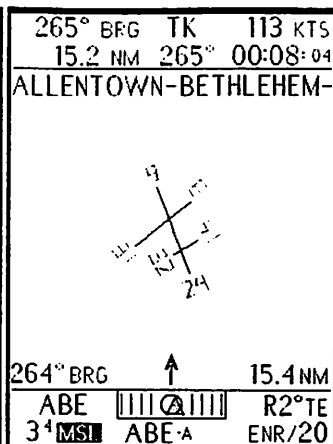
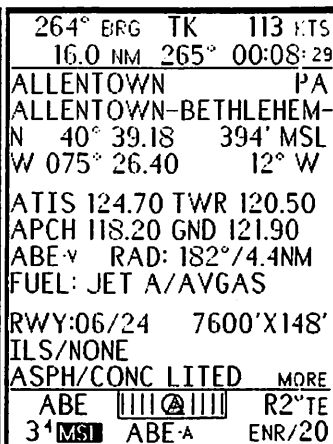
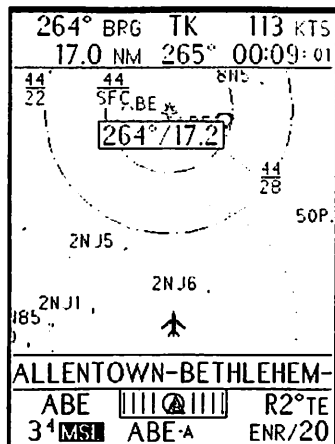


At the top left, we have switched to the **ENRoute** mode. Our position hasn't changed, we've just switched ranges. The 20 mile range shows more of the Class B airspace and, of course, a greater distance ahead of the aircraft.



In the next display, we're a bit closer to our destination. Let's confirm the Argus display with our VOR/DME. (It is always a good idea to crosscheck our Nav sources!) By pressing **SElect**, BWZ VOR is presented. According to the Argus, we are on Radial 083° at a distance of 17.5 nm.

Pressing **INFO** gives us the frequency of the Broadway (BWZ) VOR. We can confirm VOR data by comparing the VOR/DME to the Argus. The numbers should be very close except, of course, at station passage, when the radial on both the Argus display and the VOR indicator will change rapidly. ABE and the surrounding Class C airspace are now visible as we switch to **ENR 30**.

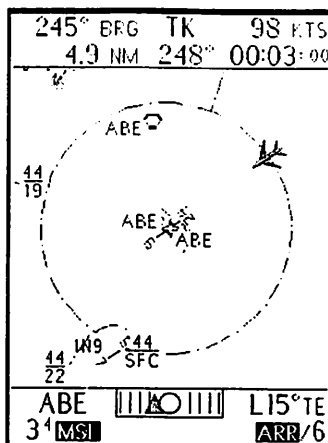
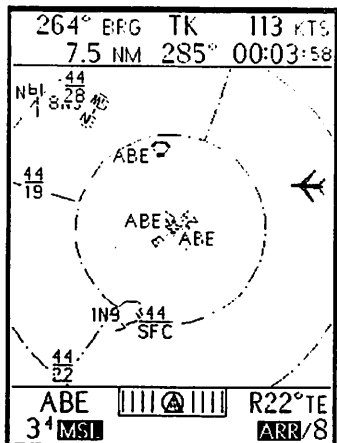


In another five minutes we're within hailing distance of ABE approach. We **SE**lect the airport this time (**ABE-A**, not **ABE-v**) and note that the name of the facility appears briefly above the lower window. (Upper left.)

Press **INFO** to find the ATIS, Tower, and Approach frequencies.

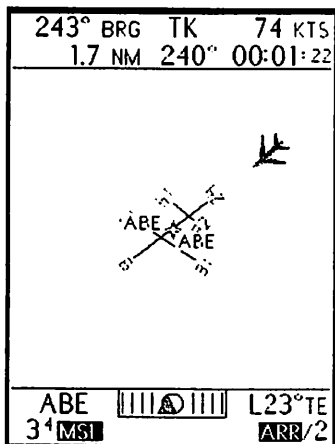
Press **INFO** twice until the **PLAN VIEW** display appears. This display comes up after the last available runway information. Note that we are heading straight toward the airport, and are almost aligned with runway 24.

After listening to the ATIS, we call approach and switch back to **ENRoute** on the 10 mile range. Notice that we have penetrated the Class C airspace. (Above, left.)



We now switch to the **ARR**ival mode. In this case we are using the **AUTO-ARR**ival feature, which allows the screen to automatically expand as we get closer to landing. (**AUTO-ARR**ival is distinguished by the display of **ARR** in reverse video.) Tower asks us to do a straight-in approach to 24,

so we turn 40 degrees to the right to intercept the extended runway centerline. (Upper left illustration.) In the next display, the screen has automatically switched to the 6 mile range, and we're almost aligned with the runway. We're just crossing the 5 mile Class C ring.



Finally, on the **ARR** 2 mile range, we're slowed down and cleared to land.

We hope you've enjoyed your first Argus flight. Remember that, while the manual is a "heads-down" exercise, the real world isn't! The actual time-lapse between the views on this page has allowed plenty of time to look outside. Before flying with the Argus, we hope you'll become sufficiently familiar with it so that you do look outside!

Navigation Data Display . . . The Upper and Lower Windows

In addition to the main graphics screen, the Argus has two "windows" used for the display of data supplementary to the moving map itself. Some of the data is sent from the GPS, and some of it is calculated or presented by the Argus.

BEARING to WPT GROUND TRACK/HEADING GROUND SPEED

190° BRG	TK	142 KTS
39.2 NM	090°	00:16:33
DISTANCE (NM) To WPT		ETE/ETA
THE UPPER DATA WINDOW		

If you have been using a GPS for some time, you are familiar with its ability to present you with basic navigational information. When you begin a trip, you select a waypoint, either by picking it from the GPS database or by entering its coordinates in the "user" database. Once you have done this, the GPS continually updates the Bearing and Distance to this waypoint as the trip progresses. It will also display this information, although it isn't necessarily *always* available since most GPS displays only have a limited number of characters available. Whether or not displayed, the GPS transmits this information to the Argus. Since the Argus has a CRT, we can show this information all the time.

The two left-hand items are the bearing and distance to the *destination waypoint entered into the GPS*. The two numbers are calculated by the GPS and displayed by the Argus.

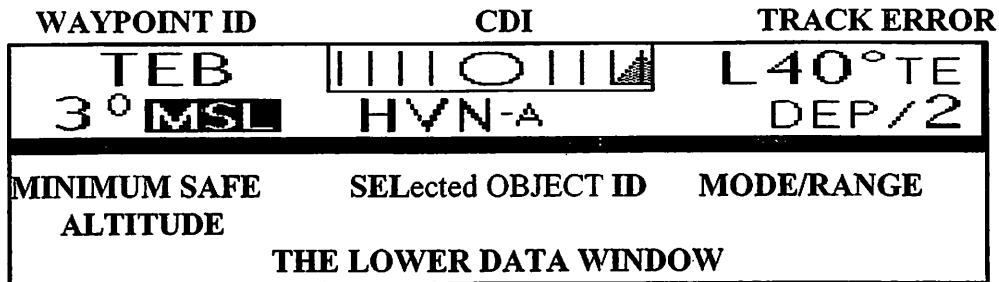
Similarly, the center item, labelled **TK**, is the (magnetic) ground track calculated by the GPS, and the number in the upper right, **142 kts**, is the ground speed calculated by the GPS. If **HEADING** is selected in **AMEND**, the Magnetic heading of the aircraft is shown instead. These numbers are all visible at the same time; many GPS units will show only one or two of these at once. The Argus shows them all.

The final item in the upper window is calculated by the Argus. It is the **Estimated Time Enroute**, and is determined by the Argus simply by dividing the distance-to-waypoint by the groundspeed. The display format is **HH:MM:SS**. Many GPSs also calculate the **ETE**, but this information is not transmitted to the Argus. You can also select **ETA** (**Estimated Time of Arrival**) in **AMEND**, in which case your actual time of arrival at the waypoint will be displayed. **ETA** is calculated by adding the **ETE** value to the time kept by the Argus set in the time setting page of the **AMEND** mode. Thus if the time is 20:00, and you will be at your destination waypoint in 12 minutes, the field will read 20:12. (The time shown is local, not UTC, unless you have set UTC as your **TIME ZONE**.) As long as your speed remains constant, the field will not change, as clock time increases at the same rate as the time to the waypoint decreases. It is normal and correct for this field to read essentially the same as you approach the waypoint, with only small variations caused by changes in groundspeed.

Under certain circumstances, the information fields can be "dashed out", i.e., the numerical information is replaced by dashes "----." This is done when information is either unavailable from the GPS or is meaningless. If you haven't selected a waypoint in the GPS, **BRG**, distance, and **ETE** cannot be displayed. If the aircraft is not moving and you are not using heading orientation, neither **TK** nor groundspeed is displayed since there is none. (And the map graphics are not displayed either, since there is no way of orienting it.) If you are taxiing slowly, or have selected a waypoint in the far distance, **ETE** might exceed 99 hours, and it will be "dashed."

The Lower Window

The lower window has six additional data fields:



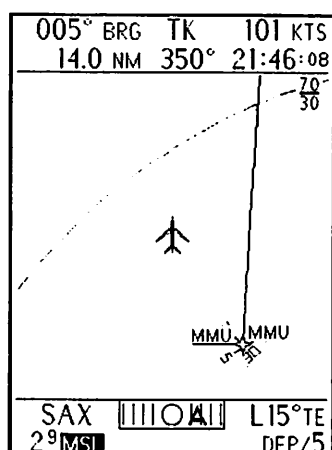
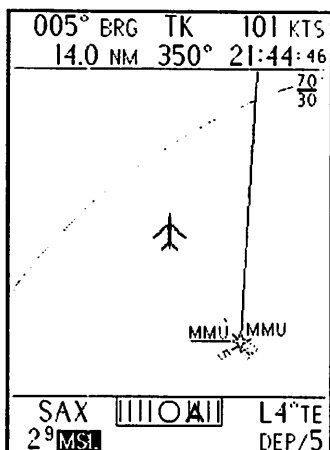
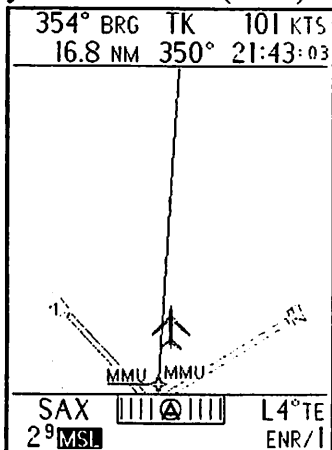
In the upper left corner, the destination waypoint identifier is displayed. This is transmitted to the Argus by the GPS, or selected in the Argus flight planning mode. It can be up to five characters.. (Some receivers, such as the II Morrow 612 LORAN, don't transmit the alphabetic characters, although the numerical information is still present. If the characters are unavailable, the field is left blank. Refer to the Appendix to see what is available from the compatible receivers.)

In the center of the top line of the lower window is a simulated **CDI** (Course Deviation Indicator). This indicates how far off-course you are; the number is obtained from the GPS-computed "crosstrack distance" or by the Argus when in flight planning mode. This CDI may be available on the GPS display, but only by sacrificing some other information. The Argus shows how far off-course you are, either symbolically with the triangle as shown above, or by placing a number in the CDI position. When the triangle is present, it also serves as a **TO/FROM** indicator. The illustration above indicates that you are off-course and should fly to the right. The display **R 9.0NM** would mean that you are 9 nautical miles to the left of course, and should fly to the right to get back on course. The **DIGITAL** selection for the CDI always tells you how far off-course you are in nautical miles. The triangle's scale factor depends upon the setting you selected in the **AMEND** mode. When you use the Argus FP software, detailed in Section 5, the Argus calculates and displays some of the information that would otherwise come from the navigation receiver.

On the right of the top line is the computed Track Error.

Your "track error" can be selected in the second AMEND page to be the difference between your current track and either the desired track between your starting point and your destination or the bearing from your present location to your destination. The first is selected as DTK-TK, the second as BRG-TK. They are equivalent if you are on your original course or flightplan; they differ if you drift or deliberately go off course, as might occur if you want to fly parallel to a particular course.

Example: A leg of your flightplan is from MMU to SAX, a distance of 16.8NM on a course of 354 degrees. The first screen below shows you essentially on-course. Your course is 350 degrees, and the bearing to the destination is 354 degrees, so you have a L4°TE, which means you should turn right 4 degrees to be on course. The next screen shows you substantially off-course. If you select DTK-TK, as on this screen, you have the same track error, even though the bearing to the waypoint is now 005°. Selecting BRG-TK on the third screen shows a track error of L15°TE, which is the difference between your current track (350°) and the track that will get you to your destination (005°).



To summarize, select DTK-TK if you want to fly parallel to a particular course. Select BRG-TK if you want the track error display to show you how much and in what direction you need to turn to get to your destination waypoint. The bottom line of the lower window shows information generated by the Argus. On the right is the (MODE) / (RANGE). The possibilities are **DEP**, **ENR**, **ARR**, **PLAN**, and **EMER**,

followed by a number giving the distance in nautical miles to the outer range ring. In addition, in the **AUTO-ENR** and **AUTO-ARR** modes, the **ENR** and **ARR** characters will be displayed in reverse video. This indicates that the range is being selected automatically. (See **ENR**oute mode and **ARR**ival mode.)

The center of the bottom line is reserved for the identifier of a **SE**lected object. Using the **SE**lect mode, you can pick any facility on the screen and determine its range and bearing (or radial, if it's a VOR). The identifier of the selected object is shown in this space, along with a character indicating what kind of facility it is. Note that you cannot select a waypoint that exists only in a flightplan with this feature, since these waypoints can and frequently do exist apart from any "object." If, for instance, your flightplan goes from VOR ABC to airport XYZ, and nav aids are turned off in **AMEND**, you can select XYZ but cannot select ABC.

HVN-A is an airport, **LGA-v** is a VOR/DME, although the symbol **v** could also designate a VOR or VORTAC. Non-directional beacons (NDBs) are designated **-N**, TACANs **-T** and fan markers **-F**. LOMs and LMMs are identified by their full five-letter name. Note that the NDB which is colocated with the marker beacon symbol appears with a one- or two-letter identifier on the graphics screen. Additional suffixes are listed in the **SELECT/INFO** description.

The final data field, Minimum Safe Altitude, is explained in detail on the next page.

Minimum Safe Altitude Display

The information in the lower left corner of the lower window gives a minimum safe altitude figure in feet above MSL (mean sea level). The display format is the same as that on the sectional charts: The larger number is thousands of feet, the smaller is hundreds. 5⁵ means 5,500 feet. The number is calculated from a database of sectional chart grid square altitudes, and is intended to provide information that will help you maintain an altitude that is comfortably above terrain and obstructions. There are two features of this display that give you the information needed:

- ! The **number itself**. This is the Minimum Elevation Figure for charted obstruction and terrain clearance determined by the Argus plus a one thousand foot margin.
- ! Whether "MSL" (Mean Sea Level) is in **reverse video**. Reverse video indicates that there is higher terrain or obstructions within a certain distance of your aircraft.

The **number itself** is a composite determined from sectional grid squares surrounding your present position. The Argus looks at the MEF (Maximum Elevation Figure) of your present sectional grid square, and also at the MEF of other grid squares near your present position. If the range displayed on the Argus is **greater than 10 miles**, then the MEF of any grid square within 10 miles of your present position is considered. If the range displayed on the Argus is **10 miles or less**, then only grid squares which have any portion within the display range are considered.

Once the Argus determines which grid squares are "near" by this definition, it simply takes the highest MEF in the group and adds one thousand feet as an additional margin. Therefore, if you fly at or above this displayed altitude, you will clear charted obstructions and terrain by at least one thousand feet.

The Argus puts **MSL in reverse video** when there is a higher MEF (potentially) within 60 miles of your present position. This is an indication that you may have to climb to reach a safe altitude. To make this determination, a circle of 60 mile radius is drawn around your aircraft and the highest MEF of sectional grid squares that fall in whole or in part within this circle are considered. If this MEF exceeds the number displayed, i.e., if there is potentially a higher obstruction within 60 miles of your aircraft, **MSL** is displayed in reverse video. If you actually get close enough to the area where the obstruction lies, the displayed number itself will increase, reflecting the new obstruction altitude plus the 1000 foot added margin

Note that these two aspects of the display are dependent solely upon the **position of the aircraft**. Even if you are flying at 40,000 feet, the altitude figure will reflect "nearby" obstructions, and whether the **MSL** is in reverse video reflects potential obstructions above the composite MEF of your present location.

As with everything else in aviation, you have to be aware of the limitations of this altitude display capability. One limitation is geometric. While grid squares encompass many square miles, you don't have *absolute* assurance that the displayed number gives you a good buffer. If the Argus range you selected *just happens* to be a bit short of the corner of a nearby grid square that has an obstruction in that corner, you can get as little warning as the range selected on the Argus. Of course, the reverse video figure will still alert you that there are higher obstacles within 60 miles, but there is no substitute for flight planning!

The second limitation is time dependent. The database is current as of the date shown on the screen. But the sectional chart from which the data were derived may have been as much as six months old. And, of course, you may have had the database for a while. Skyscrapers can be built in months; radio towers in days. If you are contemplating low altitude operations, check your NOTAMs and current sectionals as necessary.

Heading and ADF Operation

All the information displayed so far comes from the Argus and associated navigation receiver. Additional capabilities are available by connecting ("interfacing") the Argus to other aircraft instruments and systems. Some of these interfacing capabilities are built into the Argus, others require optional "adapters" available from Eventide. Normally your avionics shop will take care of the details of connecting and/or installing additional instruments or sensors. However, it is a good idea to understand the basics so that you can confirm that your Argus has been connected as it should be, and to be able to ask good questions or to describe any difficulties if you think it hasn't been.

Heading Interface

Aircraft HEADING is determined by a magnetic compass. The compass tells you which way the nose of the aircraft is pointing, which is not necessarily the same direction as the aircraft is travelling over the ground due to the wind. GPS and other long range navigation systems will normally only give you your GROUND TRACK (TK). The Argus can read heading information from magnetic heading instruments such as slaved compasses and horizontal situation indicators (HSIs) providing these instruments provide an output signal in "synchro" form. The Bendix/King KCS-55 is one of the most popular indicators, Collins, Sperry and others also make compatible instruments. In some cases the instruments will require an option known as a "bootstrap." If the Argus is connected to a heading sensor and you have selected HEADING instead of TRACK in AMEND, the map will be oriented by the heading system instead of ground track.

ADF Interface

The direction to an NDB (Non-Directional Beacon) or other low frequency radio source is determined by the aircraft ADF (Automatic Direction Finder). The ADF indicator has a needle that points in the direction of a pilot-selected signal source. In addition, the indicator frequently has a compass card behind the ADF pointer that is oriented to the magnetic heading of the aircraft. An indicator with both the ADF pointer and slaved compass card is called an RMI, or Radio Magnetic Indicator. This indicator can be used to make NDB approaches. As with the heading source, the Argus can be connected to compatible ADF receivers and can display the ADF bearing

pointer in several ways. To be able to do so, the ADF receiver must provide the Argus with data in one of several available formats. Some of the more popular compatible ADF receivers are the Bendix/King KR85 and KR87, and the Collins 650 and 650A.

Assuming proper connections, the Argus can display ADF, Heading, or both. You can choose to display ADF information superimposed on the moving map, or to display it by itself. This section illustrates how the Argus display is modified when the various ADF and Heading options are selected for display.

Important note:

The Argus is approved for conducting NDB approaches only in the ADF MODE, and only when the Argus is connected to both ADF and Heading sources. You cannot conduct an NDB approach in any map mode.

The standard Argus has the circuitry and software necessary to interface with many aircraft Heading and ADF sources. Eventide also makes optional adapters that allow the Argus to interface with and display information from other instruments. These products, if installed in your aircraft, will have their own supplements or have pages inserted in this manual. Here is a brief summary of the products available.

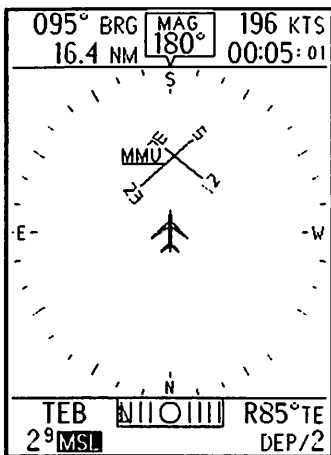
- ! Weather Display adapter, model WDA5005/WDA7005. This unit allows you to remove the display head of a Stormscope WX10/A or WX11 and connect its cable to this adapter. The Stormscope information can then be displayed on the Argus. If heading information is available (see above), the Stormscope display can be heading-stabilized even if the original Stormscope display was not.
- ! Weather Display adapter, model WDA5007-05/WDA7007-05. This unit is designed to work with the Stormscope model WX1000E (with 429 EFIS option). It uses an available output from the Stormscope and does not necessarily replace the display, although it can be used to do so.

- ! RMI adapter model RAA 5007-01 and RAA 7007-01. The Argus without this adapter can accept data from the Heading source and from one ADF. Using this adapter gives the Argus the capability of displaying two pointers on the screen, representing a pilot-selected combination of up to two VOR and two ADF pointers.
- ! ARINC adapter RAA 5007-00/RAA 7007-00. Some nav systems, especially those designed for use in jet and transport aircraft, have an output using the ARINC format. This adapter will accept data from many of these units and convert it to a format that the Argus can interpret and display
- ! Combination adapters. The Weather Display and RMI adapters are available in combination with the ARINC adapter for a more compact and simpler physical installation.
- ! Third-Party products. Shadin manufactures a fuel-flow and airdata sensor that can use the Argus as a display. Other vendors' products may be available in the future. See the Terminal Mode section of this manual for more information.

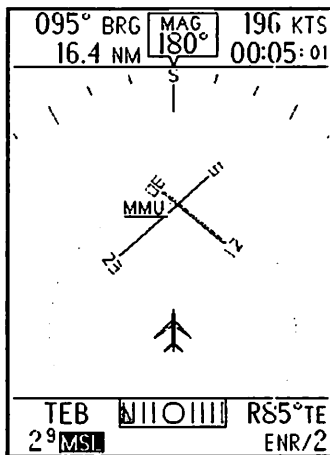
Further information is available from Eventide. Please do not rely on these thumbnail descriptions to select these products. Rather, discuss your needs with your avionics shop or with us.

Heading Display

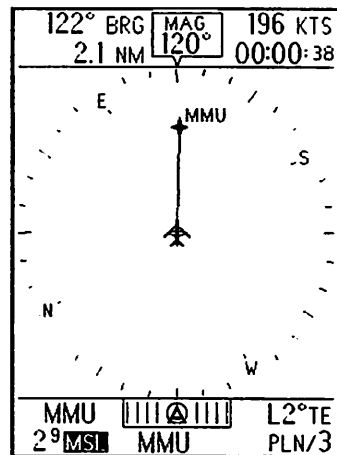
To orient the Argus map to Heading instead of track, you pick **HEADING** under the **ORIENTATION** selection of the second **AMEND** page. If the Argus is connected to a heading source, and the heading source is valid (not flagged), the center of the upper window will display **MAG**, and immediately underneath it will be the aircraft heading in degrees. In addition, a compass display will appear on the map screen. The following illustrations show how the compass appears in the various map modes.



Compass appearance in
DEPARTure mode



Compass appearance in
ENRoute mode



Compass appearance in
PLAN mode

In keeping with the philosophy of the modes, both **DEPARTure** and **PLAN** show the full 360 degrees of the compass. The **ENRoute** mode only shows approximately 80 degrees of the compass, centered on the aircraft heading. No compass is shown in the **ARRival** mode since the map is always north up.

There are several advantages to using magnetic heading orientation instead of ground track. The first is speed. When you are using a long-range navigation receiver, it determines your ground track by looking at your current position and your previous position, and calculating the direction you are travelling by the difference between them. Due to noise and other uncertainties, it is desirable to average several position points when deriving your track. This process requires time: a few seconds for modern GPS receivers, many seconds for Loran and other navigation systems. During this

time, if you maneuver the aircraft, the map orientation will lag behind, and you will not immediately have a good picture of your direction of travel. Heading is updated almost instantaneously, and the map response is correspondingly better, especially on the lower ranges that are used when maneuvering in a traffic pattern or under ATC control.

Another advantage of using magnetic heading is that it is always available. Nav receivers depend upon aircraft motion to determine your track since, by definition, you don't have one when you are standing still. If you taxi slowly, GPS track can be erratic and Loran track nonexistent. Hence, heading orientation is very useful while on the surface of an airport.

Flying while heading-oriented gives you an excellent picture of the wind direction and velocity. If you set the Argus or your GPS for a destination and select a courseline to be displayed, the courseline will go from the symbolic aircraft to the destination. If you are oriented to heading, the courseline will, except in the case of a direct head- or tailwind, be slightly offset from straight ahead. The degree of difference is due to the amount of wind correction you must apply, and the visual depiction of this angle on the map display is potentially useful.

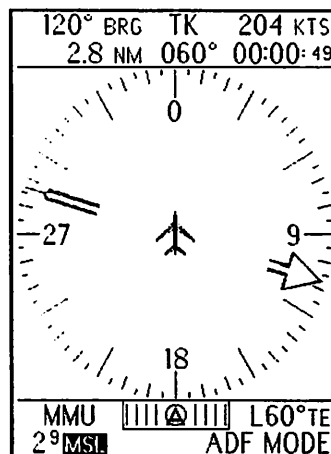
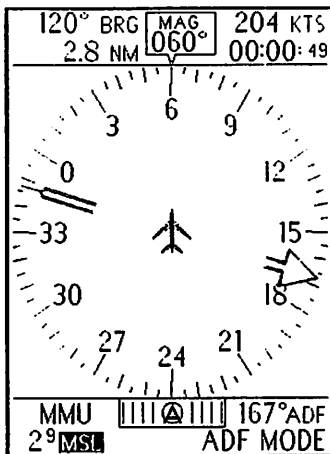
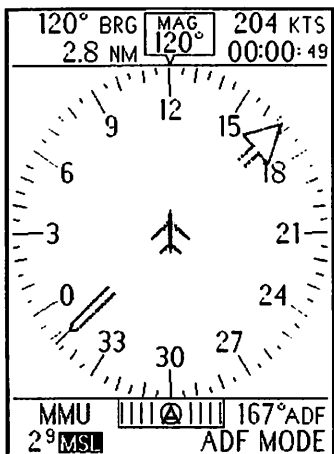
ADF Display

The first line of the first AMEND page selects under which circumstances you wish to display the ADF pointer. You can show it in PLAN ONLY, MAP ONLY, MAP AND PLAN, or you can select ADF MODE, in which case nothing but the ADF is shown. (Of course, you can choose not to show the ADF at all.)

Because the Argus can replace, as well as supplement, the ADF indicator, there is a choice that can be made when installing the Argus that causes it to automatically power up in the ADF mode. This is required for FAA approval, and is a good idea, since a pilot unfamiliar with your aircraft may not know how to select the ADF mode on the Argus and hence may be deprived of its use. If you select ADF MODE in AMEND, the Argus will always power up (and remain in) ADF MODE. If you select any other ADF option and the Argus is programmed to power up in ADF MODE, you can go into your selected mode simply by entering and exiting the AMEND mode without changing anything. The easiest way to do this is with four quick presses of

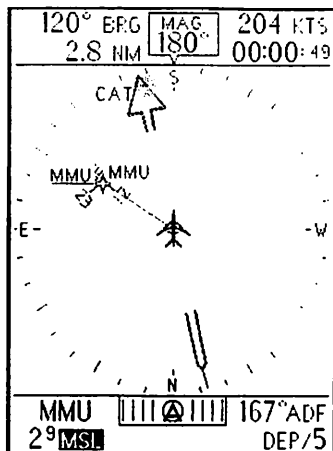
AUX.

Below are three illustrations of ADF mode. Note that in the first two, the ADF needle is pointing toward 167 degrees on the compass card, and remains there as the aircraft turns. Also, the lower window digitally shows the ADF reading above the Argus mode annunciator.



It is possible (but unusual) for the ADF to be connected to an Argus with no heading source provided. In this case, the ADF pointer will still respond to the ADF receiver, but the compass "card" will read 0 (North heading) and the digital ADF indicator will revert to the TE (track error) readout. This is depicted in the rightmost screen.

As with the compass, the ADF is displayed differently in the various map modes. In DEParture, the full 360 degree view will always show the head and the tail of the ADF pointer. In ENRoute, only the forward 80 degrees of the compass is visible, and the head (or tail) of the ADF pointer will only be visible if it happens to be within that range. In the arrival mode, which is always North up, a vector is drawn from the symbolic aircraft as it moves on the screen towards the selected facility.

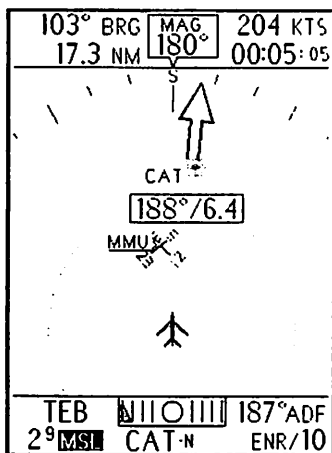
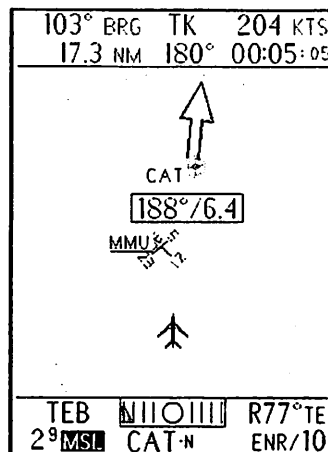


In this DEPARTURE mode view, the ADF is pointing at CAT, which is at a heading of 167 degrees, as shown on the digital ADF readout.

The aircraft is heading 180, so the CAT NDB is slightly to the left of the aircraft's course.

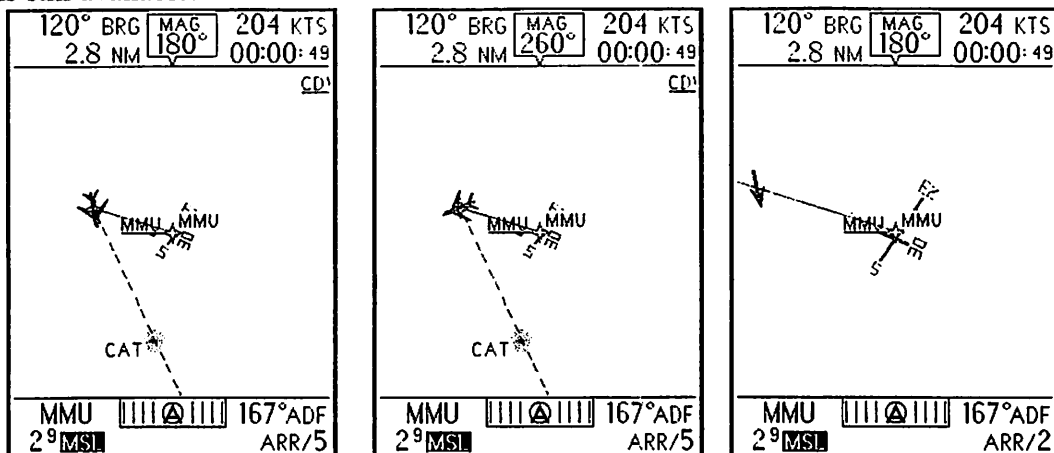
To the right is an ENRoute ADF display with TK instead of heading. In this case CAT has been selected and the Argus has

calculated bearing and distance to the NDB. The ADF pointer, which is controlled by the completely independent ADF receiver, agrees closely with the Argus calculation. This type of display, in which two nav sources agree, is a very useful "sanity check." If you encounter a situation in which sources disagree, it is wise to determine the cause of the problem before continuing with an approach. Perhaps the ADF is tuned incorrectly or there is a problem with the navigation receiver, both potentially serious problems.

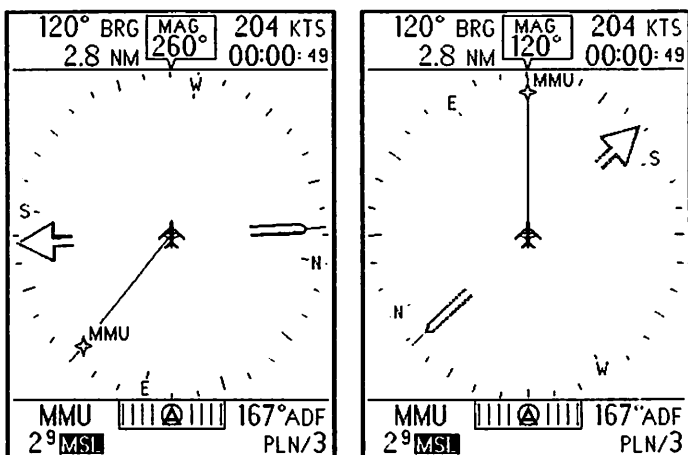


To the left is the same display, this time with heading activated. Note that, because the NDB is within a few degrees of the aircraft heading, the head of the pointer is shown. If it were off the screen, the digital ADF indicator, here reading 187 degrees, would still be available.

In the ARRival mode, there is no ADF bearing pointer. Rather, a vector is drawn from the aircraft to the NDB. Note that in the two examples below, the vector remains pointed at the NDB even though the aircraft has changed its heading. In the third screen, the aircraft is off the screen, and no vector is drawn, although the digital ADF is still available.



In the PLAN mode, the ADF works much as it does in the DEPARTure mode. Of course, neither the airport nor the NDB is visible on the display, but the symbolic aircraft and the courseline are present, as is the compass rose and the ADF pointer. The ADF continues to point to the facility even though it is not depicted.



Section 3: The MAP

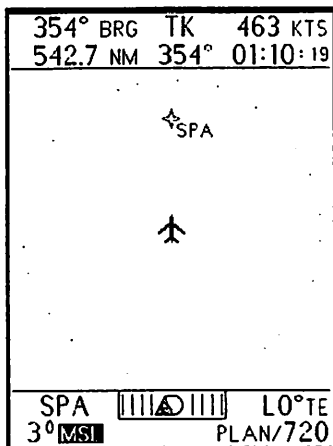
The Argus can display your position and surrounding airspace and facilities in several different formats, and you will spend most of your time using one of these formats. We refer to them as "modes," and they are detailed in this section.

- ! The PLAN mode, in which the aircraft and flight plan or destination waypoint are displayed by themselves on a screen with no airspace and no facilities. This mode gives you a long-range view.
- ! The DEPARTURE mode, which gives a 360 degree view of the surrounding airspace and facilities, oriented in the direction of travel. Allows viewing up to 40 miles in all directions.
- ! The ENROUTE mode, which gives a view directly ahead of the aircraft, up to 240 miles.
- ! The ARRIVAL mode, which gives a view of up to 40 miles from your destination waypoint. This view is presented NORTH UP.
- ! GROUND NAVIGATION views, which apply to all modes, and which show fine detail (.5 to .1 mile ranges) when the aircraft is on the ground.
- ! PLAN VIEW mode, which shows selected airport layout, and the aircraft's position with respect to the airport.
- ! EMERGENCY mode, in which information critical to finding a landing facility, reporting your position to ATC and communicating your situation is automatically presented.

Note as you read this section that, despite the *names* of the modes, any mode can be used in any phase of flight at your discretion.

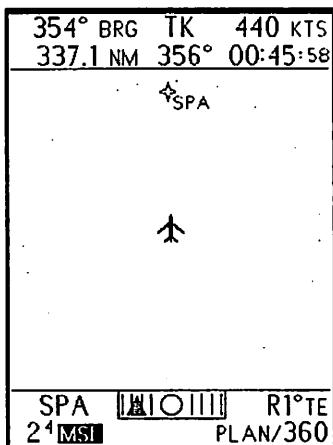
PLAN Mode

When the Argus has completed its selftest, it will enter the **PLAN** mode when you press *any* button. **PLAN** mode gives you an initial view of your route of flight. The symbolic aircraft (your current position) is centered on the screen. Depending upon your GPS model and its setting, you might see either one waypoint or several. If you have selected courselines in **PLAN** on the second **AMEND** page, you will see the symbolic aircraft and the waypoint(s) connected by a line.

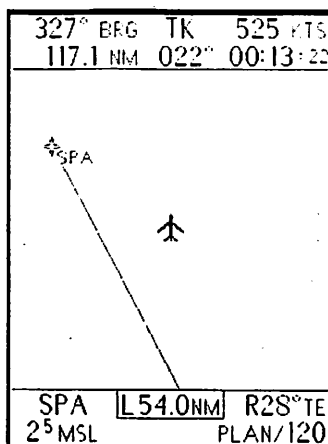
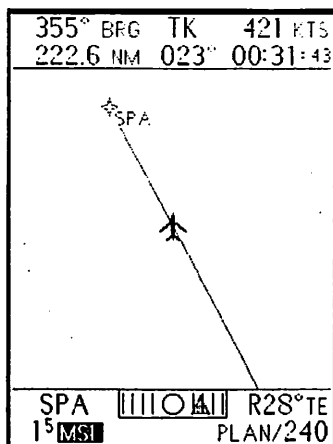


The **PLAN** mode autoranges so that the most distant waypoint is on the screen and as close to its edge as possible. The maximum range of the **PLAN** mode is 9999 nm, which allows it to display almost any conceivable trip in its entirety.

If the Argus is not integrated with the aircraft heading system, no waypoints or courselines will be displayed until the GPS has acquired and the aircraft has reached a sufficient speed to provide ground track information. This is true of all modes of operation; it is particularly worthy of note in **PLAN** since this is the first mode accessed.



In addition to entering **PLAN** after Argus warm-up, **PLAN** may also be entered from the **DEParture** mode by depressing the **DEP** button once beyond the 40 mile range or holding it down to step backwards below the 1 mile range. The screen sequence depicts an aircraft getting closer to its destination. The first screen shows the aircraft 542.7 miles away, and **PLAN** at the 720 nm range. The next screen has autoranged to 360 nm. For the third, the courseline display is **ON**, and we've made a right turn in the aircraft. The final screen

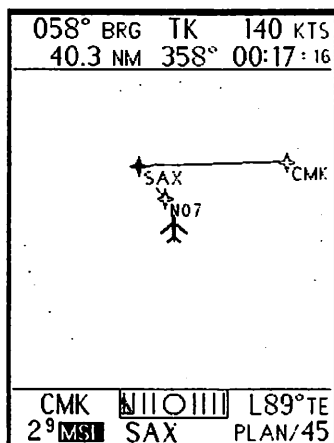


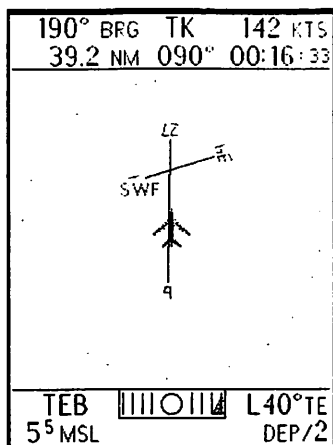
shows that we've strayed far off-course. The CDI has been set to DIGITAL to display exactly how far.

Multiple Waypoints in PLAN Mode

The screen below shows a multiple waypoint flight plan in the **PLAN** mode. Because the courseline is turned ON, the waypoints are connected. Note that the second waypoint star from the aircraft is "filled in." It has been **SE**lected by pressing **AUX** and **SEL**. (See **SE**lect and **IN**formation mode description.) If we enter the **ARR**ival mode after selecting a **PLAN** waypoint, this waypoint will become the center of the **ARR**ival mode screen. As long as this waypoint is selected in **PLAN**, **ARR**ival will

remain centered at that waypoint when entered from any mode. If no waypoint is selected in the **PLAN** mode, then the current GPS "TO" waypoint will be the **ARR**ival mode waypoint as usual. If you have selected a waypoint, and wish to revert to normal **ARR**ival mode operation, all waypoints can be deselected by cycling one press of **SE**lect beyond the end of the plan.





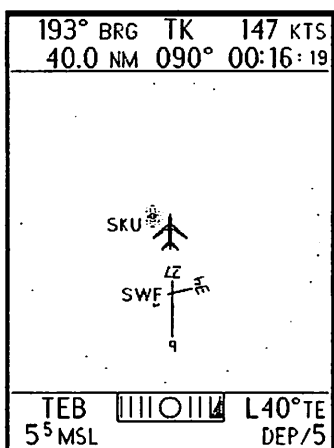
DEPARTure Mode

Depressing **DEPARTure** activates the departure display, in which the symbolic aircraft is located in the center of the screen. The selected range is shown at the bottom-right hand corner of the lower window. The screen ranges available sequence with each depression of the **DEP** button as follows:

1 2 5 10 15 20 30 40 PLAN and back to **1**

The sequence may be reversed by holding the **DEP** button. This requires attention. Many users find it more convenient to go to shorter **DEPARTure** ranges by pressing the **ARR** button twice and then quickly going back to **DEP**.

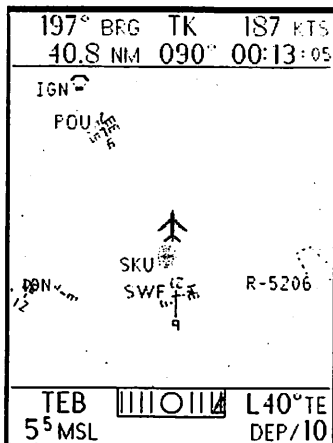
Note that when taxiing below 25 kts, additional ranges of .1, .2, and .5 mile are available for showing more detail, such as user waypoints on the airport, given sufficient GPS accuracy.



In the **DEPARTure** mode, a full 360 degree view is provided so that you can see where you've been, as well as where you're going. This is especially helpful when maneuvering in the vicinity of an airport before you've established yourself on your final course. The 2 mile range, upper left, shows an aircraft taking off from SWF. The airport layout is clearly visible.

In the screen to the left (5 mile range), the aircraft has progressed beyond the airport boundary. Because of the 360 degree view, orientation with respect to the runways is still shown, as is the NDB ahead.

On the screen to the left, the 10 mile view shows all the airports and nav aids in the

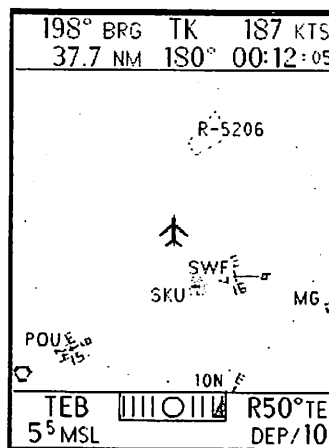


vicinity. The pilot remains fully oriented with respect to the departure airport.

Finally, after making a right turn, the airport environment is still shown, although the only feature that would be shown in the **ENRoute** mode at this time is the small restricted area.

The **DEPARTURE** mode ranges, 1 through 40 miles,

show a lot more than is visible in the comparable **ENRoute** modes. The range is calculated from the symbolic aircraft to the range ring in any direction; the actual diameter of the range ring is almost twice the corresponding diameter in the **ENRoute** mode. Therefore, you will probably want to switch to **ENRoute** once you've reached an altitude and position where facilities behind you are of little interest.



DEPARTURE vs. ARRIVAL MODE

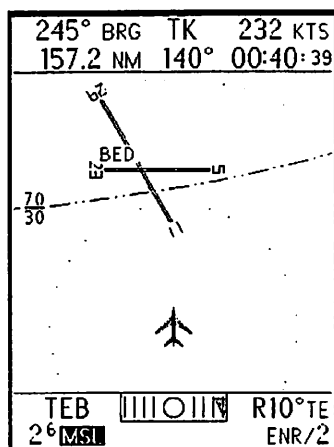
The mode names, **DEPARTURE** and **ARRIVAL** imply that you should use them when departing and arriving. However, depending on the flying you do, you might wish to substitute one for the other. The north-up orientation of the **ARRIVAL** mode feels more comfortable to pilots accustomed to instrument approach plates. The intuitive orientation of the **DEPARTURE** mode may orient the VFR pilot more quickly. Either mode can be used whenever desired.

ENRoute Mode

Depressing **ENRoute** invokes the enroute display, in which the symbolic aircraft is located 20% above the bottom of the screen. The distance from the aircraft to the outer range ring is adjustable from 1 nm to 240 nm by successively pressing the **ENR** button. (The inner range ring represents half of each distance.) The selected range is shown at the bottom right-hand corner of the lower window. The sequence is:

1 2 5 10 15 20 30 40 60 90 120 180 240 AUTO and back to **1**

.1 .2 and **.5** mile ranges also appear when taxiing below 25 kts.

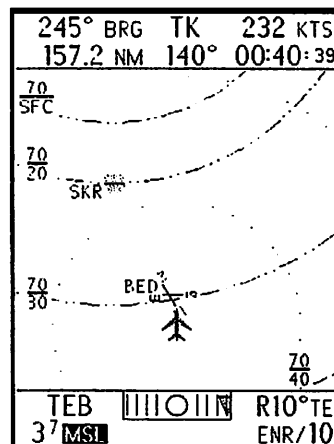


The sequence may be reversed by holding the **ENR** button. This requires attention. Many users find it more convenient to go to shorter **ENRoute** ranges by pressing the **ARR** button twice and then quickly going back to **ENR**.

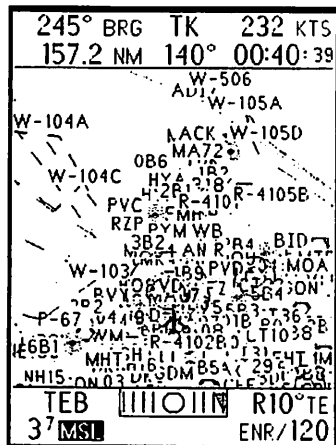
ENRoute will be used during most of your flying. It has the widest selection of ranges, and your selection of range will be largely determined by the area in which you fly.

The 2 mile range, upper left, clearly shows the location, identifier, and layout of **BED** (Hanscom Field). The runway designations are easy to read at this distance, and the altitude restrictions of the Boston Class B airspace are clearly depicted.

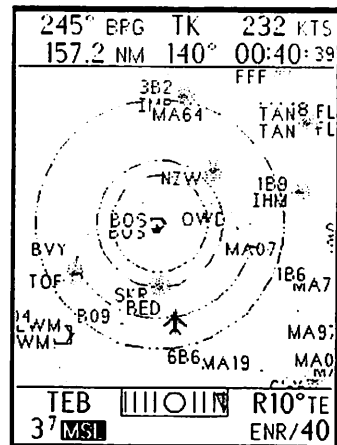
Stepping to the 10 mile range, the airport shrinks and the structure of the Class B airspace is clearly visible. The altitude restrictions are still clearly readable. The 10 through 20 mile ranges are convenient ones for maneuvering through Class B and Class C airspace and other congested areas.



Using the 40 mile range (right), one can see the entire Class B area including the central airport. However, altitude restrictions are no longer displayed (to reduce clutter) and airports essentially appear as dots due to scaling.



Using ranges beyond 40 or 60 in the crowded Northeast increases screen clutter so much that the display becomes unusable. The 120 mile display not only shows the Class B airspace (which you can barely see) but it extends out into the Atlantic Ocean, where you can see the various Warning Areas and ADIZ boundary lines. Using the 240 mile range from out at sea actually defines the coastline! If you fly in the West, the 120 mile range will be quite useful. If you fly in Alaska, even the 240 mile range can seem sparse at times.



AUTO ENRoute Mode

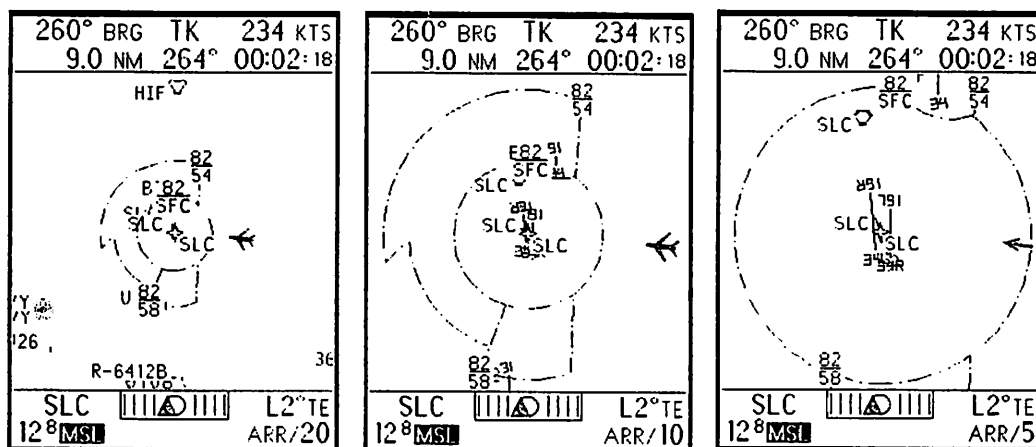
The "range" between 240 and 1 is automatically selected and places your next waypoint or your destination waypoint as far from the symbolic aircraft as possible while still allowing it to remain on the screen. As you get closer to the waypoint, the range automatically decreases to provide an expanded view. The **AUTO ENRoute** mode can be distinguished by the **ENR** legend being shown in reverse video.

Hints for Using Larger Ranges

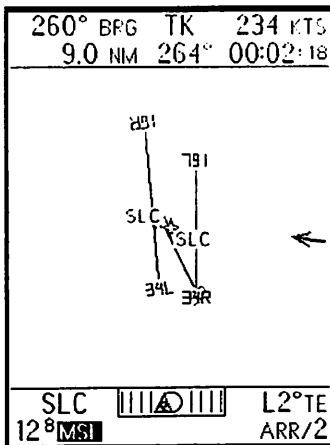
If you're flying a plane that needs a long runway, deselect the airports below your minimum runway length (see **AMEND** mode). During night flight, deselect airports without runway lighting to get a greater useful range.

ARRival Mode

Both the **DE**Parture and **EN**Route modes place the aircraft at a fixed location on the Argus screen, and the map continually reorients to the position and track of the aircraft. The **ARR**ival mode presents an entirely different picture. When activated by pressing **ARR**, a *stationary* map centered on the *destination (or intermediate) waypoint* is placed on the screen. The scale of the map is determined by the range selection, and the symbolic aircraft (or an arrow, if the aircraft would be off-screen,) "flies" around on the map. The map orientation is true-north UP, and the direction of the arrow or symbolic aircraft represents the aircraft's track. Here we see an aircraft approaching SLC.



As the **ARR**ival screen is ranged from 20 to 10 miles, the screen expands and the aircraft, stationary on the map, moves out from the center. In the 5 mile range, the screen expands again. The aircraft is now off the screen at 9 miles from SLC. Since it can't be depicted on-screen, it's drawn as an arrow at the side of screen. The tip represents the aircraft's direction, and its location on the side of the screen is at a point where a line drawn from the arrival waypoint to the aircraft would intersect the screen.

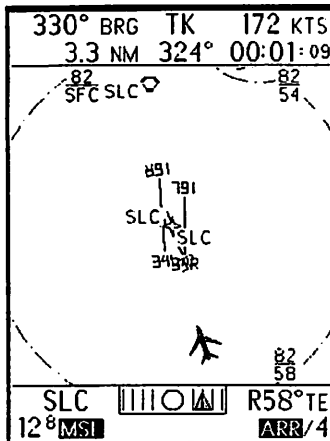


At left we expand to the 2 mile range. The arrow remains in the same location.

ARRival Ranges

Unlike **DEP**arture and **ENR**oute, pressing the **ARR** button *decreases* the area covered by the screen, on the theory that as you get closer, this is what you'll want to do. Holding the button down reverses the sequence. These are the available ranges:

40 30 20 15 10 5 2 1 AUTO. (.5, .2, and .1 mile ranges also appear when taxiing at less than 25kts.)



The "reverse action" of the **ARR** button is convenient for changing scales in the **DEP** and **ENR** modes. Say you want to go from **ENR 15** to **ENR 10**. You might find it more convenient to give **ARR** two quick presses and then press **ENR**. The Argus will then cycle (very quickly) from **ENR 15** to **ARR 15** to **ARR 10** to **ENR 10**. With practice, this takes much less time than either cycling through all the **ENR** ranges or holding the **ENR** button for over a second.

Another feature of the **ARR**ival mode is its **AUTO** ranging ability. In **AUTO**, the range is automatically adjusted (between a 40 to 1 nm range) so that the symbolic aircraft is as close to the edge of the screen as possible. This gives the most expanded view of the destination waypoint. For smoothness, many more ranges are allowed. **AUTO ARR**ival can be distinguished by the **ARR** legend appearing in reverse video in the lower right corner of the display.

The arrival waypoint can be temporarily changed by certain Argus operations. See the manual sections on PLAN VIEW, SEL/INFO, and PLAN MODE explanations for a full explanation.

Despite its similarity to an "approach plate," the ARRival mode is NOT intended to substitute in any way for required charts and manuals!

Ground Navigation Ranges

The increased accuracy of GPS and the even greater improvement promised by differential GPS has spurred us into providing a new capability for the Argus; fractional mile ranges. In all modes save EMERgency, it is now possible to select .1, .2, and .5, and mile ranges. However, these ranges are only admitted when the aircraft is on the ground, i.e., when the "air" speed is less than 25kts. These ranges allow even the smallest airport to fill the Argus screen. (Special use airspace is not displayed on these ranges.) At larger airports, the resolution is good enough to see not only your position along the runway, but even if you're centered on its width. It is vital, therefore, to understand the distinction between **resolution** and **accuracy**.

Resolution is the degree of fineness with which you can see your position. At longer ranges, the symbolic aircraft may appear on the screen larger than the whole airport. At smaller ranges, the symbolic aircraft may appear to be at a specific location on a specific runway.

Accuracy is the agreement between the location of the symbolic aircraft on the runway drawing, and the location of the physical aircraft on the runway itself. There are several factors to consider when deciding how much you can rely on the Argus display of ground position. Please, carefully read and understand these factors before using the fractional mile ranges.

Argus database accuracy is determined largely by the accuracy of the data itself. Airports whose runway end points have been surveyed will tend to be depicted more accurately than those for which we only have the ARP (airport reference point) and runway heading, which is always rounded to the nearest 10 degrees. Additional considerations include mathematical rounding when putting the data in the Argus, and additional small errors in depicting data on the map. These errors, except in the case of surveying error, will typically be quite small, on the order of 10 to 100 feet.

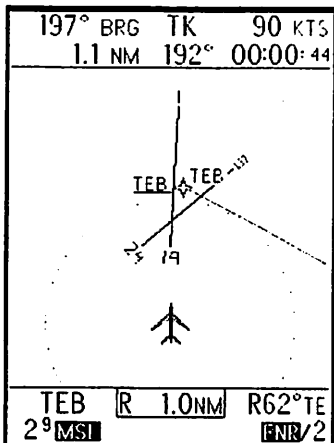
Far more critical is navigation system accuracy. GPS with Selective Availability activated only "promises" approximately 300 foot accuracy 95 per cent of the time. Loran can be far worse, with errors occasionally exceeding thousands of feet. It is vital that you do not rely on the map display for positional accuracy greater than the combined accuracy of the sum of the error sources.

DO use the Argus, with GPS, to verify that you're taxiing to the correct runway.

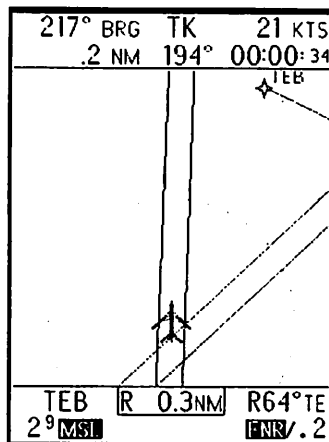
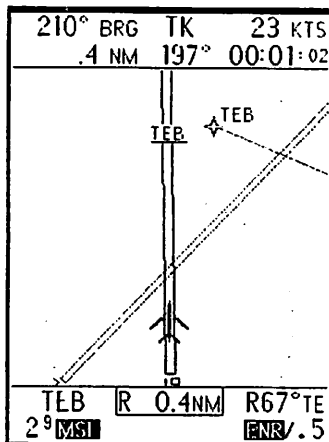
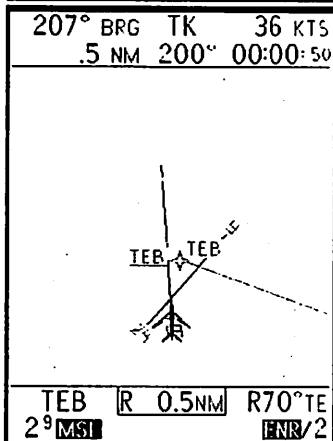
DO NOT use the Argus to guide you to the center of the runway!

DO use the Argus, with GPS and the user waypoint capability, to help you find a tiedown area or FBO.

DO NOT use the Argus to taxi into your tiedown spot or find the FBO in a fog!

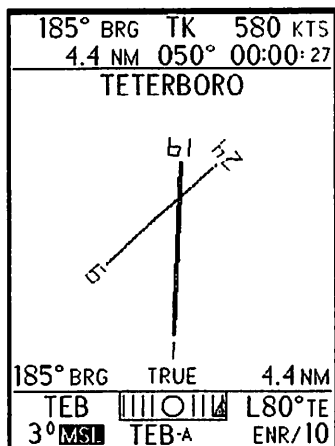


This sequence of illustrations shows the use of the AUTO ENR mode and the high resolution ranges. As you land, the Argus shows the 2 mile range to avoid giving a spurious impression of accuracy. As your ground speed decays, the airport "expands" so you can see its layout and your user waypoints in relation to the runways.



PLAN VIEW Mode

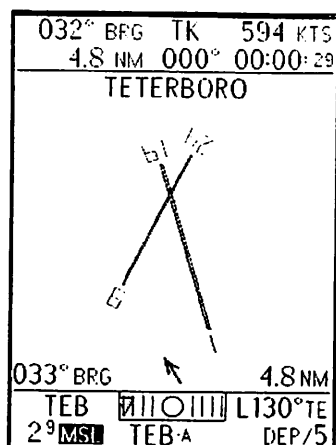
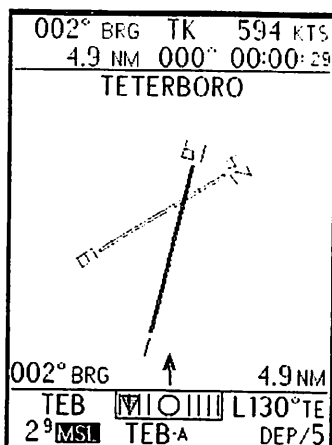
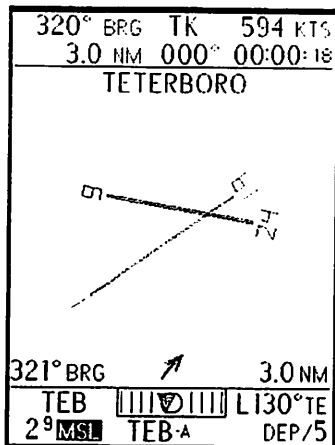
When you have selected an airport for **INFO** display, you can also get a "PLAN VIEW" of the airport by pressing **INFO** when the final text page is on the screen. An overhead view of the airport will appear in the center window,



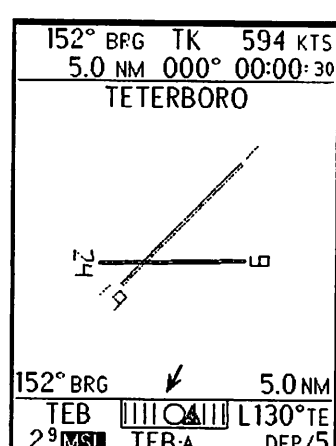
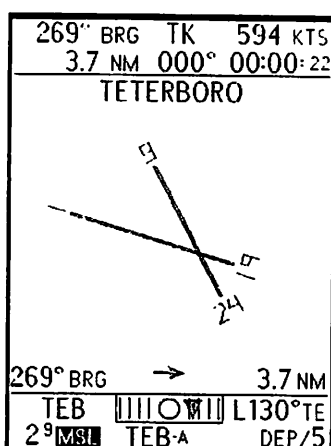
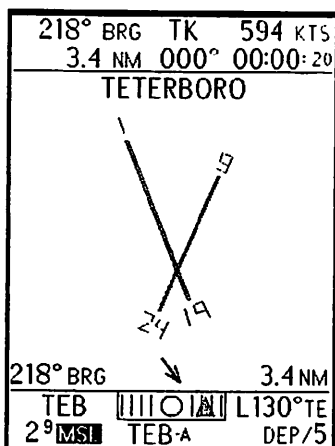
The illustration shows the **PLAN VIEW** mode as a True North Up display. This option is selected in **AMEND** if desired. In True North Up, the runway orientation is fixed, and the aircraft arrow isn't displayed.

Even more useful is Bearing Up option as selected in **AMEND**. In this view, the airport is oriented as it would appear if you could see it from the airplane window. The aircraft orientation with respect to the airport is shown by the arrow below the display. If the airport is fully surveyed, all runways will be depicted. Otherwise only the primary runway will appear, along with the message **PARTIAL VIEW**.

Note: If you exit the **PLAN VIEW** mode by pressing **ARRival**, the airport **SElected** will temporarily become the center of the **ARRival** screen. **ARRival** will revert to normal if exited and re-entered from any other mode.

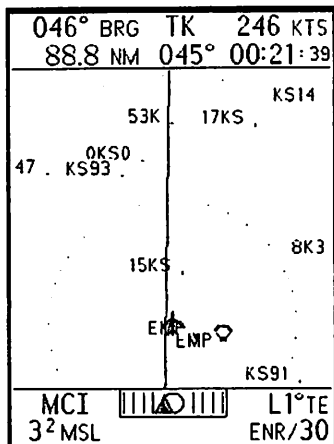


In each illustration, you are flying due north, and the airport is located at a bearing shown at the lower left of the center window (and approximately equivalent to its position on the page). Looking ahead (to the top of the page), you are approximately aligned with runway 1, and heading towards it. In the display at the bottom, you have taken off from runway 1 and are continuing to head north. Looking behind you, you see the 19 numbers as you head away from them. **The arrow is the orientation of your aircraft with respect to the airport. To "see" the airport, look out from the arrow in its direction.**



EMERgency Mode

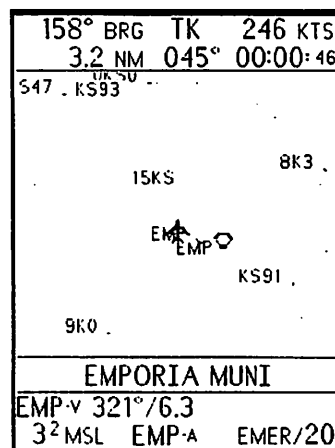
The purpose of the **EMER**gency mode is twofold: It helps you *find a suitable airport for landing*, and it helps you *report your position (and situation) to Air Traffic Control*. And, it does it *quickly*. The **EMER**gency mode is a "hybrid" of several operational modes and features of the Argus. Each has been selected to achieve those purposes as nearly automatically as possible.



At the left, you are on a routine trip. You've just passed Emporia, KS, and are looking ahead in the **ENRoute** mode. An emergency occurs that makes an immediate landing necessary. You enter the Argus **EMER**gency mode by pressing the **AUX** and **ARR** buttons simultaneously for at least one second,

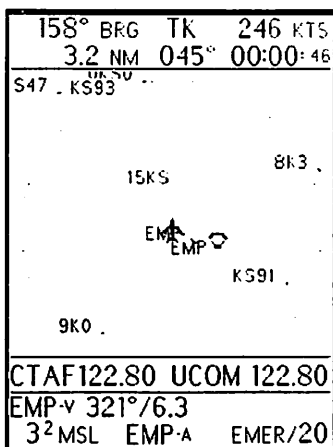
The Argus immediately searches for the nearest five suitable airports using your **AMEND** selections (except for fuel requirements). It

autoranges to the smallest range that encompasses all five airports, and displays them on the graphics screen. If the range selected has more than five airports, they are all displayed. Only VOR-type nav aids are displayed. Markers and NDBs aren't. Neither is special use airspace, except for Prohibited areas, which are always displayed.



Under the map display, the screen briefly shows the name of the nearest airport, **EMPORIA MUNI**cipal in this case, just as it would if the airport were **SE**lected. The screen takes on the characteristics of the **DEP**arture mode, because we are interested in airports all around, not just ahead of us. (Although we passed EMP, it's still the closest.) The navigation data fields, which had been showing GPS-generated information about our original destination, now show us data relevant to our current presumed destination, EMP. Specifically, the distance and bearing (upper left) now show us how far to EMP, not MCI. The ETE display upper window, bottom right,

shows how long it will take to get there. (Track and groundspeed are still relevant and haven't changed.)



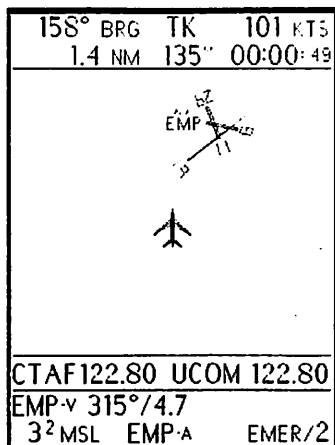
In the lower window, the destination waypoint, CDI, and track error are replaced with the distance and radial to the nearest VOR, VOR/DME, or VORTAC. The bottom line of the lower window still shows the MSA readout and the identifier of the closest airport or another one, if **SE**lected. And, finally, the mode **EMER** and screen range is on the right, as is usual for the mode display.

A second or so after **EMER**gency is entered, the name of the nearest airport is replaced by the most appropriate frequency data available. In this case, the Common Traffic Advisory Frequency and UniCOM frequency. Airports with approach controllers and towers would have these two frequencies displayed, if known, instead. (Of course, all frequencies in the database will still be displayed in the **IN**formation mode.)

So, within about a second of entering **EMER**gency, we have achieved our purposes: We know the name and frequency of the nearest airport and/or Air Traffic Control facility, and we have our precise position with respect to the nearest VOR.

Control Redefinition in **EMER**gency

Once in **EMER**gency, the Argus front panel controls are redefined so that each button has only a single function. This is done both for operational simplicity and to avoid entering non-relevant modes, such as **AMEND**.



The display at the left resulted from pressing the **ARRival** button to decrease the display range as the aircraft approached EMP. As an example of control redefinition, in **EMERgency**, the **ARRival** button continues to decrease the display range, but it does it with a **DEParture** mode-like display. Also, the ranges in **EMERgency** are somewhat different from the other modes. They are:

120 90 60 40 30 20 15 10 5 2 1 and back to 120

You always enter the mode at the smallest range necessary to display five airports. After that, you can decrease it by pressing the **ARRival** button or increase it by pressing and holding the **ARRival** button.

The **DEParture** button is redefined to **SElect** on-screen airports. It works just as does the dual **AUX/DEP** operation in the normal **SElect** mode, but **AUX** need not be used. The remote **SElect** switch, if installed, continues to operate normally. In **EMERgency**, a facility is always selected; there is no provision for deselecting all facilities.

The **ENRoute** button is redefined to get **INformation** on the **SElected** facility all by itself. You can continue to scroll through airports while the text information is on the screen using **DEP**. The remote **INFO** switch, if installed, continues to operate normally. You can return to the **EMERgency** mode map display at the range from which you left it by pressing **ARR**.

Exiting **EMERgency**

If the emergency situation is resolved and you wish to exit the mode, you can do so the same way it was entered: by holding **ARR** and **AUX** for at least one second. Pressing or holding **AUX** by itself has no effect during **EMERgency** operation. This prevents accidental entry into **AMEND**. When you exit **EMERgency**, the Argus reverts to its previous map mode and range. However, any facility previously **SElected** is lost and will have to be re**SElected** if desired.

As with the **ARR**ival and **DEP**arture modes, which can be interchanged at the pilot's convenience, there is no requirement that **EMER**gency be used only in emergencies. It is good procedure to practice with it periodically to remain proficient.

Summary of Operation

This is a brief summary of control operations in emergency. You might want to make a photocopy and keep it handy:

ENTER EMERGENCY MODE:	Press AUX and ARR for at least one second
DECREASE MAP DISPLAY RANGE:	Stroke Depress ARR to DECREASE RANGE
INCREASE MAP DISPLAY RANGE:	Hold ARR to INCREASE RANGE
SELECT DIFFERENT AIRPORT:	Press DEP button
GET TEXT INFO ON AIRPORT:	Press ENR button
TALK TO ATC/AIRPORT:	Frequencies immediately below graphics display
REPORT POSITION:	Radial/Distance to nearest VOR in lower window
BRG/DISTANCE TO AIRPORT:	Left side of upper window
TIME TO AIRPORT:	ETE display in upper window
EXIT EMERGENCY MODE:	Press AUX and ARR for at least one second

Section 4: Map "Objects"

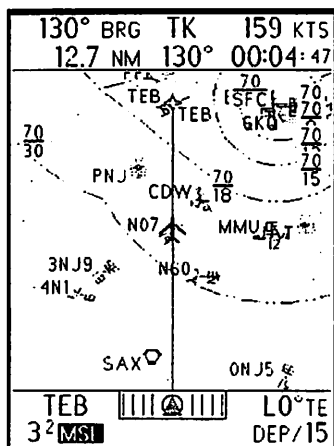
This section elaborates on some of the "objects" that can appear on the map. The database contains, in addition to nav aids and airports, special use airspace (SUAs), seaplane bases, heliports, airways, and more. In addition, an external navigation receiver can cause information to be displayed from its database. Specifically, this section covers the special characteristics of:

- ! Waypoints transmitted from an external navigation receiver
- ! Courselines created from external navigation receiver information
- ! Operation of the Argus CDI with external navigation receivers
- ! Special Use Airspace
- ! Airways
- ! Other database objects that can appear on the map

Waypoints, Courselines and the Simulated CDI

The Argus has a provision for displaying a courseline between two (or more) waypoints. Whether this courseline is displayed is determined by the pilot's preference. The **AMEND** mode allows selection of courseline in **MAP**, **PLAN**, both, or neither. For clarity, most of the illustrations in this manual do not show the courseline. However, the courseline display is a powerful feature for helping the pilot visualize and follow his flightplan, and most Argus users prefer to leave it **ON** for **MAP** and **PLAN**. The **AMEND** mode description shows how to select it; this section shows how to use it.

Courselines in "Direct To" Mode



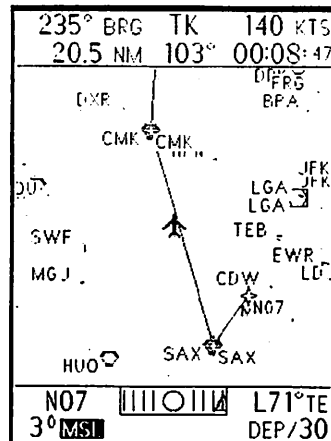
FROM:N07 To:TEB
CDI: ON-COURSE

It is very important to know that the courseline, while displayed on the Argus, is, in effect, generated by the GPS. In order to display a courseline, at least two points must be defined. These points are typically entered into the GPS as the "TO" and "FROM" waypoints. For instance, if you are navigating to airport ABC from navaid XYZ, you will select ABC as your TO waypoint, and XYZ either as your FROM waypoint, or, if you're currently flying over it, as "present position FROM," in typical GPS terminology. Should you deviate or stray from your course, the GPS will show you being a certain amount off-course (XTRACK or CROSSTRACK distance), and the Argus screen (and CDI) will agree with this calculation. If you then press the "present position FROM" button or "Direct TO" on your GPS, the

XTRACK distance will go to zero, since, in effect, a new course from your present position to your destination has been programmed into the GPS. The Argus display follows this change by redrawing the courseline from the current position of the symbolic airplane to the destination, while zeroing the Argus' simulated CDI. (The line is drawn, in effect, *from* the destination back *through* the FROM point or present position. Thus, the line will terminate at your destination.)

Courselines in Flight Plan (LEG) Mode

Some GPSs allow entry of a "flight plan," or operate in "leg mode," in which the pilot enters two or more waypoints. The Argus is capable of displaying up to 32 waypoints, although compatible GPSs (presently) vary from as few as 3 to up to 21. The Eventide Compatibility Table and GPS-specific appendices to this manual give you more information on your particular GPS. If the GPS is operating in flight plan or leg mode, the Argus will draw a courseline (if selected) between the waypoints as designated by the GPS and whose positions are sent to the Argus for display. Depending upon your GPS model, waypoints may continue to be visible on-screen after you have passed them, or they may not.



Flight Plan with
Multiple waypoints

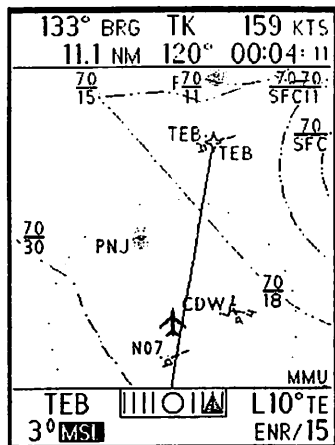
Waypoint Display on the Argus

Waypoints are shown on the Argus screen as four-pointed stars. If an alphanumeric identifier is sent by the GPS, it will be shown on the screen to the bottom right of the waypoint star. Again, your GPS may or may not send an identifier; check the Compatibility Table.

Just like the permanently mapped facilities and special use airspace stored in the Argus' database, each waypoint has a *position*. Unlike info in the database, however, the waypoint's position is sent by the GPS. In some cases, that position is sent not as a precise latitude and longitude, but rather as a bearing and distance. Because of GPS positional errors, and the fact that bearing and distance numbers are of relatively limited precision, it is possible that a waypoint display will not physically overlay the corresponding facility that has been selected as the waypoint. This normally is only noticeable in the **ARR**ival mode, and then usually when the aircraft is many miles from the destination. The farther the aircraft is from the destination waypoint, the greater this potential error. At great distances, it can even cause the arrival facility to be off-screen. This caveat does not apply to waypoints which are sent from the GPS to the Argus by latitude and longitude; these should correspond precisely with an associated facility.

Unless you use the Argus FP software (see section 4), **all courseline presentations**

are determined by the GPS. The Argus only displays the information provided! You can only select whether or not the GPS-determined courseline will be displayed or not.



CDI shows
1/2nm to LEFT
FLY RIGHT

CDI and TO/FROM Indication

The Argus' CDI display is also calculated by the GPS. The only adjustment made by the Argus is the scale factor—the amount of physical distance each CDI division represents—as determined in the Argus **AMEND** mode. The CDI shows how far off-course you are by graphically or digitally showing the GPS-generated XTRACK DISTANCE number. In addition, the CDI pointer, a small triangle, operates similarly to the TO/FROM flag on a mechanical CDI. The triangle points up (**TO**) while you are flying towards the destination waypoint, and points down (**FROM**) when you have passed the waypoint. (Because there is no OBS knob on the Argus, we define TO and FROM a bit

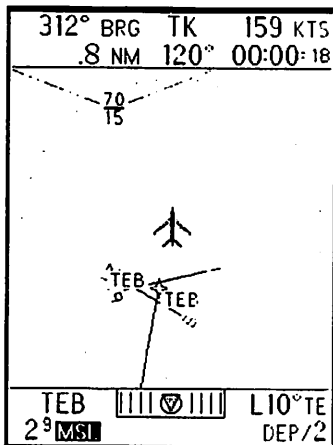
differently: If you draw a line perpendicular to the courseline and through the waypoint, any position on the courseline side of the line you drew would give a **TO** indication, a position on the other side would show **FROM**.

CDI in Flight Plans

In GPS flight plan (or leg) mode, the triangle operates differently. As you pass one waypoint, the GPS automatically switches to the next one. Therefore, you are always going **TO** a waypoint and the triangle always points up. It might briefly reverse as you pass one waypoint for the period it takes the GPS to activate the next one, or if you pass too far from the waypoint for the GPS to recognize it and make the appropriate leg change.

Remember, just as with a VOR with OBS, the direction of flight is irrelevant. It is your position with respect to the facility that determines the direction of the pointer triangle.

Waypoints and Courselines in the Argus PLAN MODE



Passed Waypoint
Triangle shows **FROM**

The Argus **PLAN** mode autoranges to encompass your destination, or, in the case of multiple waypoints, the farthest one. The maximum distance that can be shown in **PLAN** is 9999 nm from your present position. If courselines are selected, they will be drawn between on-screen waypoints as appropriate.

Great Circles in Plan Mode

The Argus performs its navigation by using Great Circles. This is the same method that is used by the vast majority of GPS and LORAN units. In even the longest enroute range (240 nm) the difference between a Great Circle and a straight line (rhumb line) is invisible. However, the maximum range of the plan mode is 9999 nm. On a 9999 nm display the range ring is only 800 nm short of the opposite side of the Earth. At this range the difference between Great Circles and rhumb lines becomes dramatic. In order to present the clearest and most useful display to the pilot, the Argus draws the plan mode as a "Great Circle Projection." What this means is that a "straight" line from the aircraft symbol to any waypoint on the screen will actually be the shortest distance Great Circle bearing to that waypoint.

A line connecting two points in a flight plan which does NOT cross the aircraft symbol may appear to be curved away from the airplane. This distortion is a normal artifact of trying to project a three dimensional globe onto a two dimensional Argus screen. If you stretch a string between two far-flung points on a globe and look straight down on the string it will appear to be a straight line. If you look straight down at another point on the globe the string will appear to be bowed out. This is the same effect that you are seeing on the Argus' screen.

Special Use Airspace

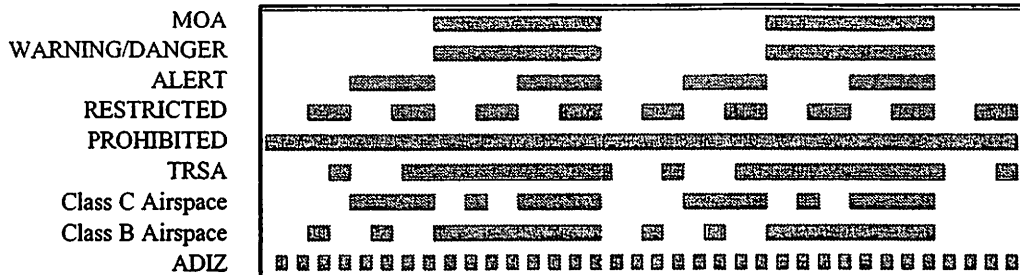
Probably more has been written in the past few years about special use airspace than about any other subject in aviation. The FAA issues violation notices for even inadvertent incursions into Class B airspace (TCAs). In Class C airspace, (ARSAs), we must know with whom and when to communicate. We are in danger of being shot down inadvertently in Restricted areas, deliberately in Air Defense Identification Zones (ADIZ), and of being set upon unexpectedly by military aircraft in MOAs (Military Operations Areas). And when we're not busy with those, we still have the Alert Areas, where we must be especially vigilant, and Warning Areas, where we really shouldn't be, but they're over international waters so they can't officially tell us to go away. What's a pilot to do?

If he has an Argus, he can see his position with respect to all categories of SUAs. He can thread his way down the Patuxent River, or avoid Class B airspace with minimum disruption to his flight path even if ATC won't give him clearance. Unlike airports and nav aids, SUAs don't advertise themselves in any visible way, and yet, as they proliferate, the task of coping with them becomes ever greater. The Argus shows the outlines of all SUAs in and around the United States, and, optionally, internationally. In the case of Class B and C airspace, altitude rings and restrictions are depicted as well.

Each type of SUA is distinguished by several characteristics:

- 1: Class B and C airspaces show altitude restrictions in the familiar sectional form with the upper boundary over the lower boundary separated by a line. In the Argus, the line separating the altitudes for Class B is thicker (and brighter) than the line for class C.
- 2: The actual identification number of the area for SUAs other than Class B and C. W-513 is a Warning area. R-2531B is a Restricted area. ADIZs and MOAs are labelled as such. There are examples on the following page.
- 3: The physical appearance of the area: rings for Class B and C airspace, long straight lines for ADIZs, and polygons for restricted areas, etc.

- 4: The SUA boundary line type. The Argus draws each type of SUA with its own line characteristics. These are given below for reference.



(MOA=Military Operations Area, ADIZ=Air Defense Identification Zone, TRSA=Terminal Radar Service Area)

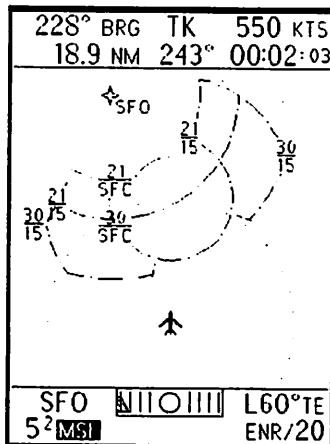
Viewing Special Use Airspace

As with airports and nav aids, SUAs can be selected for display in the **AMEND** mode. The mechanics of selection are described under that heading. If you're on an IFR flight plan, you may want to deselect Class B and Class C airspace since you're automatically cleared through them. You will probably want to deselect other SUAs, either for that reason, or because you will automatically be kept clear of, for instance, active Restricted areas, by ATC. SUAs can be deselected *en masse* on the first **AMEND** page or by type elsewhere in **AMEND**.

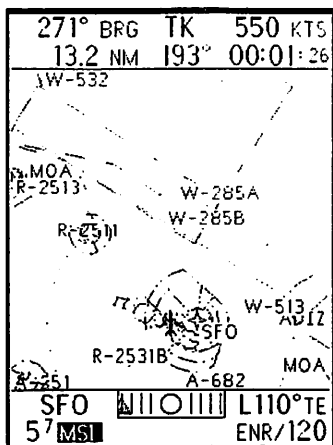
NOTE: PROHIBITED AREAS will always be displayed. They cannot be deselected by type or by category.



Even with a Terminal Area Chart it can be difficult to



SFO/OAKLAND AREA
Class C airspace only



**Special Use Airspace
off California Coast**

At the left, we've increased the display range, and are treated to a panoply of other SUA types. Along the coast we see an ADIZ line and several warning areas. Southeast and north of SFO we have restricted areas. To the southeast is a MOA, and a section of another MOA in the northwest. Note how small the Class B airspace appears compared to the vast areas reserved for military operations and national security reasons!

Using SElect and INformation does not bring up INformation on Special Use Airspace. The frequencies and times change too frequently and are too elaborate to allow us to provide consistent or useful information. Information on dealing with SUAs is available in the Airman's Information Manual and on

your current charts, which you must have with you while flying. The Argus provides only information with respect to the physical location of the SUA boundaries, and, in the case of Class C airspace (ARSAs) and Class B airspace (TCAs), the altitude restrictions.

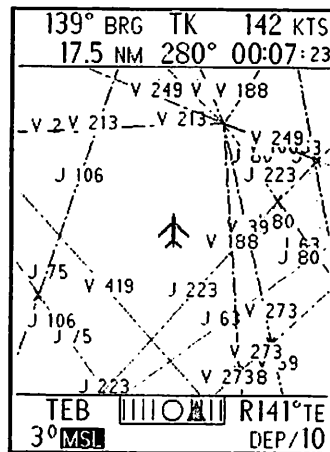
Don't Forget Your Charts!

Airways

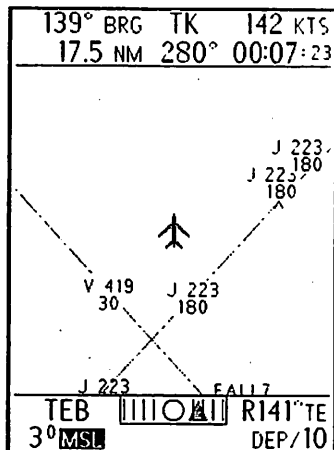
The Argus can display airways. The first AMEND page allows you to select ALL airways, SELECTED airways, or NO airways. The AIRWAYS page lets you qualify these selections for your particular convenience. For instance, "ALL" can refer to victor airways, jet airways, or both. And you can select up to two airways, V or J in combination, for display when SELECTED is chosen.

AIRWAYS			
ALL AWY TYPES: →Y:V Y:J			
SELECTED AWYS: FIRST AIRWAY J 2 2 3 SECOND AIRWAY V 4 1 9 Y SHOW MEA Y SHOW MOCA			
PAGE	LINE	CHG	PTH

In this example, we've selected all jet and all victor airways. We have also selected, individually, J223 and V419. When the first AMEND page is set to ALL AIRWAYS, serious clutter ensues.



Choosing SELECTED airways cleans up the display so that you see only the airways you desire.

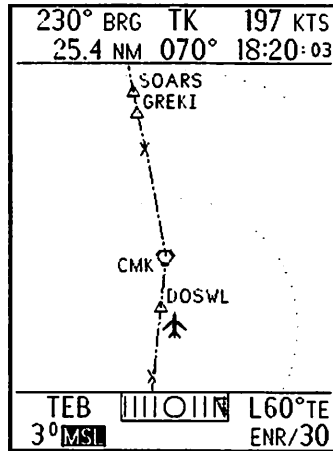
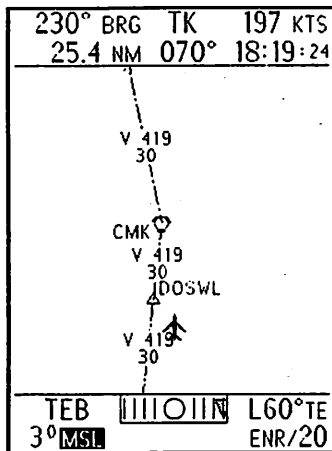
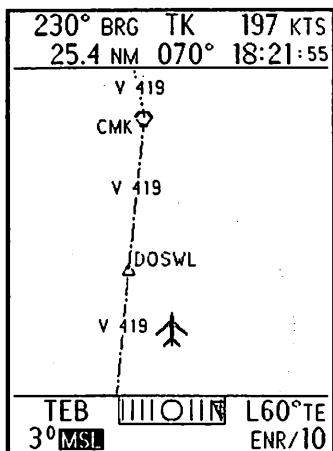


This example is from the NYC metropolitan area.

In other parts of the country, selecting ALL may not pose a problem, and saves you from having to make numerical selections.

You can show MOCA (Minimum Obstruction Clearance Altitude, when available) and MEA (Minimum Enroute Altitude) on the airway. The examples below show the structure of airway V419. Note that if you select a map range of 30 miles or greater in any mode, the MEA and airway identification are suppressed for clarity. The ENR/10 screen shows a section of the airway with MEA/MOCA turned off. They are turned on for the succeeding screens, although suppressed on the 30-mile screen. The other elements comprising the airway-intersections SOARS, GREKI, and DOSWL, VOR CMK, and the mileage breakdown and reporting points (small "x") continue to be shown in all ranges. Information on the named points can be obtained using SELECT and INFO.

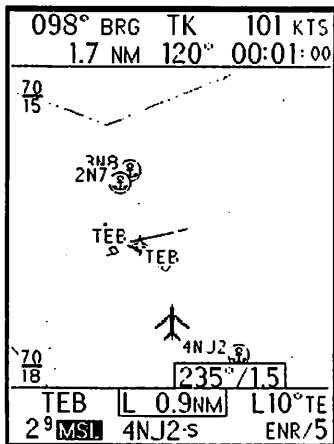
When selected airways are displayed, the intersections and nav aids which comprise those airways are always drawn even if intersections and/or nav aids have been deselected in AMEND.



Seaplane Bases

If you have examined the **AMEND** pages carefully, you probably noticed that "water" was an allowable selection for runways. You probably also noticed the Heliport selection. The Argus has the capability of displaying seaplane bases and heliports as well as airports. This feature was not covered earlier in this manual to reduce the number of details and exceptions. Unless your Argus is installed in a helicopter or in an aircraft that is amphibious or water-based, this information will be of little use to you.

As part of the **SETUP** operation performed by the installation agency, an entry is made in the Argus software describing your aircraft's landing gear. The choices are **LAND**, **AMPHIBIOUS**, and **WATER**. If **LAND** is selected, the Argus operates as described earlier. If water runways are selected in **AMEND**, you will see any seaplane bases that happen to be encompassed by the area of the graphic display.



Three seaplane bases are shown in the illustration at the left, and **4NJ2** has been **SELECTed** for bearing and distance display. As with land airports, the **INFORMATION** mode calls up data on the facility. The "runways" of seaplane bases are not graphically depicted, either on the map screen or in the Plan View Mode. Rather, the bases are shown as a small circle with an "anchor" in the center. They are further distinguished with an **-S** following the alphanumeric identifier.

In **EMERGENCY** mode, the Argus selects airports for display based on these major criteria: Pilot choice of minimum runway length, lighting, and aircraft landing gear type. While it is useful to depict land airports as landmarks while flying enroute from one waterway to another, you probably don't want to land on one in a seaplane! For this reason, in **EMERGENCY**, the Argus makes the following choices:

If you are flying a **LAND**-based aircraft, **ONLY** airports with solid runways that meet your length and lighting criteria are depicted. This is true regardless of whether you

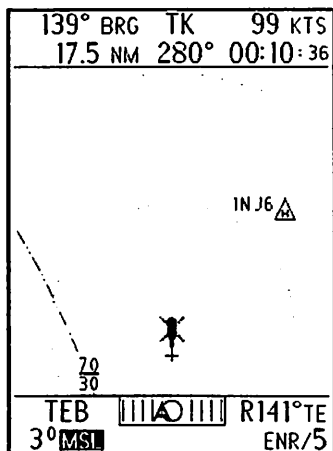
have admitted WATER runways in the **AMEND** mode.

If you are flying an AMPHIBIOUS aircraft, ALL airports with runways that meet your length and lighting criteria are depicted, regardless of runway type selection.

And, if you are flying a WATER-based aircraft, ONLY airports with water runways that meet your length and lighting criteria are depicted.

Heliports

As with seaplane bases, heliports are not depicted graphically. Rather, a symbol (an "H" in a triangle) is placed on the map at the location of the heliport. Information about the heliport is available by the SELECT/INFO process. Note that although multiple helipads may be available for the heliport in question, they are not depicted graphically in Plan View mode.



Many airports are colocated with heliports and, of course, runways are suitable for landing helicopters. Occasionally helipads are listed in INFO as part of the runway structure of an airport. This occurs when the helipads are specifically called out in the FAA database. In most cases, however, helipads are neither shown nor listed when located on an airport.

If you are flying a helicopter, then the Argus should be SETUP for "ROTARY WING" in aircraft type. Lest you forget, the aircraft symbol is replaced by a helicopter symbol. In the EMERgency mode, heliports will be accepted as potential emergency landing sites even if all heliports have been deselected in the AMEND

mode.

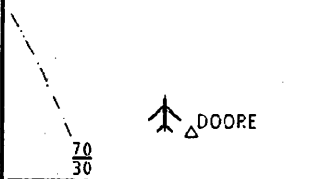
Airspace Fixes (Intersections)

139° BRG TK 142 KTS	
17.5 NM 280° 00:07:23	
INTERSECTION	
DOORE	
ENR-HIGH	STAR
N 41° 01.69	
W 074° 22.06	
BRG: 045°/1.6NM	
TEB	R141°TE
3°MSL DOORE	ENR/5

The Argus database contains intersections. They can be turned on and off in a group, and by category (see AMEND.) Intersections are positions in space; they have no physical reality. As such, when SELEcted for INFO display, their type, e.g., STAR, IAP, etc, along with their position is shown. They are depicted on the map as small triangles.

Other Map Objects

Of course, airports, VORs, NDBs, are also shown on the moving map. They are discussed with examples elsewhere in this manual. You also have the capability of creating your own map objects, USER Waypoints and Flightplans. They are covered in detail in the flightplanning section.

139° BRG TK 142 KTS	
17.5 NM 280° 00:07:23	
	
TEB	R141°TE
3°MSL DOORE	ENR/5

Section 5: Flight Planning and Recording

Previous sections have discussed the display and use of information in the Argus database and navigation and waypoint information transmitted to it from your GPS or other navigation receiver. Just as some of these GPS units can store and transmit flightplan and waypoint information to the Argus, the Argus can be used to create, store and follow flightplans by itself. It can also record your position during flight for later examination. Of course, information created and stored in the Argus is available graphically, an enormous boon. This section discusses:

- ! Creating user waypoints
- ! Selecting database waypoints
- ! Creating flightplans using database and user waypoints.
- ! Using flightplans and user waypoints in flight
- ! Use of the Argus database without a navigation input
- ! Using the Argus flight recording capability

User Waypoints and Flight Planning

The Argus allows you to create waypoints and flightplans. You can perform all your flight planning and navigation using only the Argus and its extensive database. This capability obviates the need for expensive dual databases, since the GPS or Loran is now used only to provide position and velocity information. You can use a much less expensive navigation source, since you will rarely (if ever) want to refer to it other than to turn it ON or OFF. In fact, an inexpensive "blind sensor" can be used, which requires NO panel or radio rack space!

A flightplan is a list of waypoints. You create this list using the Argus controls and database, or, optionally, download it from a navigation receiver capable of flightplan outputs, or from a special computer program. You can have up to 20 waypoints in a flightplan.

You can use database objects as waypoints; you can also create USER WAYPOINTS at any location for use in your flightplan. In addition to displaying these waypoints when they are part of an active flightplan, you can elect to show them as identified points on the screen even if no flight plan using them is activated.

130° BRG TK 100 KTS	
12.6 NM 130° 00:07:33	
MAIN MENU	
AMEND	
FLIGHT PLANS/WPTS	
MAP/DISPLAY	
TEB	@
3 ² MSI	LO°TE
	PLAN/14

The CDI display indicates whether you are using the internal Argus software for flight planning and waypoint selection, or if you are using an external navigation source. When using Argus flightplanning, the triangular pointer that indicates cross-track error becomes a bold "A" character. I.e., the triangle is not fully filled in. If you are using the digital CDI, the distance legend is followed by a small -A character.

Overview of the Flight Planning Software

The Argus FP uses a *menu* structure to allow you to select the actions you wish to perform. This type of menu structure is frequently referred to as a "tree," in which the "root" is the first action, there are various "branches," and each "leaf" is the final action in a particular sequence. If you are a personal computer user, this structure and terminology will already be familiar to you. If not, you will quickly become accustomed to it.

You access the FP mode in the same manner as **AMEND**, by pressing **AUX** quickly three times (or holding it down for 5 seconds). This is the "root" of the menu, and is always the first step in accessing the FP software. The first time you do this, you will see at least three selections, one next to the **DEP** key, one next to **ENR**, and one next to **AUX**. Because Argus 7000 versions have keys along the bottom, small legends next to each menu item remind you to which key it corresponds. The software for the Argus 5000 and 7000 is identical, and the correspondence between the keys and menu items on the 7000 will quickly become instinctive.

Because the keys are redefined with each menu selection, we refer to them as "softkeys." In the above example, "AMEND" is immediately adjacent to the **DEP** key (and the "DEP" legend), "FLIGHT PLANS/WPTS" is adjacent to **ENR**, and "MAP/DISPLAY" is adjacent to **AUX**. Instead of referring to the name of the key and the menu item that appears next to it, we will henceforth say "press AMEND" or "press the AMEND softkey." (If you have the remote **SE**lect and **IN**fo switches installed in your aircraft, **SE**lect corresponds to **DEP** and **IN**fo corresponds to **ENR**.)

The AMEND softkey "branches" to the **AMEND** mode of the Argus.

The MAP/DISPLAY softkey "branches," or, in this case, returns to the moving map display.

The FLIGHT PLANS/WPTS softkey branches to the various menus that allow you to create your own waypoints, make flight plans from these and from database waypoints, and to navigate using these flight plans. This section will cover this branch and its various sub-branches and "leaves" in detail.

177° BRG TK 100 KTS	
4.5 NM 130° 00:02:42	
MAIN MENU	
AMEND	
FLIGHT PLANS/WPTS	
RESET P.P. TO (CENTER CDI)	
MAP/DISPLAY	
CDW	@
3° MSI	L47° TE
	PLAN/6

Another characteristic of softkeys is that they can change depending upon various conditions. Above, we said that the *first* time you access the "root" menu, you will see three selections. Since there are four keys, there are potentially four selections. Whether the fourth selection is present is determined by the current operating state of the Argus. If you have activated and are following a flight plan, the legend "RESET P.P. TO (CENTER CDI)" appears next to the ARR key. This key allows you immediately to reset the CDI to "on course," and is equivalent to the PPTO or equivalent key on most LORAN/GPS units. We will cover this function in detail later on. Please just note here that it appears optionally

when conditions warrant.

Because the Argus has a CRT screen, it can present longer and more detailed choices and messages than can the typical LCD or LED display on panel-mounted navigation receivers. This capability, along with the menu structure, makes the Argus far easier to operate than most alternative units.

Waypoints

Taking full advantage of the navigation and flight planning features of the Argus FP software involves a "building block" approach. Activating and following a flight plan, for instance, requires that you first create a flight plan. Incorporating a "user waypoint" in the flightplan requires first that you create the user waypoint. The task of creating or selecting a waypoint, be it in the database, the flightplan, or one you create yourself, will be repeated many times.

Waypoint Characteristics

Every waypoint displayed on the Argus has a NAME and a TYPE. A waypoint NAME is one to five characters long. Acceptable characters are the 26 upper case alphabetic characters, "/", and the digits 0 through 9. (Spaces can be included, but are removed when the waypoint is stored.) The following waypoint TYPES are recognized:

AIRPORT (-A)

FAN MARKER (-F)

HELIPORT (-H)

NDB (-N)

SEAPLANE BASE (-S)

TACAN (-T)

USER (-U)

VOR or VORTAC (-V)

INTERSECTIONS (5 characters, no extension)

A NAME and a TYPE do NOT necessarily uniquely define an object. There are duplications, especially among those with two-character identifiers. For this reason, when you are entering a waypoint, you are given an opportunity to verify that the one you have selected is the one you want. Although database waypoints can have duplicate names, user waypoints that you enter are prevented from having this unfortunate characteristic.

Selecting a Waypoint

In almost all cases, selecting a waypoint involves entering its alphanumeric identifier and verifying that the waypoint found is the one you want. (Creating a waypoint also involves entering its alphanumeric identifier.) After this explanation, we will substitute the phrase "select waypoint XYZ" (or "create waypoint XYZ") for the more lengthy process. The following explanation presupposes that you have not selected any waypoints or screen objects yet. If you have, the Argus will "default" to the most recently selected appropriate waypoint name, and give you the opportunity to use or modify it instead of creating a new one.

Perform the following steps: Press AUX three times quickly to get to the root menu. (From now on, "from the root menu.") Press FLIGHT PLANS/WPTS. Press ACTIVATE FP/WPT. Press DIRECT TO WPT. Press DATABASE WPT.

177° BRG TK 100 KTS 4.5 NM 130° 00:02:42		177° BRG TK 100 KTS 4.5 NM 130° 00:02:42		250° BRG TK 100 KTS 1.7 NM 230° 00:01:01	
FLIGHT PLANS/WPTS	DEP	ACTIVATE FP/WPT	DEP	ACTIVATE DIRECT TO	DEP
ACTIVATE FP/WPT	ENR	DIRECT TO WPT	ENR	USER WPT	ENR
EDIT FP/WPT	ARR	FLIGHT PLAN	ARR	DATABASE WPT	ARR
EXTERNAL NAV	AUX	RESET P.P. TO (CENTER CDI)	AUX	SELECTED OBJECT (NONE SELECTED)	AUX
QUIT		QUIT		QUIT	
CDW 3° MSI	▲ L47°TE PLAN/6	CDW 3° MSI	▲ L47°TE PLAN/6	TEB 2° MSI	0.0NM-A L20°TE ENR/2

The screen should now show the title "DIRECT TO D.B. WPT," and the softkeys UP, DOWN, NEXT, and DONE should be available. The letter "A" with an underline cursor appears on the screen. If, instead of the letter "A," there appears a waypoint or facility name, it's because the Argus has selected a "default" based on previous operations. If there's a previously selected waypoint, it becomes the default name for the next waypoint, on the assumption that you may want to modify its

name instead of creating something entirely new. If you press the UP or DOWN key while the cursor is in the first character position, the default name will disappear and a blank field will replace it so an entirely new name can be created as described below. If you press the NEXT key, the Argus will keep the first letter and move the cursor successively to the remaining letters, while the UP and DOWN keys modify them starting from their current values.

Pressing the UP softkey increments the letter above the cursor through the alphabet, through "Z", through "/", and then through the digits 0 through 9. The DOWN softkey decrements the letter above the cursor through the numbers 9 through 0, "/", and then Z through A.

--- BRG TK --- KTS		D E P E N D E N T A U X
--- NM ---		
DIRECT TO D.B. WPT		
TEB	UP	
	DOWN	
	NEXT	
	DONE	
---	---NM---	---TE
---MSL	PLAN/720	

Pressing the NEXT softkey cycles the cursor from the leftmost position through the 5 possible character positions, and back to the beginning.

Using these three keys, arguably the world's least efficient word processor, you can construct any legal waypoint name. You will quickly get used to the number of presses necessary to enter a letter. At this time, please enter the letters TEB in the first three character positions.

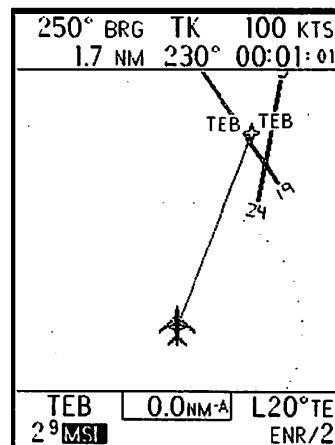
--- BRG TK --- KTS		D E P E N D E N T A U X
--- NM ---		
DIRECT TO D.B. WPT		
TEB-A	FIND NEXT	
TETERBORO		
TETERBORO	NJ	
AIRPORT		
N40°51.00		
W074°03.65		
7000'X148'	QUIT	
TEB-V R048°/.INM.		
ACTIVATE ⌕		
---	---NM---	---TE
---MSL	PLAN/720	

With TEB showing on the display, press DONE. The screen will show the entry for TEB-A, Teterboro Airport. The last line on the display shows the calculated radial and distance from the nearest VOR. This is a very handy feature when you select an object such as an intersection, whose location isn't as blatant as that of an airport. The radial/distance display gives you assurance that you have selected the correct location or facility.

The next softkey menu gives you three choices, "FIND NEXT," "QUIT," and "ACTIVATE D>." Press "FIND NEXT." Now, TEB-v, Teterboro VOR, is shown on the screen. (Radial and distance are not shown from VORs or TACANs for obvious reasons.) If you continue to press "FIND NEXT," the screen will continue to cycle through all facilities with the identifier "TEB." In this case there are only two, so TEB-A will alternate with TEB-v. The Argus will also scan the database for facilities and cities whose *names* begin with TEB after looking for identifiers. (Screen displays (#A3 and #A4) for these two cases appear in the section on creating flight plans.)

If you misspell an entry and the Argus can't find a matching database object, pressing DONE will bring you to a menu that will allow you to either "TRY AGAIN" or "QUIT." "TRY AGAIN" reverts to the name selection menu, at which time you can correct the spelling.

Whenever you enter this type of menu, you will eventually have the option of accepting one of the choices and using it. In this case, the option "ACTIVATE D>", (read as "activate direct-to") will select TEB as your destination and draw a course line from your present position to TEB. In other cases, it might add the waypoint to the flightplan you are creating, or add it to the user waypoint list. In any event, this is how you "select a waypoint." You'll see it again.



Creating a User Waypoint

Another important feature and task is the ability to create your own waypoints. The Argus can store over 600 user waypoints. (The memory used to store them is shared with flight plans, so you will probably not be able to save the full complement.) In addition to the obvious usefulness of creating waypoints for procedures you normally follow and paths you normally fly, the remarkable accuracy of GPS and Loran can frequently be used to lead you back to the same spot on an airport, or the correct end of the runway instead of the generic "Airport Reference Point" supplied by most databases. Here's how to create your own waypoint:

217° BRG TK 21 KTS		DEF ENR ARR AUX
.2 NM 194° 00:00:34		
CREATE USER WPT		
NEW USER WPT AT CURRENT POS.		
COPY DATABASE WPT		
NEW OFFSET WPT		DEF ENR ARR AUX
647 WPTS LEFT QUIT		
TEB <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> R64°TE		
29MSI		
ENR/.2		

From the root menu, press FLIGHT PLANS/WPTS, EDIT FP/WPT, CREATE FP/WPT, CREATE USER WPT. You are now ready to begin.

The three menu choices are "NEW USER WPT AT CURRENT POS, COPY DATABASE WPT," and "NEW OFFSET WPT." The first choice is ideal if you are flying and wish to enter your current position as a waypoint. When you press this key, your current position is read from the navigation receiver and entered as coordinates. If you are following this manual with a receiver in demo mode (or actually navigating) connected to the Argus, you will see the coordinates. If not, the LAT/LON field will be filled with zeros. Press the "NEW USER WPT ..." key now.

250° BRG TK 100 KTS		DEF ENR ARR AUX
1.7 NM 230° 00:01:01		
CREATE USER WPT		
30) UP		
MY WPT I-U		
DOWN		DEF ENR ARR AUX
N 40° 51.91'		
W 074° 01.80'		
NEXT		
DONE		
TEB <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> L20°TE		DEF ENR ARR AUX
29MSI		
0.0NM-A		
ENR/2		

You will see the by-now familiar screen in which you can select a waypoint name. In addition, there is a latitude and longitude field, as mentioned above. If the numbers have been filled in automatically, you can still modify them manually by moving the cursor to the correct position with the NEXT key using UP and DOWN. If they haven't been, you must fill in the LAT and LON.

The COPY DATABASE WPT. menu allows you to pick an item from the database, modify, and rename it for your own purposes. For instance, you can make a user waypoint of a particular runway threshold. This is also helpful in saving memory, and is discussed further under "housekeeping."

The CREATE OFFSET WPT. menu allows you to select an already existing waypoint or facility and create a waypoint with reference to its position. This is extremely useful if you are told to "report 10 miles north of XYZ" or if you know a position by its relative location rather than its precise latitude and longitude.

217° BRG TK 21 KTS	DEP ENR ARR AUX
.2 NM 194° 00:00:34	
OFFSET FROM...	
SELECTED OBJECT (NONE SELECTED)	
DESTINATION OBJECT TEB	
DATABASE WAYPOINT	
QUIT	
TEB <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> R64°TE	
2 ⁹ MSI ENR/.2	

The first menu gives you an opportunity to select the reference waypoint. This can be any object in the database or a user waypoint. Once you have made and approved the selection, the Argus will select a name for the offset waypoint. It will take the first three characters of the waypoint name, follow it by a "/" character, and an alphanumeric character, beginning with 1 through 9, followed by A through Z, should you wish to have more than one

reference to the same base waypoint. You then enter the position of the offset waypoint with regard to the base waypoint. Any bearing from 0 to 359 degrees is acceptable, as is any distance up to 999.9 nautical miles. You also have the opportunity to edit the name, in case the "WPT/1" is not what you desire.

217° BRG TK 21 KTS	DEP ENR ARR AUX
.2 NM 194° 00:00:34	
NEW OFFSET WPT	
28) UP	
TEB / 1 -U	
DOWN	
090° TRUE BRG.	
001. 5 NM.	
OFFSET FROM TEB	NEXT
DONE	
TEB <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> R64°TE	
2 ⁹ MSI ENR/.2	

Once you have created the offset waypoint, the Argus will calculate its latitude and longitude, and enter it into the user waypoint database just like any other user waypoint.

Not illustrated: The MODIFY USER WPT menu allows you to fill in latitude and longitude automatically by pressing the UPDATE POS key after selecting a user waypoint. This way, you can create the waypoints on the ground and fill in the positions as you fly over them, saving the heads-down time that would be required to create them while flying.

Pressing DONE will accept the waypoint, store it in non-volatile memory, and make it available (by name) for future use. To prevent the waypoint "A" from being inadvertently stored, pressing DONE without actually editing the entry abandons it. If you accidentally store a waypoint that you do not want, it is easily removed.

Navigating "DIRECT TO" Waypoints

In addition to their use in flightplans, waypoints can be used for navigation by themselves. As shown earlier, after entering TEB, we pressed the **ACTIVATE D>** button, and the Argus drew a course line to the waypoint. The illustrations and text explained the usual way of selecting and navigating to a waypoint, after pressing the **DATABASE WPT** key in the **ACTIVATE DIRECT TO** menu. There are two additional methods, accessed by the other softkeys in the **ACTIVATE DIRECT TO** menu:

USER WPT: Instead of entering the waypoint name alphabetically, you can select a *user* waypoint by scrolling through the list of those available. While this is obviously impractical for the database, which contains tens of thousands of waypoints, it is a shortcut in the case of user waypoints since there are only a limited number. If you have a large number of user waypoints as well, you can search for them alphabetically in the same manner as you search for database waypoints, by entering the exact name.

SELECTED OBJECT: If you have selected an object from the map display using **SEL (AUX+DEP)**, you can fly **DIRECT TO** this object by hitting this softkey. If you have not selected an object, it will show "NONE SELECTED." If you have, the name of the object will be shown below the softkey.

Sorting and Storing Waypoints

Each time you add or delete a waypoint, the Argus has to sort through all waypoints and flight plans to make sure that they are updated to account for the new information. This process can take several seconds if you have a lot of user waypoints and flightplans. Each time you perform an action that requires this sorting, a screen message will appear apprising you of this, and the Argus will not respond to any controls until it is finished.

The Argus stores waypoints in "NVRAM", or non-volatile random access memory so that they will not be lost if there is a power failure. This storage process requires a few seconds, and is performed each time you return to any MAP mode after having made any changes to the data, such as adding a waypoint. You can add multiple waypoints or flightplans as desired before returning to the moving map and hence storing the data. When the NVRAM is being updated, a message on the screen advises you of this. **It is important that you NOT CYCLE POWER to the Argus while this message is displayed.** If you do, it is likely that all your user waypoints and flightplans will be lost. (If you cycle power after making changes or additions but before exiting to the map, only the recent changes will be lost; your earlier data will be safe.)

Waypoint Summary

In this section, you learned about selecting and creating waypoints. We also discussed how the Argus can guide you from your present position to a waypoint that you have selected. We will now build on this knowledge to create flightplans.

Flightplans

A flightplan is an ordered group of up to 20 waypoints. You create a flightplan by selecting the waypoints that make it up and entering them in the sequence that you desire. Of course, the sequence will probably represent a route that you desire to fly. Whenever you use ("activate") a flightplan, you are given the opportunity to fly it forward or in reverse, so that one plan typically serves as two. You can also "join" a flightplan in progress, as when a plan incorporates a fuel stop.

Creating a flightplan requires selecting the waypoints that comprise it, and inserting them in the flightplan in the appropriate order. The Argus CRT display makes this easy by displaying the entire flightplan at once, instead of forcing you to remember where you are. You can always insert or delete waypoints in the list if you should find you left one out or you want to skip one.

To learn how to modify and use flightplans, we must first create one. We will go through the steps of creating a 4-waypoint flightplan. This flightplan will be used as an example throughout this section; you may want to duplicate it in your own Argus so you can follow along.

Creating a Sample Flightplan

Let's start by creating a 3-waypoint flightplan, from Teterboro Airport to Sparta VOR to Stewart Airport. We will then add a fourth waypoint by modifying the flightplan.

From the root menu, select FLIGHT PLANS/WPTS.

Select CREATE/EDIT FP/WPT

Select CREATE FP/WPT

Select CREATE FLIGHT PLAN (screen #A1)

Select NEW FLIGHT PLAN (screen #A2)

You are now in the familiar waypoint creation screen, although this time it is entitled "ADD WPT TO FP." Enter TEB as described earlier, and press DONE, followed by ADD (screen #A2-A3).

Pressing ADD brings you to a new screen (#A5), on which the new flightplan is displayed. The first waypoint, TEB, is displayed, and there is a "box cursor" immediately below it. The box cursor always indicates the location of the next waypoint to be entered or deleted. **If you are inserting a WPT *between* other**

waypoints, it will be inserted *above* the box. Since our goal is to continue with creating the flightplan, press INSERT.

We have returned to the waypoint creation screen. Enter SAX (screen #A6) for the Sparta VOR and press DONE, followed by ADD.

Again, press INSERT, and now enter SWF (screen #A7) for Stewart Airport, followed by DONE and ADD.

Press DONE, followed by SAVE, to store the flightplan in the Argus.

Entering Waypoints by Name

Throughout this manual, we show waypoint selection by "identifier." If you don't happen to know the identifier, you can search for a facility by its name or by its location. For instance, if you don't happen to know Boston's main airport is "BOS", you can enter "BOST" or "LOGAN" or even "GEN" (General Logan). After the Argus searches through known identifiers, it will search by name, first through nav aids, then through landing facilities. The search only considers facilities that are allowed in your AMEND selections. It treats each word in the name or location as a separate entity, so you can find DES MOINES either by "DES" or "MOIN." If you search by name, it can take longer to find what you're looking for, since the Argus has to search through a lot more information, and you have to accept or reject each "match." You can speed the search by selecting a good "key." In the example above, entering "MOIN" will result in far fewer false matches than "DES." The Argus begins each comparison at the beginning of a word. You can't find "BOSTON" by entering "OSTO."

Modifying A Flightplan

Now let's try something different. Instead of adding a WPT at the end of the flightplan, let's insert one between SAX and SWF. After saving the flightplan, we are in the EDIT FP/WPT menu. Select MODIFY FP/WPT, followed by MODIFY FLIGHT PLAN (screen #A8). The first two keys, NEXT FP and PREV FP allow you to select the flightplan to modify. The one last used is preserved, so it shouldn't be necessary to press either key. Press MOD to select the current flightplan to modify, and use the NEXT WPT key to move the block cursor over SWF (screen #A9). Now press MOD, and the data on SWF (screen #A10) will appear, with the options to

INSERT, MOD, or DELeTe. Press INSERT.

You are presented with the ADD WPT TO FP (screen #A11) menu, which now shows both the PREV. WPT SAX and the NEXT WPT SWF. Insert the waypoint HUO in the flightplan, and save the plan by pressing SAVE. You have now created a flightplan (screen #A12) from airport TEB via two VORs, SAX and HUO, to airport SWF. We will continue to use this flightplan as an example throughout this section.

STEPS IN CREATING A FLIGHTPLAN

177° BRG TK 100 KTS 4.5 NM 130° 00:02:42	
CREATE FLIGHT PLAN	
NEW FLIGHT PLAN	
COPY FLIGHT PLAN	
146 WPTS LEFT QUIT	
CDW	▲ L47°TE
2 ⁹ MSI	N07-A ENR/1

#A1

130° BRG TK 100 KTS 12.6 NM 130° 00:07:33	
ADD WPT TO FP	
TEB	
UP	
DOWN	
NEXT	
146 WPTS LEFT DONE	
TEB	0.0NM L0°TE
2 ⁹ MSI	ENR/1

#A2

130° BRG TK 100 KTS 12.6 NM 130° 00:07:33	
ADD WPT TO FP	
TEB-A FIND NEXT	
TETERBORO NJ	
AIRPORT	
N40°51.00	
W074°03.65	
7000'X148'	
TEB-V R048°/.1NM.	
QUIT	
ADD	
TEB	0.0NM L0°TE
2 ⁹ MSI	ENR/1

#A3

This sequence of screen images illustrates the creation of a NEW FLIGHTPLAN. You select a series of waypoints that comprise the flightplan, which then form a list on the screen. As each WPT is added, the list grows. 20 WPTs can be stored in each flightplan. The first screen begins the process, the second shows TEB as the first WPT. By pressing FIND NEXT, you can select between TEB-A (airport) and TEB-V (VOR). Screen 5 shows the box cursor after TEB has been added;

130° BRG TK 100 KTS 12.6 NM 130° 00:07:33	
ADD WPT TO FP	
TEB-V FIND NEXT	
TETERBORO	
VOR/DME	
N40°50.92	
W074°03.73	
QUIT	
ADD	
TEB	0.0NM L0°TE
2 ⁹ MSI	ENR/1

#A4

130° BRG TK 100 KTS 12.6 NM 130° 00:07:33	
MODIFY WPT IN FP	
12) TEB-A TO INSERT	
TEB-A	
MOD.	
DEL.	
DONE	
TEB	0.0NM L0°TE
2 ⁹ MSI	ENR/1

#A5

130° BRG TK 100 KTS 12.6 NM 130° 00:07:33	
MODIFY WPT IN FP	
12) TEB-A TO INSERT	
SAX-V	
TEB-A	
SAX-V	
MOD.	
DEL.	
DONE	
TEB	0.0NM L0°TE
2 ⁹ MSI	ENR/1

#A6

6 and 7 show SAX and SWF being added. After #7, the flightplan was saved, and then reselected for modification. By placing the box cursor on a WPT, you can modify or delete it, or insert another WPT ahead of it. Hitting MOD at screen 9 allows you to insert HUO in the flightplan, after which it is SAVED again.

130° BRG TK 100 KTS		
12.6 NM 130° 00:07:33		
MODIFY WPT IN FP		
12) TEB-A TO	INSERT	
SWF-A		
TEB-A		
SAX-V		
SWF-A		
	MOD.	
	DEL.	
	DONE	
TEB	0.0NM	LO°TE
29MSL		ENR/1

#A7

130° BRG TK 100 KTS		
12.6 NM 130° 00:07:33		
MODIFY FLIGHT PLAN		
12) TEB-A TO	NEXT	
SWF-A		
TEB-A		
SAX-V		
SWF-A		
	PREV	
	F.P.	
	QUIT	
	MOD.	
TEB	0.0NM	LO°TE
29MSL		ENR/1

#A8

130° BRG TK 100 KTS		
12.6 NM 130° 00:07:33		
MODIFY WPT IN FP		
12) TEB-A TO	NEXT	
SWF-A		
TEB-A		
SAX-V		
SWF-A		
	MOD.	
	QUIT	
	SAVE	
TEB	0.0NM	LO°TE
29MSL		ENR/1

#A9

130° BRG TK 100 KTS		
12.6 NM 130° 00:07:33		
MODIFY WPT IN FP		
SWF-A	INSERT	
STEWART INT L		
NEWBURGH NY		
AIRPORT		
N41°30.24		
W074°06.29		
11816'X148'		
IGN-V R245°/15.9NM.		
	MOD.	
	DEL.	
	DONE	
TEB	0.0NM	LO°TE
29MSL		ENR/1

#A10

130° BRG TK 100 KTS		
12.6 NM 130° 00:07:33		
ADD WPT TO FP		
PREV. WPT SAX	UP	
A		
	DOWN	
NEXT WPT SWF		
	NEXT	
140 WPTS LEFT	DONE	
TEB	0.0NM	LO°TE
29MSL		ENR/1

#A11

130° BRG TK 100 KTS		
12.6 NM 130° 00:07:33		
MODIFY WPT IN FP		
12) TEB-A TO	NEXT	
SWF-A		
TEB-A		
SAX-V		
HUO-V		
SWF-A		
	MOD.	
	QUIT	
	SAVE	
TEB	0.0NM	LO°TE
29MSL		ENR/1

#A12

Copying Flightplans

Once you have created a flightplan, you have the opportunity to follow it in either the forward or reverse direction. However, there are occasions where you may want to follow a slightly different flightplan in the reverse direction, or perhaps to follow one flightplan for the first part of several different trips. As the illustrations at the right show, the Argus facilitates this by allowing you to COPY an already-created flightplan without having to enter the waypoints again. (You arrive at the COPY FLIGHT PLAN menu by taking this branch instead of NEW FLIGHT PLAN.)

You can copy the flightplan in either the forward or reverse direction, and make as many copies as you desire. After you do so, it becomes several separate plans, and each one can be modified independently.

152° BRG TK 106 KTS		D E P
31.4 NM 186° 00:17:46		
COPY FLIGHT PLAN		E N R
12) TEB-A TO	NEXT	
SWF-A	F.P.	
TEB-A	PREV	A R R
SAX-V	F.P.	
HUO-V		A U X
SWF-A		
QUIT		
COPY		
TEB	0.0NM-A	R34°TE
3 ² MSI		PLAN/36

152° BRG TK 106 KTS		D E P
31.4 NM 186° 00:17:46		
COPY FLIGHT PLAN		E N R
12) TEB-A TO	FWD	
SWF-A		
TEB-A	REV	A R R
SAX-V		
HUO-V		A U X
SWF-A		
QUIT		
TEB	0.0NM-A	R34°TE
3 ² MSI		PLAN/36

152° BRG TK 106 KTS		D E P
31.4 NM 186° 00:17:46		
MODIFY WPT IN FP		E N R
13) SWF-A TO	NEXT	
TEB-A	WPT	
SWF-A		A R R
HUO-V	MOD.	
SAX-V		A U X
TEB-A		
QUIT		
SAVE		
TEB	0.0NM-A	R34°TE
3 ² MSI		PLAN/36

Copying Flightplans from Navigation Receivers

Some GPS and Loran receivers have flightplan capability, and can transmit flightplans to the Argus for display on the map. If your navigation receiver has this capability, you can copy the flightplan so-transmitted into an Argus flightplan.

First, select and activate the desired flightplan in your navigation receiver. Then, select EXTERNAL NAVigation in the Argus. (Root, FLIGHT PLANS/WPTS, EXTERNAL NAV.) This will place you in an Argus map mode. You can take this opportunity to verify that the desired flightplan appears in the PLAN mode if you wish.

Now, again enter the CREATE FLIGHT PLAN menu as described above, and select COPY ACTIVE FLIGHT PLAN. The Argus will read the data from the nav receiver and put it in a newly created flightplan just as if you had entered the data manually. (Note: if you try to do this while there is no external flight plan being received, the Argus will notify you by a screen message.)

When copying a flightplan, either one previously stored in the Argus, or one copied from the navigation receiver, the copy will be saved and you will be placed in the MODIFY WPT IN FP menu. This way, you can make any changes required in the copy. After copying a FP from an external navigation receiver, be sure to check the waypoint types. The Argus will not always select the right waypoint type if, for example, it is an airport colocated with a VOR. Use MODify to select the waypoint in question and use FIND NEXT to select the correct waypoint.

Using a Flightplan

We have now created a typical flightplan, and are prepared to ACTIVATE and FLY it. To activate a flightplan you select the flightplan desired and the direction in which to fly it (forward or reverse). And, if you are not starting at the first or last waypoint, you might also want to select the waypoint at which to start.

The next 12 screen illustrations depict the narrative that follows. To activate a flightplan, you start at the main menu and select FLIGHT PLANS/WPTS, followed by ACTIVATE FP/WPT and FLIGHT PLAN. The screen will then list a flightplan, provided at least one has been entered. Use the NEXT F.P/PREV F.P buttons to select the flightplan you wish to fly, and press the USE softkey. You now have the choice of flying the flightplan in the FWD or REV direction. Press FWD and the next menu presented gives you three softkeys:

NEXT WPT: You would press this key if the box cursor is not over the next waypoint to which you desire to fly. The Argus normally can determine which is the "next" waypoint in your flightplan by a built-in algorithm. It will not always be correct, and you have the opportunity to make a different choice. If you continue pressing this key, it will cycle through the flightplan and wrap around to the beginning.

SHOW DIST: This key alternates between the current screen and a screen that shows you the distances involved in the current flightplan. Six distances are involved, as shown on the screen. The first three, respectively, show how far you will have to fly if you *follow the flightplan* from the beginning to the end, from your current position to the end, and from the selected waypoint to the end. The second three show how far you will have to fly if you go *direct* from each of these three points to the end of the flightplan. Comparing the flightplan vs. the direct distances gives you an idea of how "efficient" the flightplan is. Pressing SHOW F.P. from this menu, which is on the same physical key as SHOW DIST, returns to the previous screen.

The ACTIVATE D> softkey activates the flight plan and returns the Argus to the map display. The WPT that was in the box cursor becomes your TO waypoint. The bearing and distance to the WPT is shown in the left of the upper window, and the waypoint's name is shown in the lower left. If you enter the **ARR**ival mode, this waypoint will be centered on the screen. (Note that SAX is shown in the eighth screen. In the previous screens, before the flightplan was activated, the external

navigation source was showing TEB as the destination.)

The PLAN mode, screen 9, shows your position along the flightplan at a glance. Next, in the ENRoute mode as you approach waypoint HUU, the Argus notifies you of the required turn and direction by a blinking reverse video bar above the bottom window. This bar remains on the screen for one minute or until you press the AUX key. If you *don't* press AUX and continue flying the flightplan, the TURN TO heading will be continuously updated. (Pressing any key will cancel the blinking bar. However, the key will also perform its normal function.) Screen 11 shows the ARRival mode as the destination WPT is approached after the turn at HUU.

This completes our sample flight plan. We can fly it in reverse, as shown in the final illustration, by following the menus in illustrations 1 through 4, and selecting "REV" instead of "FWD" in number 5. Also, if you complete a flightplan and simply turn off power to the Argus, that flightplan will automatically be activated in reverse when power is restored.

200° BRG TK 100 KTS	
1.0 NM 310° 00:00:36	
MAIN MENU	DEP
AMEND	ENR
FLIGHT PLANS/WPTS	ARR
MAP/DISPLAY	AUX
TEB R 1.0NM R180°TE	ENR/2
2 ⁹ MSI	

#1

200° BRG TK 100 KTS	
1.0 NM 310° 00:00:36	
FLIGHT PLANS/WPTS	DEP
ACTIVATE FP/WPT	ENR
EDIT FP/WPT	ARR
EXTERNAL NAV	AUX
QUIT	
TEB R 1.0NM R180°TE	ENR/2
2 ⁹ MSI	

#2

200° BRG TK 100 KTS	
1.0 NM 310° 00:00:36	
ACTIVATE FP/WPT	DEP
DIRECT TO WPT	ENR
FLIGHT PLAN	ARR
QUIT	AUX
TEB R 1.0NM R180°TE	ENR/2
2 ⁹ MSI	

#3

Flying The Demo Flightplan from TEB to SWF

200° BRG TK 100 KTS	
1.0 NM 310° 00:00:36	
ACTIVATE FLIGHT PLAN	
12) TEB-A TO	NEXT
SWF-A	F.P.
TEB-A	PREV
SAX-V	F.P.
HUO-V	
SWF-A	
QUIT	
USE	
TEB	R 1.0NM R180°TE
2 ⁹ MSI	ENR/2

#4

200° BRG TK 100 KTS	
1.0 NM 310° 00:00:36	
ACTIVATE FLIGHT PLAN	
12) TEB-A TO	FWD
SWF-A	
TEB-A	
SAX-V	REV
HUO-V	
SWF-A	
QUIT	
TEB	R 1.0NM R180°TE
2 ⁹ MSI	ENR/2

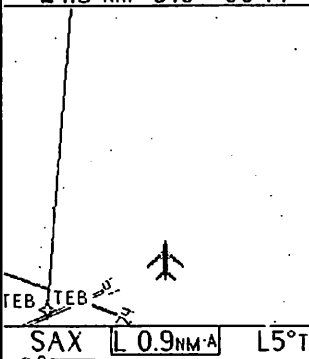
#5

200° BRG TK 100 KTS	
1.0 NM 310° 00:00:36	
ACTIVATE FLIGHT PLAN	
12) TEB-A TO	NEXT
SWF-A	WPT
TEB-A	SHOW
SAX-V	DIST.
HUO-V	
SWF-A	
QUIT	
ACTV	
⬇	
TEB	R 1.0NM R180°TE
2 ⁹ MSI	ENR/2

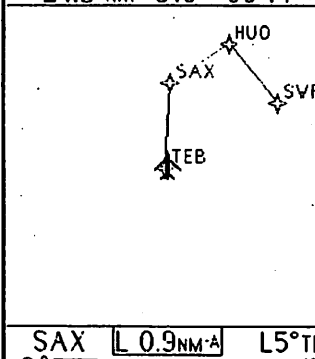
#6

200° BRG TK 100 KTS	
1.0 NM 310° 00:00:36	
ACTIVATE FLIGHT PLAN	
12) TEB-A TO	NEXT
SWF-A	WPT
DIST. TO SWF-A	SHOW
VIA F.P. FROM:	F.P.
TEB-A 69 NM	
P.P. 68 NM	
SAX-V 43 NM	
QUIT	
SWF-A DIRECT FROM:	
TEB-A 39 NM	ACTV
P.P. 38 NM	⬇
SAX-V 33 NM	
TEB	R 1.0NM R180°TE
2 ⁹ MSI	ENR/2

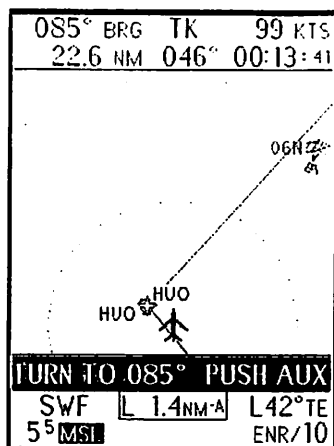
#7

312° BRG TK 100 KTS	
24.8 NM 310° 00:14:52	
	
SAX	L 0.9NM-A L5°TE
2 ⁹ MSI	ENR/2

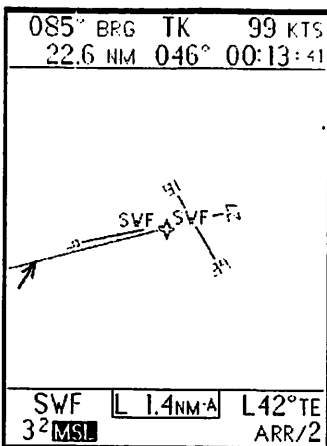
#8

312° BRG TK 100 KTS	
24.8 NM 310° 00:14:52	
	
SAX	L 0.9NM-A L5°TE
3 ⁰ MSI	PLAN/45

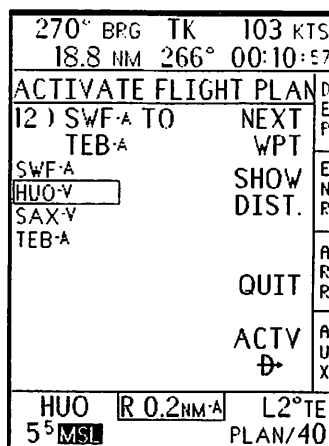
#9



#10



#11



#12

In-Flight Changes to the Flightplan

Under the best circumstances, one would fly from the beginning to the end of the flightplan, serenely, without any nasty diversions or modifications. Because this doesn't happen too often, the Argus gives you several ways to change the flight plan while you're en route. You can, of course, modify the flight plan as shown earlier, but this is seldom desired since today's diversion is unlikely to be repeated tomorrow. Thus, we employ the concept of the "Active Flightplan."

Whenever a flightplan is activated, a separate, temporary copy is created that can be modified without worrying about changing the flightplan from which it was derived. This Active Flightplan can be modified by adding or deleting waypoints. In addition to actually modifying the Active Flightplan, you can also skip waypoints and/or temporarily warp your courseline to include your present position. These capabilities are depicted in the next set of screens.

The first group shows how to "MODIFY ACTIVE FP" to include an intermediate waypoint. In this sequence, you are flying our demo flightplan in reverse, starting on the leg from SWF to HUO. You have decided to take a side jaunt to airport 4NY1, in the left center of the screen. Before entering the menus, make 4NY1 your "selected object" using SEL. This makes it the "default" selection. From FLIGHT

PLANS/WPTS, select EDIT FP/WPT, MODIFY FP/WPT, MODIFY ACTIVE FP (screens 2-4). This brings you to the MODIFY WPT IN FP screen.

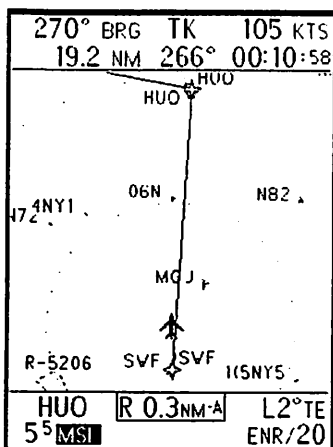
MODIFY WPT IN FP is the same screen you saw in creating a flightplan. As with that example, you place the box cursor over the waypoint you wish to modify, delete, or insert ahead of, and press the MOD softkey. Screen 6 shows the result of pressing MOD on screen 5, i.e. INFO on HUU. In this case we want to do an INSERTion, so press that key. The display shows where the insertion will occur, by showing the previous WPT, SWF, and the next, HUU. Since 4NY1 was made the default in the previous paragraph, there is no need to manually enter the identifier as the Argus does it automatically. Press DONE and info on 4NY1 will be displayed. Since this is the correct (and, in this case, only) 4NY1, press ADD.

You are now returned to the MODIFY WPT IN FP screen, this time with the listed flightplan showing your addition. You can continue using this menu for additional modifications, or press DONE to indicate this is the only one you wish to make. The next menu allows you to choose among three actions:

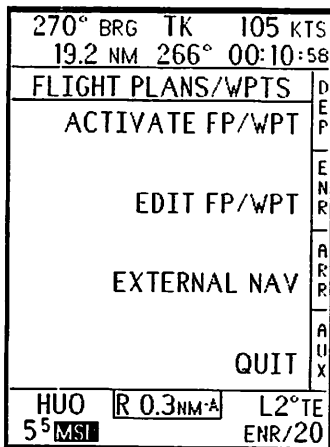
SAVE modifies the ORIGINAL flightplan from which the active flightplan was derived. If you press the SAVE key, that flightplan (in this case, #12), will have 4NY1 added without any change to the flightplan on the screen. ACTIVATE AND SAVE does the above, and also modifies the flightplan you are currently flying. ACTIVATE modifies the flightplan you are currently flying without making any change to the flightplan as it was originally created.

In the latter two cases, you are placed in the ACTIVATE FLIGHT PLAN menu, which gives you the familiar listing of the flightplan and the opportunity, to change the WPT to which you will be flying next. Since 4NY1 has now been incorporated in the flightplan, you can move the cursor over 4NY1, to select it as "next." If you don't, HUU remains "next" although 4NY1 appears ahead of it.

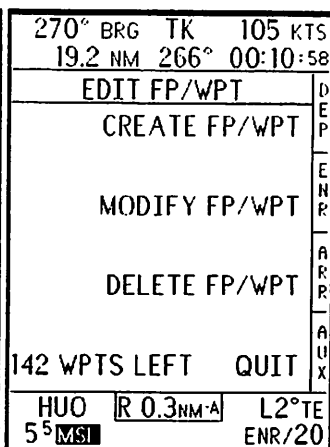
Modifying the Active Flightplan to Include an Additional Waypoint



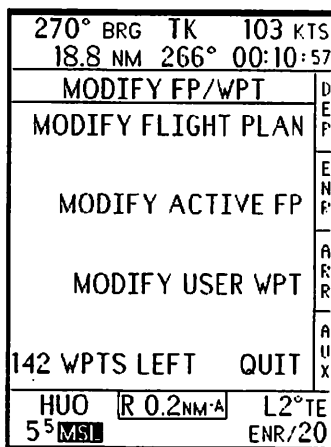
#1



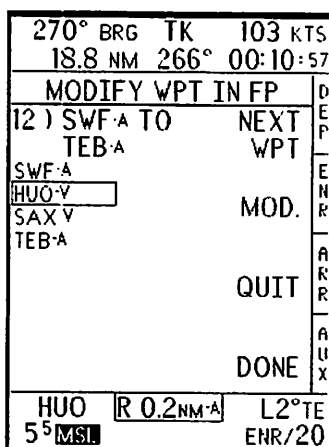
#2



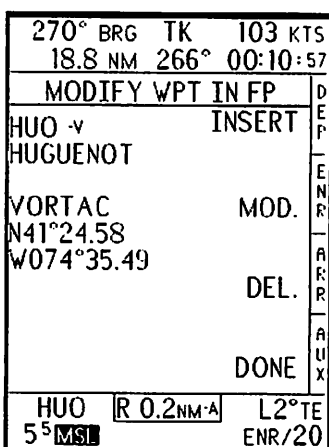
#3



#4



#5



#6

The illustrations on this and on the preceding page showed how you can insert another waypoint in the flightplan you are flying.

270° BRG TK 103 KTS	
18.8 NM 266° 00:10:57	
ADD WPT TO FP	
PREV. WPT SWF	UP
4 N Y 1	DOWN
NEXT WPT HUO	NEXT
138 WPTS LEFT	DONE
HUO R 0.2NM-A	L2°TE
5 ⁵ MSI	ENR/20

#7

270° BRG TK 103 KTS	
18.8 NM 266° 00:10:57	
ADD WPT TO FP	
4NY1-A	FIND NEXT
ORANGE POULTRY FRM	
CHESTER NY	
AIRPORT	
N41°19.67	
W074°19.47	
2000'X148'	QUIT
HUO-V R124°/12.9NM.	
	ADD
HUO R 0.2NM-A	L2°TE
5 ⁵ MSI	ENR/20

#8

083° BRG TK 103 KTS	
3.8 NM 266° 00:02:12	
MODIFY WPT IN FP	
12) SWF-A TO	NEXT
TEB-A	WPT
SWF-A	
4NY1-A	MOD.
HUO-V	
SAX-V	
TEB-A	QUIT
	DONE
SWF 0.0NM-A	L177°TE
5 ⁵ MSI	ENR/20

#9

270° BRG TK 103 KTS	
18.8 NM 266° 00:10:57	
MODIFY ACTIVE FP	
	SAVE
SAVE AND ACTIVATE	
	QUIT
ACTIVATE	
HUO R 0.2NM-A	L2°TE
5 ⁵ MSI	ENR/20

#10

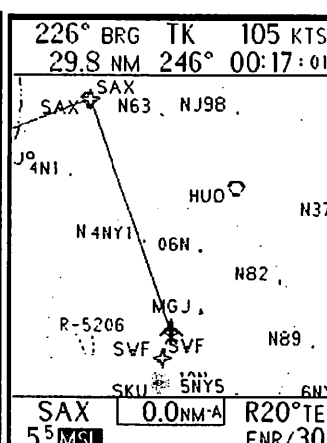
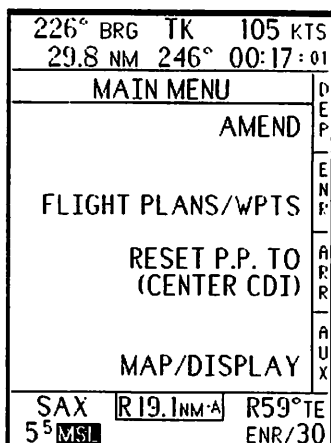
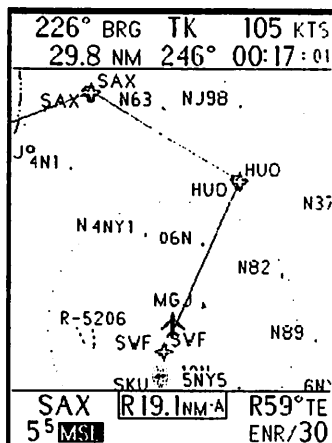
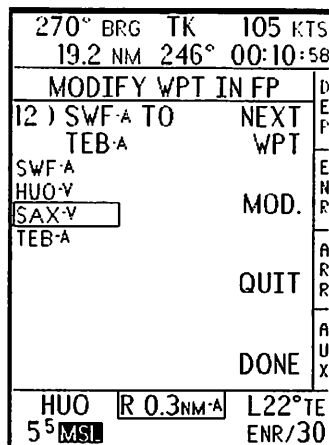
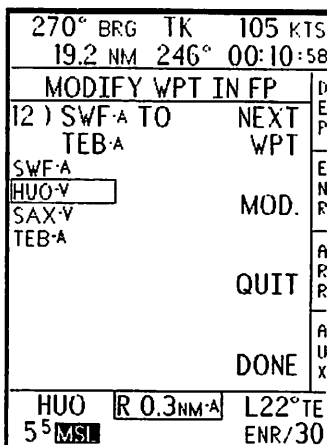
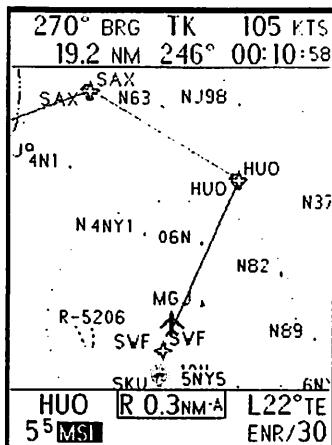
270° BRG TK 103 KTS	
18.8 NM 266° 00:10:57	
ACTIVATE FLIGHT PLAN	
12) SWF-A TO	NEXT
TEB-A	WPT
SWF-A	
4NY1-A	SHOW
HUO-V	DIST.
SAX-V	
TEB-A	QUIT
	ACTV
	✈
HUO R 0.2NM-A	L2°TE
5 ⁵ MSI	ENR/20

#11

227° BRG TK 103 KTS	
11.2 NM 266° 00:06:31	
4NY1	L 1.8NM-A
5 ⁵ MSI	R30°TE
	ENR/20

#12

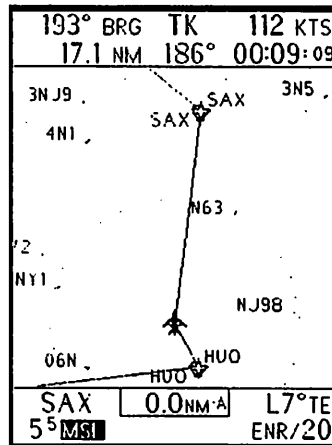
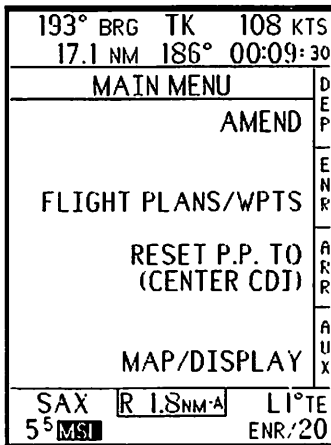
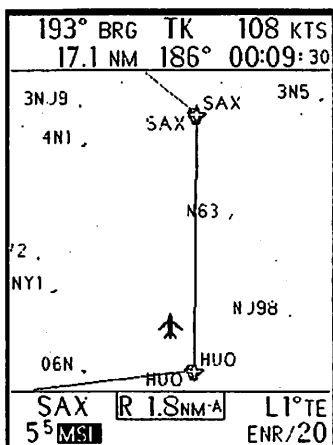
It is also frequently desirable to be able to skip an intermediate waypoint, such as when you are cleared to fly direct to a subsequent one. Again, the MODIFY ACTIVE FLIGHTPLAN menu allows you to do this, as this group of illustrations shows.



Instead of *deleting* a waypoint that you wish to skip, there is an even simpler procedure you can follow. As earlier, use the MODIFY ACTIVE FLIGHTPLAN menu to get to the MODIFY WPT IN FP menu. Since we are flying from SWF to HUO as shown, the box cursor will be on HUO, the next WPT. Simply press NEXT WPT once, which will move the cursor to SAX. Then press DONE. Since you have

not actually modified the flightplan, but only selected a different "next" waypoint, the Argus is smart enough to realize that you don't have to go through any further menus. Therefore, pressing DONE immediately returns to the MAP display. Note that the courseline is now drawn from SWF to SAX, and the next WPT (shown in the lower left window) is now SAX instead of HUO as it was on the previous screen. Of course, the upper left window now shows the bearing and distance to SAX instead of HUO.

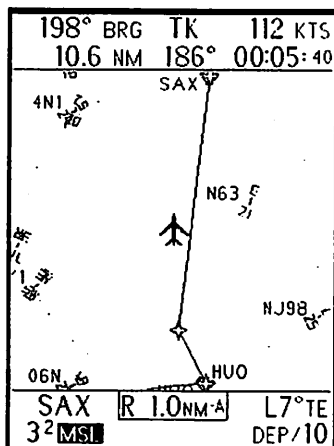
To modify the courseline and tell the Argus you want to fly direct to the next WPT instead of following the flightplan, you use the RESET P.P TO (CENTER CDI) key in the main menu. When you press this key, the Argus immediately creates a courseline from your present position to the new "next" waypoint, which is SAX, and the digital CDI now declares you to be precisely on-course.



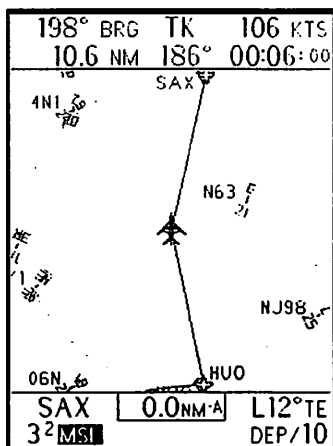
We just saw how the RESET P.P. TO (CENTER CDI) function could give us a course direct to the waypoint to which we were heading. The RESET P.P. TO function does the following:

- 1: Creates a temporary, unnamed waypoint at the current location of the aircraft.
- 2: Draws a courseline from this waypoint to the next desired waypoint.
- 3: Centers the CDI, since you are now, by definition, on course.

You can press this key as often as you wish. In each case, it will bring you on-course. If you are using a "DIRECT TO" waypoint instead of a flight plan, it will draw a courseline from your present position to that waypoint.



This set of illustrations shows how RESET P.P. TO works: In the first screen you are flying from HUO to SAX, and have gotten somewhat off-course. Press P.P. TO and you're on course! If you continue on the same track instead of following the courseline, you'll drift off-course again. Again, press P.P. TO, and a courseline is drawn consonant with your new position. Note that the Argus creates an unnamed "waypoint" at your current position each time you press P.P. TO, and erases the previous one, if any.



The P.P. TO function can also be used to give you an immediate course line to a database or user "DIRECT TO" waypoint, as is illustrated at the beginning of Section II. Because this function is so useful, it is designed to be easy to access. It's on the main menu page; all you have to do is press **AUX** three times quickly, followed by **ARR**, which is immediately above **AUX**. This process, which takes about half a second, immediately brings you back to the map display with the new or corrected course line showing. (The P.P. TO function also appears on the ACTIVATE FP/WPT menu, as a third softkey.) If P.P.TO does NOT appear on either menu, it's because no Argus waypoint or flightplan has been selected, and you are using the

"EXTERNAL NAVigation" menu choice under FLIGHT PLANS/WPTS. In this case, you might be navigating to a waypoint or using a flightplan supplied by your navigation receiver, as described in detail in the moving map section of this manual. If you wish to use the database and flight planning features of your navigation receiver in conjunction with the Argus, you must select EXTERNAL NAVigation. When you're using an external navigation source, the Argus CDI display doesn't use the bold "A" or show the -^A in the digital CDI that is present in the illustrations in this section.

User Waypoints

The Argus can store over 600 user waypoints. This is an extremely handy capability. (The mechanics of creating and modifying user waypoints were discussed under the Waypoints heading.) User waypoints can be used in several ways:

To mark a feature of interest. You just flew over a scenic landmark. A beautiful house. An antenna farm. The White House. Create waypoints LNDMK, BHOUS, ANFRM, WOOPS. You can then return to them without keeping notes.

To compensate for database limitations. Due to space limitations, the Argus only shows airports with runways longer than approximately 2000 feet. If you occasionally use an airport or two with shorter runways, add them yourself.

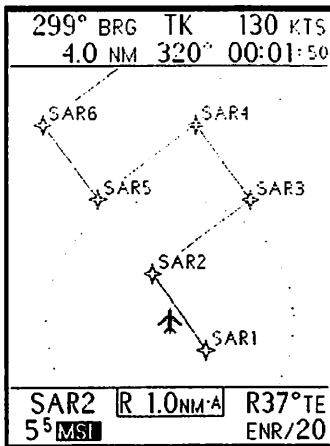
To help find locations on the ground. Large airports can be confusing. If the accuracy of your navigation receiver permits, you can mark specific locations on a given airport.

To create deviations in flightplans. If a flightplan you create takes you through class B, C or other airspace you wish to avoid, a strategically placed user waypoint can cause the plan to deviate around the area to be avoided.

To create specialized flightplans. If you need to fly a grid pattern on, say, a search-and-rescue mission, the user waypoints can create the necessary grid, and a flightplan connecting them covers the area you wish to search. The first illustration shows the creation of a user waypoint on a grid point. Once you have created user waypoints on the grid you wish to follow (SAR1 through SAR7), create a flightplan. Activate the flightplan (3rd illustration) and fly it.

299° BRG TK 130 KTS		D E P E N R A R R A U X
4.0 NM 320° 00:01:50		
CREATE USER WPT		
37)	UP	
SAR1 -U	DOWN	
N 41° 30.00'		
W 074° 10.00'	NEXT	
	DONE	
SAR2	R 1.0NM-A	R37°TE
5 ⁵ MSL		ENR/20

299° BRG TK 130 KTS		D E P E N R A R R A U X
4.0 NM 320° 00:01:50		
ACTIVATE FLIGHT PLAN		
14) SAR1-U TO	NEXT	
SAR7-U	F.P.	
SAR1-U		
SAR2-U	PREV	
SAR3-U	F.P.	
SAR4-U		
SAR5-U	QUIT	
SAR6-U		
SAR7-U	USE	
SAR2	R 1.0NM-A	R37°TE
5 ⁵ MSL		ENR/20



(An alternative method of creating a grid pattern is by creating successive waypoints at a constant distance from each other at the appropriate 90 degree angle. For example, from WP1, WP2 would be 1 mile/90 degrees, WP3 would be 1 mile/180 degrees from WP2, WP4 would be 1 mile/270 degrees from WP3, and WP5 would be 1 mile/180 degrees from WP4, after which the sequence repeats.)

To save space in the user waypoint/flightplan memory.
(See the information on memory usage under Housekeeping.)

User waypoints are stored in an alphabetical list, 0 through 9 followed by A through Z. Many menus give you the option of "NEXT" or "PREV" WPT. As with entering letters, you can save yourself time by using "PREV" when you know a waypoint is near the end of the alphabet.

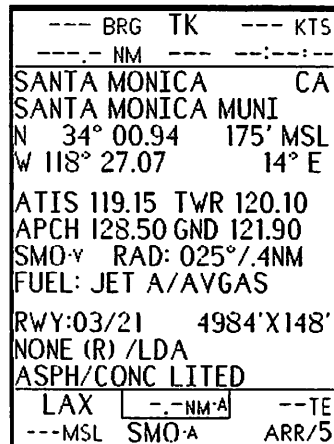
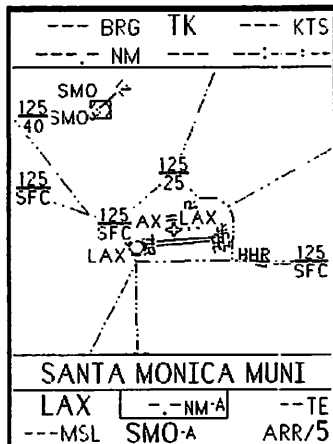
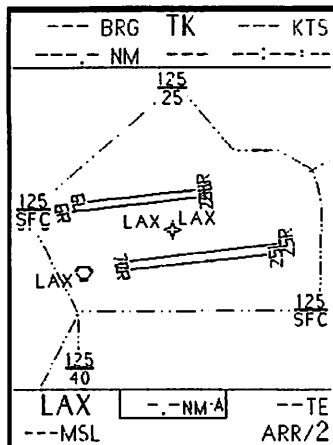
U

U

---		BRG	TK	---		KTS
---		NM	---		---	
DIRECT TO D.B. WPT						
						UP
L A <u>X</u>						DOWN
						NEXT
						DONE
		-.-NM-A				--TE
---		MSL		PLAN/720		

Example: You are looking for a small airport near Los Angeles. Everybody knows LAX, but not necessarily SMO or VNY. First, fly **DIRECT TO LAX**. Press **ARR** and LAX is centered on the screen. Select the correct **ARRival** range to encompass the surrounding area. Press **SEL** until Santa Monica is displayed above the lower window. Press **INFO** for data on this facility.

There are a few differences when operating without a navigation receiver (and not using DEMO mode). The pictorial layout of the airport always will be oriented to true-north up, regardless of the **AMEND** mode setting, since there is no aircraft position or direction information available to rotate it. For the same reason, there will be no symbolic aircraft displayed on the screen, and no box with distance and bearing or radial displayed next to the facility.



Housekeeping

152° BRG TK 106 KTS	
31.3 NM 186° 00:17:43	
DELETE FP/WPT	
DELETE FLIGHT PLAN	
DELETE USER WPT	
141 WPTS LEFT QUIT	
TEB	R 11.6NM R56°TE
3 ² MSI	PLAN/36

152° BRG TK 106 KTS	
31.3 NM 186° 00:17:43	
DELETE FLIGHT PLAN	
12) TEB-A TO	NEXT
SWF-A	F.P.
TEB-A	PREV
SAX-V	F.P.
HUO-V	
SWF-A	
QUIT	
DEL.	
TEB	R 11.6NM R56°TE
3 ² MSI	PLAN/36

152° BRG TK 106 KTS	
31.3 NM 186° 00:17:43	
DELETE FLIGHT PLAN	
12) TEB-A TO	YES
SWF-A	
TEB-A	
SAX-V	
HUO-V	
SWF-A	
NO	
TEB	R 11.6NM R56°TE
3 ² MSI	PLAN/36

152° BRG TK 106 KTS	
31.4 NM 186° 00:17:46	
DELETE FLIGHT PLAN	
THIS FLIGHT PLAN IS CURRENTLY ACTIVE. IT CAN NOT BE DELETED.	
HIT ANY KEY TO CONTINUE.	
TEB	0.0NM-A R34°TE
3 ² MSI	PLAN/36

152° BRG TK 106 KTS	
31.4 NM 186° 00:17:46	
DELETE USER WPT	
30)	NEXT WPT
MY WPT -U	PREV WPT
N 41° 14.64'	
W 074° 30.98'	DELETE
QUIT	
TEB	0.0NM-A R34°TE
3 ² MSI	PLAN/36

152° BRG TK 106 KTS	
31.4 NM 186° 00:17:46	
DELETE USER WPT	
USER WPT IS IN USE IN A STORED FLIGHT PLAN. CAN NOT BE DELETED.	
PRESS ANY KEY TO CONTINUE	
TEB	0.0NM-A R34°TE
3 ² MSI	PLAN/36

If you keep creating flightplans and waypoints, you will eventually run out of room. To free memory space for more waypoints and flightplans, you must delete some that are already present. This is easier done than said. As the screen illustrations show, you simply select the WPT or flightplan to be deleted and hit the **DEL** key. In all cases, you are given a "YES/NO" screen to confirm the deletion.

The Argus will not let you delete a flightplan if it is active, i.e., it's the one you have currently selected and are flying. Instead, a message appears reminding you of this fact. The Argus also will not let you delete a USER WPT if it is used as a component of a flightplan. If the Argus tells you it can't remove one, you will have to scrutinize all your flightplans to determine those in which it is used. If you don't want to delete the flightplan(s) themselves, you can delete the USER WPT from the flightplans. You can, however, *modify* the name or position of a user waypoint that is used in a flightplan. If you do, the new version of the waypoint will be used the next time a flightplan that incorporates it is activated.

Efficient Non-Volatile Memory Use

A technical note: The Argus "non-volatile" memory has storage space for approximately 600 user waypoints. Each time you create a user waypoint or add a database waypoint to a flightplan, that capacity is decreased by one. However, adding a *user* waypoint to a flightplan is much more efficient because the waypoint and the flightplan reside on the same memory chip. Thus, if you plan to use the same database waypoint in more than one flightplan, you can save memory by first making it a user waypoint using the COPY DATABASE WAYPOINT menu. Each flightplan also requires a small amount of "overhead" memory, but this is negligible compared to that taken by waypoints. The non-volatile memory is re-written every time you return to the main menu after making a modification. There is a short delay when this happens.

Power Cycling

The selected flightplan is remembered even when power is off, and is re-activated when power is applied. It is automatically reversed if you completed it before turning the unit off. (Since the flightplan remains active, you will have to deliberately deactivate it if you want to delete it.) If you are flying to a DIRECT TO WPT, it, too, is remembered. Any P.P. TO information, however, is lost, as is the current "next waypoint."

The Flight Recorder

Improbable as it may seem, your Argus comes with a lifetime supply of breadcrumbs. Of course, they are figurative breadcrumbs, as they only appear on the screen of the Argus, and only when you want to see them. As you fly along, you have the option of using the Flight Recorder mode to record your position. This is an extremely useful function, as you can see from the potential applications:

- ! Prove that you were where you claim to have been.
- ! Prove that you *weren't* where *they* claim you were.
- ! Review your trip at leisure and see how you could have done it better.
- ! Be able to retrace your route to find something you saw previously.
- ! On a search-and-rescue mission, see where you have flown so you don't repeat an area.
- ! In an instructional situation, be able to review a student's progress or errors.

Note that you can activate and use the flight recorder without viewing the recording, and you can view a previous recording without recording presently.

FLIGHT RECORDER	
→Y DISPLAY TRIP	PAGE
DISPLAY LIMITS	LINE
START TIME 20:31:16 18-DEC-96	CHG
END TIME CURRENT	RTN
REC. INTERVAL 5 SECONDS	
N ERASE RECORD	
FLIGHT REC. END	

Flight Recorder Settings

You activate and adjust the flight recorder settings in the AMEND mode. The first line, DISPLAY TRIP, determines whether a flight recording will be displayed on the map or not.

The DISPLAY LIMITS are updated for each trip. The Argus attempts automatically to show the data from your most recent previous trip along with any data generated on the current trip. Data from other previous trips are also retained until they are overwritten by new data.

REC. INTERVAL is adjustable to 2 seconds, 5 seconds, 10 seconds, and OFF. This determines how often a new data point is placed in memory.

You can erase all previous flight recorder data by selecting "Y" in front of ERASE

RECORD and hitting PAGE or RTN. Data is NOT erased unless you leave the flight recorder page with "Y" having been set.

Flight Recorder Operation

If you have selected any value other than OFF for REC INTERVAL, the Argus will place values for latitude and longitude in a sequential block of memory. This memory is sufficient to hold at least 3500 entries, which, depending upon the interval you have selected, will hold from about 2 to 10 hours of flight data. The Argus does this continuously as long as power is applied, regardless of speed, location, or altitude. Recording is suspended when the Argus is in demo mode or being used as a dedicated terminal. It also is suspended when you are viewing a previous flight and the second DISPLAY LIMIT is not set to CURRENT.

The main consideration in selecting the interval is how long a record you wish to maintain. Obviously, a 10-second interval will record 5 times as much flying time as will a 2-second interval. A reason you might want to use the shorter intervals is if you are doing a lot of maneuvering and wish to be able to view the fine details of your trip, such as with IFR practice approaches. If you are doing cross-country flying, there is little reason to select the shorter intervals.

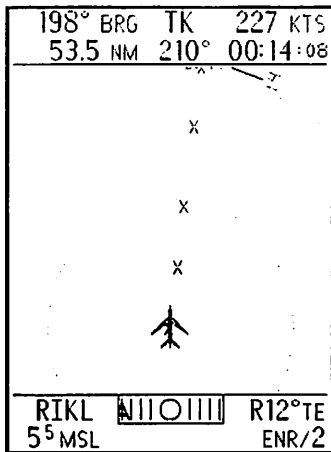
As mentioned above, the Argus will attempt to display data from the most recent previous trip and the current trip. The "most recent previous trip" is determined by a gap of 10 minutes in the flight record. Thus, if you take off for a \$100 hamburger and return, you will automatically see the trip to the present airport on the way home, but should not see the record of any previous trips. A flight that is interrupted for less than 10 minutes is considered to be one trip, so brief refueling stops should not interrupt the record. You can always manually extend the length of the assumed trip by adjusting the START TIME on the flight recorder AMEND page.

You can also review any trip (or trips) as long as they are still present in the recorder's memory. First adjust the START TIME to the beginning of the trip. Note that the END TIME automatically tracks the START TIME so that one trip is bracketed. Once you have selected the START TIME, you can move the cursor to the END TIME and increase it to encompass as many past trips as you desire, until it reads "CURRENT," which, of course, cannot be passed. When the "end time" is selected to anything other than "current" no new points are recorded. This avoids possibly

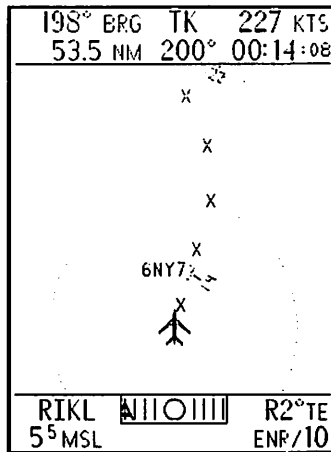
overwriting an old flight.

Displaying a Flight

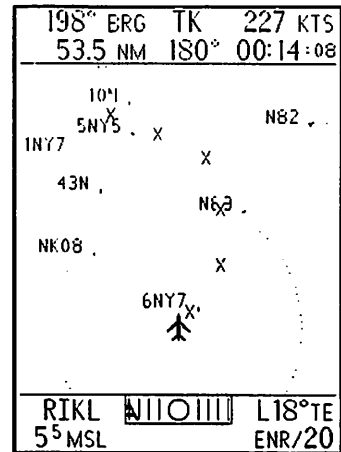
When a recorded flight is selected for display, the map display places a series of x's on the screen at datapoint locations. Flight recorder data points are also displayed on the PLAN mode screen. In order to prevent clutter, the points are spaced close enough together to give you a feeling for the continuity of the trip, but far enough apart to avoid excessive interference with other map objects. As you can see from the sequence below, there are roughly the same number of datapoints shown regardless of the map scale.



Flight Recording on 2-Mile Range

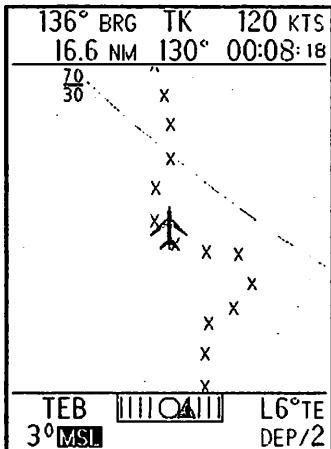


Flight Recording on 10-Mile Range



Flight Recording on 20-Mile Range

The screen below shows a flight-recorded segment in the DEParture mode. Note that the points are more dense in the DEParture mode since the same range effectively depicts roughly twice the distance.



From this flight recording, you can see the aircraft is maneuvering over a distance of about 3 miles.

Important Note

While it is possible to stop recording by turning the REC. INTERVAL to OFF, this disables the safety-related features of the recorder, such as the ability to reconstruct a past trip. Unless you have a specific reason for turning the recorder off, we recommend that you continue to record, and simply deselect the display by turning DISPLAY TRIP to N. To prevent permanently disabling the recorder when this is unintended, if you select REC. INTERVAL to OFF, it will turn itself ON (at a REC. INTERVAL of 5 seconds) the next time you cycle power on the Argus. (Other interval settings are retained during power off times.) Therefore, if you truly wish to disable the flight recorder, you will have to remember to turn it off each time you use the Argus.

Section 6:

Database Information and Pilot-Selectable Features

The Argus database stores an enormous amount of graphic data. It also stores alphanumeric data about database objects, such as navaid frequencies, airport fuel availability, etc. It also can calculate information about objects, such as range and bearing to an object, your current VOR radial, etc. Obtaining, managing, and selecting what information you want to display and/or read is the subject of this section.

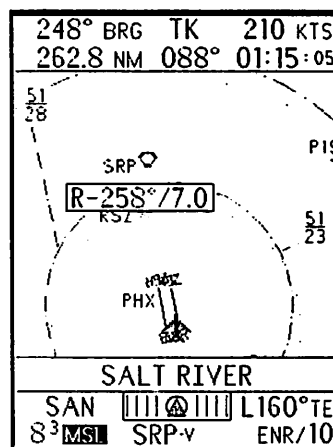
- ! Selecting objects for range/bearing tracking
- ! Obtaining alphanumeric information on airports, navaids, etc.
- ! Using the AMEND mode to select the Argus features to use
- ! Using the AMEND mode to select what objects will be displayed
- ! Using the AMEND mode to restrict displayed objects and reduce clutter

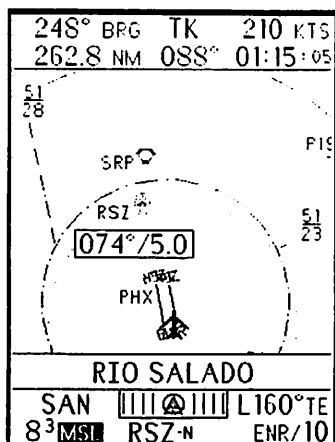
SElect and INFOrmation Modes

The Argus database contains not only graphic images and positions of airports and navaids, it also contains supplementary information of interest to airmen. And, since the positions of facilities relative to the aircraft are continually being calculated by the Argus, both positional and supplementary information can be presented to the pilot on demand. To accomplish this, the **SElect** and **INFO** modes are provided. In **SElect**, we can pick an airport, navaid, or other onscreen object (with the exception of SUAs) from the map display and get information about it. When an object is **SElected**, a box is created near its display that shows the distance it is from the aircraft, and either the bearing to the facility in the case of airports, tacans or NDBs, or the radial in the case of VORTACs and VOR/DMEs. While this information is similar to that presented by a VOR, it is derived and calculated independently. For this reason, this capability is an extremely valuable cross-check against your other navigation instruments.

To choose a facility, you press **SElect**. This function is a combination of the **AUXiliary** button and the **DEParture** button. By pressing **AUX** first, followed immediately by **DEP**, the first selection is made. (This button sequence becomes automatic very quickly. Just press them both, being sure to hit **AUX** a tiny bit earlier. They can both be held down together.) Pressing the panel or yoke-mounted select switch, if one has been installed in your aircraft, has the same effect as pressing the two buttons.

The first press will bring up a VOR, VORTAC, or VOR/DME if one is on the screen. Additional presses will cycle through facilities in order from nearest to farthest from the aircraft when on-screen VORs are exhausted. The name of the facility (SALT RIVER, in this case) will be displayed for a second or so over the lower window. The display is held just long enough so you can read the actual name of the facility if you don't happen to know it by its identifier. Note that the box shows "R-258°/7.0", signifying that it's a radial from the VOR.

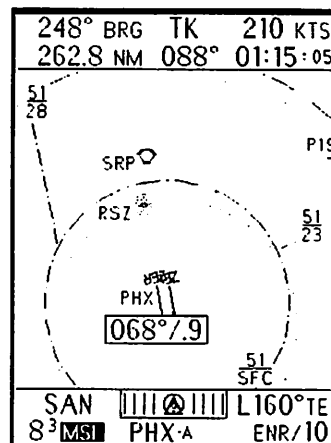




The next figure shows the RIO SALADO NDB having been selected. This time the box shows "074°/5.0", indicating a bearing of 74 degrees and a distance of 5.0 nm. If you're following along on your ADF receiver with RMI, the needle should point to about 74°. Of course, distance can't be determined.

Once **SE**lected, a facility remains **SE**lected even if it goes off-screen. The box will move to an appropriate position. E.g., if you pass the facility, the box will go to the bottom-center of the screen and remain there. A facility can be de**SE**lected deliberately (see below). If you enter the **AMEND** mode or the **EMERGENCY** mode, the facility is deselected upon return to normal operation.

The final example shows an airport, PHX, Phoenix Sky Harbor, in the box. Again, bearing and distance are shown. The name is not shown because the screen printout was made several seconds after selecting the airport and the name was erased. Incidentally, the range and bearing to an airport is to the "Airport Reference Point," the mathematical center. That's why there is a range shown even though the aircraft appears to be on the airport.



When going through a crowded screen looking for a particular facility, you might press the button once too often and "pass" it. If you do, holding the **SE**lect button(s) for over a second will cause the facility names to scroll backwards, allowing you to get back to one you missed. The facility **type** is given by a letter after the identifier -V, -T, -N, or -F for VOR, TACAN, NDB, or fan marker, or -A for Airport, -S for seaplane base, -H for heliport, and -U for User Waypoint.

After five facilities have been displayed (or all facilities, if there are fewer than five on-screen), a blank is selected. This allows you to deselect all facilities and remove the

INFO box from the screen if the information is no longer needed. (If you press **INFO** with no facility selected, information from your navigation receiver is displayed.)

Getting INFORMATION on SElected Facilities

To get information about any on-screen facility, you first **SE**lect it as described previously. You then press **IN**formation, either by hitting **AUX** and **ENR**, or by hitting the remote **INFO** switch if you have one installed in your aircraft. A text information page will replace the map display. The navigation information in the upper and lower windows remains present and continues to be updated even though the map is not visible. Depending upon the type of facility, different information is displayed.

The first example is an **INFO** page for a VOR. Looking at the display, right, we see the following information presented:

- 1: The IDENTIFIER, **SRP-v** and name, **SALT RIVER**
- 2: The Morse Code Identifier
- 3: The Latitude, **N 33° 25.88** and Longitude, **W 111° 53.28**
- 4: Elevation, **1185' MSL** and Magnetic Variation, **14° E**
- 5: Type of navaid **VORTAC HIGH** [altitude], as opposed to low or terminal
- 6: **FRE**quency **115.60 MHz**
- 7: **CHAN**nel **103X** (of concern primarily to military users)
- 8: **RAD**ial **259°** and distance **6.1NM**
- 9: Location of associated Air Route Traffic Control Center, **ALBUQUERQUE**
- 10: The primary (**125.40 MHz**) and, if available, secondary (**132.35 MHz**), VHF Center communications frequency.

248° BRG	TK	229 KTS
263.6 NM	088°	01:09:03
SRP-v SALT RIVER		
N 33° 25.88	---	
W 111° 53.28	--.	
1185' MSL	14° E	
VORTAC HIGH		
FREQ: 115.60 MHZ		
CHAN: 103X		
RAD: 259°/6.1NM		
ALBUQUERQUE ARTCC		
125.40 MHZ 132.35 MHZ		
SAN		L160°TE
S ³ MSI	SRP-v	ENR/10

The radial and distance are the same as those shown in the box when the map display is selected, and they continue to be updated even while **INFO** is being displayed.

248° BRG	TK	210 KTS
262.8 NM	088°	01:15:05
RSZ-N RIO SALADO		
N 33° 26.28	---	
W 111° 55.61	---	
1150' MSL 14° E		
NDB		
FREQ: 281 KHZ		
BRG: 074°/5.0NM		
SAN		L160°TE
8 ³ MSL	RSZ-N	ENR/10

The next example, the RIO SALADO NDB at the left, exhibits almost identical information. Some distinctions worth noting include the identifier, which sports a -N, signifying NDB. Other possibilities include -A for airport, and -T for TACANs.

The elevation, **1150' MSL** and magvar, **14°E**, happen to be supplied in the case of RSZ. However, many NDBs have one or both of these fields dashed out (unavailable).

The **FRE**quency, **281 KHZ**, is provided, but NDBs don't use channel numbers.

In the case of an NDB, **BRG 074°** and distance **5.0 NM** is provided, instead of the radial and distance as is supplied with VORs. Again, this information continues to be updated while **INFO** is displayed, so that navigation data remains current with or without the map graphics being on the display.

You do not have to go back to the map display to pick another facility for **INFORMATION** display. If you hit **SE**lect, information will appear on the next facility that would have been selected had you been in the map display mode. Likewise, holding in **SE**lect scrolls backwards through the facility choices. Unlike the normal **SE**lect function, no "blank" facilities appear while you are scrolling in the **INFO** mode.

If you should inadvertently enter the **INFORMATION** mode without having first selected a facility, the screen will display information from the navigation receiver.

Airport Information

As with nav aids, **INFORMATION** is also available on airports. Airports are less one-dimensional than nav aids, and require both more screens and more explanation. In addition to the basics such as location and elevation, the Argus provides data on all the runways and a very useful "plan view" of the airport. This view shows you, in effect, what the runways would look like from your present location.

Having previously selected **PHX**, Phoenix Sky Harbor, we now hit the **INFO** button. The first display always contains information pertaining to the airport as a whole, and specific data pertaining to the primary runway.

1: City **PHOENIX**, state **AZ**

2: Airport name **PHOENIX SKY HARBOR**
INTERNational (names are abbreviated as necessary to fit the screen)

3: Latitude **N 33° 26.16** elevation **1132' MSL**

4: Longitude **W112° 00.52** magvar **13° E**

5: A maximum of 4 frequencies. In this case, **ATIS**, **ToWeR**, **APproaCH**, and **GrouND**. **PHX** is a "class 1" airport, with **ATIS** and **Tower**. If the airport in question has no **ATIS** and/or **Tower**, **Common Traffic Advisory Frequency** or **UniCOM** will be substituted if available

6: Nearest **VOR** to airport **SRP-V**, and the airport's **RADial/dist, 259°/6.0NM** from the **VOR**

7: **FUEL** available (if known), in this case **JET A** and **AVGAS**

8: **RunWaY 08L/26R** Length **11000'** Width **148'**

9: Instrument Landing System (if any) **NONE(08L)/NONE (26R)** Right-hand traffic pattern (**R**) for runway 26R

10:Runway surface **ASPHalt/CONCcrete LITED** (or **UNLITED**)

248° BRG	TK	210 KTS
262.8 NM	088°	01:15:05
PHOENIX		AZ
PHOENIX SKY HARBOR INT		
N 33° 26.16	1132' MSL	
W 112° 00.52	13° E	
ATIS 121.20	TWR 118.70	
APCH 124.90	GND 121.85	
SRP-V	RAD: 259°/6.0NM	
FUEL: JET A/AVGAS		
RWY:08L/26R	11000'X148'	
NONE/NONE (R)		
ASPH/CONC	LITED	MORE
SAN		L160°TE
8 ³ MSL	PHX-A	ENR/10

The final entry, **MORE**, tells you that there is additional runway information available. By pressing **INFO** again, you can call up the next runway display, shown on the next page.

These lines correspond to the **(R)** on the runway **INFO** page, and signify a right-hand traffic pattern for these runways.

The arrow at the bottom of the center window represents the current heading of the aircraft with respect to the airport. If the arrow points toward the airport, you're flying toward it. If it points away, you're leaving the airport.

Pressing **INFO** again returns you to the primary airport page. Pressing **SElect** cycles to the next facility. You can return to the map display by pressing **DEP**, **ENR**, or **ARR**. If you press **ARR** from the **PLAN VIEW** display, the facility shown temporarily becomes the center of the **ARRival** display until that mode is exited. Pressing **INFO** or the **remote INFO** switch for one second returns you to the map mode and range previously selected when you entered **INFO**rmation.

Using the **REMOTE Select/Info** Switch

If you have the remote switches mounted on your yoke or panel, you can use them in place of the less convenient double key-presses otherwise necessary. The remote **SElect** switch and remote **INFO** switch operate exactly as do pressing the respective panel buttons: the remote **SElect** switch cycles through map objects, **INFO** displays information about them. If you *hold* **INFO** for one second, the Argus returns to showing the map display in the same mode and at the same range at which you entered **INFO**, thus allowing you to exit the **INFO** mode more conveniently.

Airport Traffic Areas

An airport with a control tower is surrounded by a five (statute) mile airport traffic area when the control tower is active. In addition to tower frequencies being shown on the **INFO** pages, the map itself designates airports with ATAs by underlining the identifier. The Argus gives no indication of when the tower is active. Note that colocated VOR identifiers will not be underlined. (This feature is not shown in most illustrations, as it was added recently. For an example, refer to the section on ground navigation using TEB as an exemplar.)

Latitude/Longitude Display

If you press **INFO** when no facility is selected, a screen is displayed giving the manufacturer and model number of the navigation receiver as selected in the **SETUP** mode, and your current position (latitude and longitude) as transmitted to the Argus from the receiver. This screen allows you to determine your coordinates without having to access your GPS and will be especially convenient if it's located inconveniently or "blind" mounted. It also verifies that the Argus has correct information about the connected nav receiver, which might have been changed accidentally after service. This display may be exited by pressing any map mode button, or by holding **INFO**.

130° BRG		TK	100 KTS
12.8 NM		130°	00:07:40
LRN STATUS DISPLAY			
LRN MODEL:			
ARNAV R15A/B			
LAT	N	40° 56.87	
LON	W	074° 18.78	
TEB		@	L0°TE
2 ⁹ MSI		PLN/14	

AMEND Mode (Pilot Selectable Display Features)

The **AMEND** mode permits you to "personalize" the Argus to your type of flying and type of aircraft. Using **AMEND** you can select such things as minimum runway length (to avoid display clutter), whether courselines are displayed, and even the size of the lettering used to indicate facilities on the map.

All these items and more are chosen from "menus." When you enter **AMEND**, a screen with choices and "softkeys" is displayed; you pick the feature and method of operation you desire. Once you've done so, your selections are saved in "non-volatile random access memory." This memory is preserved even when Argus power is turned OFF, so you don't have to make the selections again unless you want to change them.

Entering AMEND Mode

You enter the **AMEND** menu page by first pressing the **AUXiliary** key. You can either hold it for 5 seconds, or, more conveniently, give it three quick presses within 5 seconds. A set of "softkeys" will appear, of which **AMEND** is the first. (**AMEND** can only be entered during normal operation. In **EMERgency** mode the **AUX** key is locked out. See **EMERgency** mode.)

At the right(Argus 5000) or bottom(Argus 7000) of each **AMEND** screen are four labels that we call "softkeys." Each corresponds to the button adjacent to it and, in effect, relabels the button. **DEP** becomes **PAGE**, **ENR** becomes **LINE**, **ARR** becomes **CHAnGe**, and **AUX** becomes **ReTurN**. **PAGE** is used to advance to the next menu selection (or return to the previous selection by holding the key down). **LINE** is used to choose which item on the menu you wish to modify. As you press **LINE**, a small arrow will advance down the list, showing which can be changed. **CHG** cycles through the available choices, either specific selections or **Y** or **N** for Yes or No. And finally, when you wish to exit the **AMEND** mode, you do so by pressing **RTN**.

AMEND PAGE 1: Display Features (Categories)

DISPLAY FEATURES			
DISPLAY OPTIONS:			
→ ADF: MAP+PLAN			
Y AIRSPACE			
FIXES			
Y NAVAIDS			
Y SPECIAL USE			
AIRSPACE			
Y AIRPORTS			
N HELIPORTS			
Y USER WPTS			
SELECT. AIRWAYS			
PAGE	LINE	CHG	RTN

The first **AMEND** page allows quick selection of whole classes of SUAs or facilities to be displayed or not, as well as selecting under what circumstances the ADF pointer will be displayed and which NAV source is selected. The DISPLAY FEATURES page acts as a "master switch" for the various facility types or for all SUAs. It was placed first in the **AMEND** menus to make it easy to access so you can select or deselect SUAs, or eliminate airports when far from your destination.

ADF may be selected as OFF, on in PLAN only, on in MAP and PLAN, or in ADF MODE. (If version 05.2x software installed see TCAD Supp. p/n 32-2303 (contact Ryan Int'l at 800-877-0018) or Argus/WX500 Supp. p/n 141029 (included) for additional options) Note: FAA approval for conducting NDB approaches requires that ADF MODE *must* be selected when conducting an NDB approach.

By moving down the list with **LINE** and pressing **CHG** to place a **Y** or **N** in front of AIRSPACE FIXES, NAVAIDS, SPECIAL USE AIRSPACE, AIRPORTS, HELIPORTS, USER WPTS, *all* objects of the corresponding type can be admitted or deleted from the map display. If, for instance, you select **Y** for NAVAIDS, all nav aids allowed on the NAVAID SELECTION page will be admitted. If you select **N**, then no NAVAIDS will be admitted at all.

Finally, the AIRWAYS selection allows ALL AIRWAYS, SELECTED AIRWAYS (which conforms to the selections made on the AIRWAYS page), or NO AIRWAYS.

AMEND PAGE 2: Display Parameters

DISPLAY PARAMETERS			
COURSELINE(S):			
→MAP & PLAN			
ORIENTATION:			
HEADING			
PLAN VIEW:			
BEARING UP			
CDI SCALE:			
AUTO			
LETTER SIZE:			
SMALL			
TRACK ERROR:			
BRG-TK			
TIME DISPLAY:			
ETE (TIME TO WPT)			
PAGE	LINE	CHG	RTN

The four items on this page allow you to customize many display features to your preference. Pressing **CHG** shows you the possible selections:

Line 1 allows you to select courseline display in MAP, PLAN, both, or neither.

Line 2 orients the map display to the GPS-supplied TRACK, or the aircraft magnetic HEADING source, such as a slaved compass or HSI, if present and connected. If heading is available, it recommended to be used. It is *required* to be used if you are conducting an NDB approach, along with ADF mode, as described

above.

Line 3 allows you to choose whether the airport PLAN VIEW display shows you the airport TRUE NORTH UP or BEARING UP. See **PLAN VIEW MODE**.

Line 4 selects the scale of the simulated CDI. The choices are 1.25 nm, 2.5 nm, or 10 nm full scale, i.e., from the center to either side of the scale. AUTO gives you 10 nm in **ENRoute** and **DEParture**, and 2.5 nm in **ARRival**. **DIGITAL** shows the numerical crosstrack distance.

LETTER SIZE selects the font used for the map. **MEDIUM** is easier to read; **SMALL** allows more information to be presented without clutter.

TRACK ERROR selects the meaning of the TE field in the in the lower navigation window. **DTK-TK** (desired track minus track) gives you the difference between the two, or the amount and direction you need to turn to get back on track. ("On track" could also mean a track parallel to the one that would get you to your destination.) Selecting **BRG-TK** gives you the amount and direction you need to turn to get to your destination.

TIME DISPLAY selects whether the upper right-hand window will display the time to arrival at a waypoint (e.g., 10 minutes from now) or the actual clock time of arrival,

e.g., 14:02:30. The first is chosen with ETE (Estimated Time Enroute or Time TO WPT), the latter with ETA (Estimated Time of Arrival or Time AT WPT).

AMEND PAGE 3: Airspace Fixes

AIRSPACE FIXES			
→Y	ENROUTE	HIGH	
Y	ENROUTE	LOW	
Y	IAP		
Y	STAR		
Y	SID		
Y	AREA/RNAV		
Y	NEC	WPTS	
PAGE	LINE	CHG	RTN

This page allows you to select which categories of airspace fixes will be displayed when the "master switch" on the first AMEND page is set to "Y." Operation is self-explanatory. (NEC is "NorthEast Corridor.")

AMEND PAGE 4: Airways

AIRWAYS			
ALL AWY TYPES:			
→N	:	V	Y:J
SELECTED AWYS:			
FIRST AIRWAY			
V	0	0	0
SECOND AIRWAY			
V	0	0	0
Y	SHOW MEA		
Y	SHOW MOCA		
PAGE	LINE	CHG	RTN

This page gives you the option of showing specific types of airways or even just showing specific airways. The first line selects Y or N to ALL Victor airways, and ALL Jet routes. These selections apply when ALL AIRWAYS is selected on the first AMEND page.

The next two lines select individual airways. Each line allows selection of the prefix (V or J) and three digits. These selections apply when you pick SELECTED AIRWAYS on the first AMEND page.

You can decide whether to select MEA (minimum enroute altitudes) and MOCA (minimum on-course altitudes) with the remaining two lines. See the Airways section for more information and illustrations.

AMEND PAGE 5: Navaid Selection

NAVAID SELECTION	
VORTAC STATION	
Y HIGH ALT.	PAGE
Y LOW ALT.	
Y TERMINAL	
N VOR FREQS.	LINE
NDB STATIONS	
Y AVIATION	CHG
Y MARITIME	
→N NDB FREQS.	
LOCATOR/MARKER	
Y LOM	RTN
Y LMM	
Y FAN	
NAVAID SELECTION END	

Placing a Y or an N before the selections shown at left admits or rejects navaids as listed. Depending upon your flight regime, you might want to, for instance, remove low altitude and terminal VORs and TACANs from the display to reduce clutter. Selecting Y for VOR or NDB frequencies places the frequency of the associated facility on the map immediately beneath the identifier.

AMEND PAGE 6: Special Use Airspace Selection

As with the navaids, above, you can select categories of SUA for display or nondisplay depending upon your flight regime. If you're IFR, you'll probably want to inhibit most or all. If you're not, you'll probably want to see them all.

SPECIAL USE AIRSPACE	
→Y RESTRICTED	
Y ALERT	PAGE
Y WARN/DANGER	
Y MOA	
Y CLASS B (TCA)	LINE
Y CLASS C (ARSA)	CHG
N ADIZ	
	RTN
SUA SELECTION END	

AMEND PAGE 7: Airport Runway Characteristics

AIRPORT SELECTION	
RUNWAY LENGTH	
→2000	PAGE
RUNWAY SURFACE	LINE
Y ASPH/CONC	
Y TURF	
N DIRT	CHG
N GRAVEL	
N TREATED	
N ICE	RTN
N SNOW	
N WATER	
CONTINUED...	
PROCEED TO NEXT PAGE	

This **AMEND** page allows you to deselect airports based upon runway characteristics. The first item cycles through runway lengths, starting at 2000, the shortest available in the database, and going in 200 foot steps to 8000 feet. If you select, for example, 3,000, no airport will be shown on the map unless it has at least one runway whose length is greater than or equal to 3,000 feet.

The remaining lines on this page refer to runway surface characteristics. Selecting Y next to ASPH/CONC means that you want to display airports whose runways are asphalt or concrete. Selecting N next to DIRT means

you don't want to display airports with dirt runways. (Unless, of course, one of the runways is ASPH/CONC, to use the same example.)

Select Y for all surface types that you are willing to land on.

AMEND PAGE 8: Airport Type

This **AMEND** page allows you to select or reject airport types based on ownership and on fuel availability. Placing Y in front of CIV PUBLIC means you want to show civilian public airports. Placing N in front of MIL PRIVATE means that you don't want to show military private airports, i.e., those at which the public isn't welcome.

If you're in IMC, you can reject airports without instrument approaches as listed by placing N in front of "APTS. W/O ILS/LOC/LDA APPROACHES."

AIRPORT SELECTION	
FACILITY ACCESS	
Y CIV PUBLIC	
→N CIV PRIVATE	PAGE
Y MIL PUBLIC	
Y MIL PRIVATE	LINE
Y APTS. W/O ILS/LOC/LDA APPROACHES	CHG
Y UNLIGHTED	
FUEL TYPE REQ.	RTN
NONE	
AIRPORT SELECTION END	

The **FUEL SELECTION** item permits you to reject airports with no JET A fuel, for instance, by selecting JET A on the line. NONE means that you will accept the airport regardless of fuel availability. If you need

AVGAS, select it. And if your airplane is omnivorous, select EITHER.

AMEND Page 9: Heliport Selection

HELIPORT SELECTION			
SURFACE CLASS			
→Y ASPH/CONC			
Y TURF			
Y DIRT			
Y GRAVEL			
Y TREATED			
Y ICE			
Y SNOW			
Y WATER			
CONTINUED...			
PAGE	LINE	CHG	RTN

This page is similar to the airport selection page, except that there is no "runway length" entry. The type(s) of surface acceptable for landing are selected here.

AMEND Page 10: Heliport Selection

This page is analogous to the second airport selection page, with many of the same choices.

HELIPORT SELECTION			
FACILITY ACCESS			
→Y CIV PUBLIC			
Y CIV PRIVATE			
Y MIL PUBLIC			
Y MIL PRIVATE			
Y UNLIGHTED			
FUEL TYPE REQ.			
NONE			
PAGE	LINE	CHG	RTN

AMEND PAGE 11: Flight Recorder

FLIGHT RECORDER	
→ Y DISPLAY TRIP	PAGE
DISPLAY LIMITS	LINE
START TIME	
20:31:16	
18-DEC-96	CHG
END TIME	
CURRENT	
REC. INTERVAL	RTN
5 SECONDS	
N ERASE RECORD	
FLIGHT REC. END	

The flight recorder is controlled with this page. The first line selects whether your trip is displayed.

The next two entries select the start and stop time of the displayed trip. This allows you to display the current trip, a previous one, or consecutive trips.

REC. Interval determines whether a new set of coordinates is captured every 2, 5, or 10 seconds or whether recording is turned OFF.

Finally, selecting "Y" at ERASE RECORD and changing the page erases the flight recorder data.

Details on use of the flight recorder are in Section 5 of the manual

AMEND PAGE 12: TIME/DATE Setting

29-OCT-95 22:08:05			
UTC DATE/TIME			
→ 29	OCT	95	
22 :	08 :	05	
TIME ZONE			
-5 NEW YORK			
Y DAYLIGHT			
SAVINGS TIME			
N +30 MINUTES			
PRESS "PAGE" OR			
"RTN" TO SET			
PAGE	LINE	CHG	RTN

This page is used to set the Argus time, date, and time zone. The time and date should be set to UTC (GMT). You set the time by placing the cursor before the appropriate numeral or month name and adjusting it to the current time using the CHG button.

If you prefer to use local time, set your TIME ZONE appropriately by scrolling through the options on the TIME ZONE line. The Argus will then display local time in the ETA field, if selected.

DAYLIGHT SAVINGS TIME should be set to "Y" when it is in effect.

Some areas of the world offset their time from standard time zones by 30 minutes. You can correlate Argus time with such areas by selecting "Y" on the +30 MINUTES line.

AMEND PAGE 13: Data Transfer

DATA TRANSFER	
→N ENTER DATA TRANSFER MODE	PAGE
UP TO 19200 BAUD LENGTH: 8 PARITY: NONE STOP: 1	LINE
TO ENTER DATA TRANSFER MODE SELECT "Y" THEN PRESS "RTN".	CHG
	RTN

The Argus is capable of updating its database and its operating system using an electronic download from a PC or other computer. Eventide supplies data on a one-time and on a subscription basis. To download and activate these updates, follow the instructions supplied with the data or media. The Argus will automatically accept any baud rate up to 19,200. Because the amount of data to be transferred can exceed two megabytes, we recommend the use of the higher baud rates.

AMEND PAGE 14: Simulated Flight

SIMULATED FLIGHT	
FLIGHT PLAN →STOP	PAGE
GROUND SPEED 150 KNOTS	LINE
STOP AT DESTINATION	CHG
	RTN
SIM. FLIGHT END	

The final **AMEND** page provides a training mode for the pilot to become familiar with Argus operation. By setting the first line to **FLY**, the Argus becomes a tireless autopilot, flying you from the beginning to the end of your flight plan at the selected ground speed (second line). The final line gives you the option to **STOP AT DESTINATION** or **REVERSE AT DESTINATION**.

Once you have made your settings and either activated a flight plan or selected a direct-to waypoint, the map will show you following the path selected just as if you were flying it or an external navigation unit were providing course and speed data. The flight will continue indefinitely if you select **REVERSE AT DESTINATION**. During this demo flight, you can manipulate all the Argus map mode selection buttons, select and deselect objects and facilities as described above, and generally act if you're exercising all the Argus functions in a moving aircraft. One minor limitation: Since you're using the Argus to guide itself,

you can't have selected **EXTERNAL NAVIGATION** because the Argus has no self-directed destination in that mode.

DEMO mode is annunciated by the word **DEMO** appearing in reverse video at the top center of the screen, replacing the **TK** or **HDG** normally present when actually navigating. You exit the **DEMO** mode by returning to the simulated flight page and selecting **STOP**. As a safety feature, the Argus will also drop out of **DEMO** mode whenever data is received from a navigation receiver. Thus, if you have wired both the Argus and your GPS together for home use, you will have to turn the GPS off or otherwise inhibit its data output when using the Argus in **DEMO** mode. Of course, if the GPS has a demo mode as well, you can use the units together as they would be used in the aircraft.

AMEND SELECTIONS IN EMERGENCY MODE

In **EMER**gency mode, only **RUNWAY LENGTH**, **SURFACE**, and lighting selections are honored (except for **ASPH/CONC** and **TURF**, which will always be admitted whether selected or not). Heliports will not be displayed unless **Rotary Wing** is selected in **SETUP** for aircraft type. Airports are displayed regardless of fuel availability or ownership/use status, on the theory that in an emergency you're less worried about getting fuel than about getting *down*!

Section 7: Option Information

While the Argus only **REQUIRES** connection to aircraft power and to a navigation source, it can also be connected to other aircraft systems, either on its own (as described earlier), or with internal and external hardware. This section covers the operation of these accessories.

- ! Weather Display Adapter to show Stormscope information on the Argus
- ! RMI Adapter to show VOR and/or multiple ADF pointers on the Argus
- ! ARINC Adapter to allow interfacing with certain navigation receivers

Only accessories supplied with your Argus will have appropriate pages inserted. If you purchase an accessory after your Argus has been installed and delivered, please be sure to insert the manual pages in this section as detailed in the manual supplement.

- ! Terminal mode entry and exit

The Argus also allows display of ASCII and graphical information as determined by other manufacturer's products when used in the Terminal mode. This section covers entering and exiting the terminal mode. If you are using a 3rd party product, its manual will describe Argus operation with that product. If you are interested in using the Argus as a display, information on doing so appears here.

- ! Tandem mode software option

There is a special Argus software option that allows two units to be connected together with a keypress on either being reflected in the operation of both. This option is used primarily for training purposes, and is described in this section if installed.

THIS PAGE INTENTIONALLY LEFT BLANK

Argus Terminal Mode

The Argus can be used as a display terminal. When this feature is selected, the Argus screen can depict alphanumeric information and graphics sent to it by an external device such as a fuel flow indicator, transponder data link, or other source of serial data. The first part of this section describes operation of the Argus as a terminal, and is intended to be used in conjunction with information provided by the manufacturer of equipment connected to the Argus. The second part contains the technical information necessary to use the Argus terminal capability, such as interface data. This part is intended for programmers and developers who wish to connect their own equipment to the Argus. It also may be of interest to builders of experimental aircraft who wish to use the Argus as a display for their own avionics sensors or other equipment.

Terminal Mode Operation

There are two possibilities for terminal mode operation: dedicated and on-demand.

When the Argus is set up as a dedicated terminal, the only Argus control defined explicitly is the ON/OFF/BRIGHTNESS knob. When the Argus is powered on, it will go through selftest and display the serial number page. At this time the brightness control is active and may be adjusted for the desired illumination. To enter terminal mode, press any button. This causes the Argus to enter the terminal mode with a blank screen. The display is now completely controlled by the external device to which it is connected, with the exception of power on/off. Any information on the Argus screen is generated by the external accessory, and if you press any buttons on the Argus, they are communicated to the external accessory. Therefore, all further information about Argus operation in this mode must be supplied by the manufacturer of the accessory.

Important Note: If the accessory is not turned on or is defective, it can appear that the Argus is not working. If you suspect this may be the case, it is possible to go into the SETUP mode to see if the Argus works in other modes. If you do so, be sure to make a note of the baud rate and other SETUP parameters on the page immediately following the page on which the terminal is selected so you can reset them when returning to terminal mode. (See SETUP.)

When the Argus is set up as an on-demand terminal, the Argus works normally until terminal mode is accessed deliberately. To access the terminal mode, first make sure there are no SElected objects on the screen, and then press INFO two times. The first press brings up the LRN INFO page as described earlier, the second press activates the terminal mode. As above, when the Argus is in terminal mode, button presses are sent to the accessory device, and the screen display is determined by the accessory. However, the Argus can be made to exit the terminal mode in two ways:

1: Pressing INFO when the Argus is in on-demand terminal mode returns it to the MAP mode and range it was in when terminal was selected. (PUSH "INFO" TO EXIT) is normally displayed at the bottom of the terminal screen to indicate this option. 2: Pressing AUX three times will enter the first menu page.

As with the dedicated terminal mode, and with the few exceptions described above, operation of the Argus in the on-demand terminal mode is completely determined by the external device. Please refer to its instruction manual for more information.

Terminal Mode Programming.

The remainder of this section is of interest only to programmers developing products that will use the Argus as a display. Unless you are doing so, you can skip to the next section.

The Argus is available in a monochrome and in a color version. This section includes information on sending data to the color Argus. The monochrome unit cannot display colors and has other significant hardware differences. If your program is intended to operate with either a color or monochrome unit, you have three choices:

- 1: Eschew using the color command sequences.
- 2: Use the color command sequences in a non-critical way, i.e., for "decoration" rather than for critical information distinction.
- 3: Determine programmatically whether the Argus is a color or monochrome version and have your program operate conditionally upon the result.

In general, sending a color command sequence to the Argus is a no-op. It will silently be disregarded. You also cannot adjust the screen brightness (although brightness will be reported as being changed, no change will be visible to the operator). Commands

sent to simulate turning the knob will be ignored and, of course, you will never receive a sequence indicating that the knob has been turned or pressed.

Information can be placed on the Argus screen by sending serial data to the selected Argus port with the appropriate RS-232 parameters. The input port (A or B) and the baud rate, parity, and number of stop bits are selected at the Argus using the SETUP mode. The first two pages of SETUP determine if the dedicated terminal mode will be used, and its RS-232 parameters. The on-demand terminal mode is selected on the ADAPTER page of SETUP, followed by its RS-232 parameters. Of course, data from the external device must conform to the parameters selected. There is no provision for remotely changing this SETUP information. In particular, there is no "autobaud" or similar feature at the Argus end.

The terminal mode uses the "software handshake" (XON [\$11]/XOFF[\$13]) protocol. It is possible to overrun the Argus input buffer by ignoring the XOFF command. XOFF is sent when there is space for 10 bytes in the queue, and XON is sent when there are 10 bytes left in the queue. Since some escape sequences can exceed 10 characters, be sure that either your program can respond to XOFF while you are sending an escape sequence, or that when sending parameterized sequences there is sufficient space to receive them completely. The Argus input buffer is 1024 bytes. Operations such as scrolling and some graphics operations take considerably longer than one character time. Note that while the Argus SENDS the XON/XOFF sequence, it isn't set up to RECEIVE XOFF characters. At most, the Argus sends only a few characters in response to a data request. If you avoid sending the request unless you have room to receive the reply, this won't be a problem.

The Argus can go into terminal mode by two means. If the LRN in setup is selected as "ASCII PORT A" or "ASCII PORT B" then terminal mode is the only operation (besides setup) which the Argus will support. This is referred to as the "dedicated" terminal mode.

If a valid LRN is selected and the adapter type is selected for "AUX. PORT. B" in SETUP, then the Argus will operate normally until "info" is hit two times with no selected object. At that time, the Argus will enter terminal mode with a single-line prompt at the bottom of the screen (PUSH "INFO" TO EXIT). When "info" is hit the Argus will leave terminal mode and return to the map display. If "AUX" is hit three times the Argus will leave terminal mode and go into the main menu page. (If the

Argus has the optional internal GPS, additional presses of INFO will be necessary to exhaust the GPS info pages before entering the terminal mode.)

You should avoid sending data to the Argus when it is not in terminal mode. You can determine if the Argus is in the terminal mode and ready to receive data by sending a single ENQ character:

When in terminal mode, the Argus will echo an ACK (\$06) when it receives an ENQ (\$05). When NOT in terminal mode, the Argus will echo a NAK (\$15) when it receives an ENQ. In addition, when the Argus goes into terminal mode as "AUX. PORT B" then it will send the string "YY" when it enters terminal mode and "ZZ" when it leaves terminal mode. Note that if the Argus has not been SETUP to allow entry into terminal mode at all or is turned off, then there is NO RESPONSE to ENQ. However, sending data to the Argus when it is not in terminal mode will absorb CPU cycles.

Queries

You can determine important characteristics of the Argus by sending it an interrogation sequence. Information including model number, serial number, software version, cursor location, and brightness can be obtained.

The Argus model number tells you, among other things, the screen size, the location of the softkeys, and whether the unit is capable of displaying color. The software version will be useful in determining what terminal features are available. The information in this manual is provided for software release 5.00. If a version greater than 5.00 is returned, it may mean that new features have been added. Some terminal features, NOT INCLUDING this one, were implemented in versions as early as 4.00. The Argus serial number will be useful if you desire to "lock" your software or product to a particular Argus.

All queries elicit a response from the Argus. This response is in the form of a question mark ("?"), the query number, a comma (","), the answer to the query and a carriage return. If there is more than one number in the answer then the numbers will be separated by commas.

For example: If "<ESC>[1?" is sent to an Argus 5000, it will return "?1,5000<CR>". If "<ESC>[4?" is sent to the Argus whose cursor is at Y=64 pixels, X=20 pixels, then the Argus will return "?4,64,20<CR>".

<ESC>[1? Report the model number of the Argus.

<ESC>[2? Report the serial number of the Argus.

<ESC>[3? Report the version number of the Argus software. The version is returned as a number with a decimal point. I.e. Version number 05.01 will return "?3,05.01<CR>".

<ESC>[4? Report the current cursor position in pixel units. The Y position is returned first, followed by the X position after the comma.

<ESC>[5? Report the current CRT brightness in percent of full brightness. A brightness of "0" is minimum brightness and "100" is maximum brightness.

When the Argus enters terminal mode, it does so with all parameters set to their defaults, and the brightness as set by the user. If you have set the clipping limits, color, line pattern, etc., and the user exits the terminal mode, when he re-enters it, these settings will NOT be retained and the screen will be cleared. As described above, you

can determine when the Argus is paying attention to your data. You must re-establish any settings you want to apply to your data and instructions each time it enters terminal mode. For this reason, we recommend that you periodically confirm that the Argus is paying attention to your data by using the ENQ/ACK sequence. Another reason is that, while the "YY" data can act as a "wake up" for your program, the Argus can fail to send a "ZZ" if, for instance, the user turns off Argus power or pulls a breaker without exiting terminal mode. Note: If you are using an automatic interrupt or a multitasking operating system, be sure not to insert the ENQ character in an escape sequence, since an illegal character will terminate the sequence. If possible, only issue an ENQ when you are sure your output buffer is empty, and refrain from sending any further data until you receive the ACK.

When the Argus is in the terminal mode, data can be transferred in both directions. Data transferred FROM the Argus to your device comprises character codes activated by the user pressing and/or holding individual and certain combinations of front panel keys, and, optionally, when the user rotates or presses the brightness/data input knob. Data transferred from your device to the Argus can place alphanumeric and graphical information on the Argus screen.

Data FROM the Argus:

While in terminal mode, the Argus will send the following characters when the front panel buttons are activated:

Key	Character sent
DEP push	A
ENR push	B
ARR push	C
AUX push	D
SEL push	E
INFO push	F
EMER push	G
DEP hold	I
ENR hold	J
ARR hold	K
AUX hold	L
SEL hold	M

INFO hold N
EMER hold O

When a key is held, the character for the push of that key will be sent first. The hold character will be sent once per second (unless the repeat rate has been changed) while the key is held. For the combinations (SEL, INFO and EMER) each key code will be sent as that key is pushed. Thus, when holding the SEL combination the Argus will send "D" when AUX is first pushed, "E" will be sent when SEL is pushed (AUX and DEP) and finally "M" will be sent after one second has passed. If the remote switches are installed then they will send the same characters as the SEL and INFO combination without the initial "D" since AUX is not pushed first.

The rotary knob is normally used by the Argus to turn power on and off, and to adjust the screen brightness. It is also used during Argus map operation as a data input device. For instance, if a character must be selected as part of a waypoint, turning the knob clockwise scrolls through the alphabet A-Z-0-9, and turning it CCW scrolls 9-0-Z-A. In the terminal mode, the knob, by default, does NOT provide any RS-232 output. You can use the knob to output data by sending the following character sequence to the Argus:

<ESC>[78m where <ESC> is ASCII character 27 decimal

After this sequence is received, the following codes will be output:

POWER hit P
POWER hold Q
KNOB CW R
KNOB CCW S

If the knob is not being actively used to input data, it is good practice to relinquish control so that the user can adjust the screen brightness. You do so by sending the following sequence:

<ESC>[77m

The Argus power is shut off by HOLDING the rotary knob in for about 3 seconds. In map operation, the user is notified of this by a warning screen "power will be turned off in 3-2-1- seconds." This warning is NOT provided in terminal mode, but holding the switch down will nonetheless turn off Argus power. Therefore, we recommend the following:

1: Do not provide any functions that would cause the user to hold the rotary knob in. If you use the rotary knob hit function (return character "P"), try to give the user immediate feedback so that he will release the control right away.

2: If you receive one or two "Q" characters, perform any actions you think appropriate, as the user will likely no longer have a display in a second or so.

It is possible that the user will turn the rotary knob faster than the Argus circuitry can keep up or faster than the RS-232 link can send a character for each successive click of the knob. Therefore, do not count on being able to determine the position of the knob. If the user turns the knob slowly and deliberately, no characters should be lost. You can infer the approximate rate at which the knob is being turned by timing the space between characters. This information can be used to generate a rate-sensitive response. If the user turns the knob exceptionally rapidly, it is possible that the wrong character (R instead of S or vice versa) will be transmitted. This is usually benign because, at worst, the sequence will be something like:

"RRRRRRRRRRRRRRSSRRRRRRRR"

If you use "R" to increment a function and "S" to decrement it, it will simply increment more slowly than would be expected. However, if you use the knob to implement two completely different functions depending upon the direction in which it is turned, the undesired function may be activated unexpectedly. Since you cannot control the user's knob turning speed, we strongly recommend that the knob CW/CCW rotation be used only to control either functions that increment and decrement or that turning the knob in EITHER direction perform the same function regardless of direction turned.

Data TO the Argus.

The terminal mode responds to some standard and some non-standard VT-100/ANSI command sequences. All commands begin with the escape character (\$1B) and the left

bracket (\$5B). The escape character is shown here as "<ESC>". Most of the commands accept one or more numerical values. If the value is not present, it will be assumed to be equal to one. If more than one value is needed they are separated by a semi-colon (;). To aid in programmatic generation of parameters for the graphics commands, a "number" can have a leading space. E.g., "<sp>123;<sp>456" is interpreted as 123;456. However, numbers may not have trailing spaces, decimal points, minus signs, exponents, or anything other than the digits themselves.

With the exception of the brightness control escape sequence, all the commands described below are used to affect the display screen. All data that ISN'T part of an escape sequence is considered to be alphanumeric data that will be, if possible, placed on the screen at the present cursor location. Note that not all ASCII characters have standard or even extant alphanumeric representations. Some fonts contain special symbols that are used as part of the map drawing routines or for other functions. While it may be tempting to use some of these symbols, we recommend AGAINST doing so because they are not guaranteed to remain constant with software revisions. More on this subject in the Font descriptions.

The following escape sequences are "standard" VT-100 ANSI codes.

- | | |
|-----------------------|---|
| <ESC>[NA | Move the cursor up "N" lines. All lines are assumed to be 32 pixels high. Commands that would raise the cursor higher than the top line leave it on the top line. |
| <ESC>[NB | Move the cursor down "N" lines. All lines are assumed to be 32 pixels high. Commands that would place the cursor below the lower clip limit leave it on the last valid line above the clip limit. |
| <ESC>[NC | Move the cursor right by "N" characters. The width of a character varies with the size of the currently selected font. Commands that would place the cursor beyond the right edge of the screen leave it on the right edge of the screen. |

<ESC>[ND	Move the cursor left by "N" characters. The width of a character varies with the size of the currently selected font. Commands that would place the cursor to the left of the left edge of the screen leave it on the left edge of the screen.
<ESC>[Y;XH	Move the cursor to character row number "Y" and character column number "X". If "Y" and "X" are omitted, the cursor will be positioned at 1;1 which is the upper left corner of the screen.
<ESC>[J	Clear the screen and position the cursor at the upper left corner of the screen.
<ESC>[K	Erase from the cursor position to the end of the line.
<ESC>[m	All character attributes off. Set font to "monospace", cancel reverse video and set color to yellow. Set repeat rate to once per second.
<ESC>[7m	Set reverse video on all following characters. Note: due to the design of the fonts, especially the smaller ones, inverse video is significantly more difficult to read than the same message in normal video. We recommend against presenting long messages in inverse video. It is best used to highlight a brief message in a large font.
<ESC>[31m	Set foreground color to red on all following characters and graphics.
<ESC>[32m	Set foreground color to green on all following characters and graphics.
<ESC>[33m	Set foreground color to yellow on all following characters and graphics.
<ESC>[s	Save cursor position.
<ESC>[u	Restore cursor position.

The following escape sequences are non-standard VT-100 ANSI codes

<ESC>[10m Set to "small" font.

<ESC>[11m Set to "medium" font.

<ESC>[12m Set to "large" font.

<ESC>[13m Set to "monospace" font.

<ESC>[14m Set to "giant" font.

<ESC>[BBh Set the CRT brightness to "BB" percent of maximum brightness.

<ESC>[TTi Set the repeat rate for held buttons to TT * 20 milliseconds.

Argus screen information

The Argus has four "layers" of screens that can be drawn to. Only the front layer is visible to the user, but all four layers are identical as far as drawing is concerned. This feature can be used to advantage under several circumstances:

- 1: If it takes a long period of time to accumulate information for display, and you would like to leave the previous information available in the interim.
- 2: You can draw a special screen to be used for an urgent notification that must be available on a moments notice. Since displaying an already-drawn screen is much faster than drawing one from scratch, the three undisplayed layers can be held in reserve and displayed almost instantly when necessary.
- 3: A higher numbered screen can contain elaborate formatting data (many boxes, lines, etc.) That screen can be copied forward after which only alphanumeric data need be added. Then, the screen with the data and formatting can be copied forward to the display screen. The screen with the formatting, if it has not been overwritten, can be reused with a different set of data.

The first four sequences below determine to which screen subsequent writing and graphics operations are applied. The next three copy higher numbered screens forward. Note that the copy is destructive. When screen two is copied to screen one, the previous contents of screen one are lost.

<ESC>[50m	Draw to screen number zero (the displayed screen).
<ESC>[51m	Draw to screen number one.
<ESC>[52m	Draw to screen number two.
<ESC>[53m	Draw to screen number three.
<ESC>[60m	Copy screen number one forward to screen number zero.
<ESC>[61m	Copy screen number two forward to screen number one.
<ESC>[62m	Copy screen number three forward to screen number two.

The next two escape codes control the Argus' reaction to the user's adjustment of the power/brightness knob. As discussed earlier, we recommend leaving the control in its default state whenever possible so the user can adjust the screen brightness.

<ESC>[77m	Pushing or turning the Power/Brightness control will adjust the brightness or turn off the power. When the knob has been pushed for four seconds, the power will be turned off. No data is sent from the Argus when the knob is manipulated. This is the default state of the Power/Brightness knob.
<ESC>[78m	Pushing or turning the Power/Brightness control will send characters "P" through "S" instead of adjusting the brightness. When the knob has been pushed for four seconds, the power will still be turned off.

You draw a line on the Argus screen by setting the cursor at the beginning of the line and then issuing a draw command whose coordinates are at the end of the desired line. It is important to remember that the Argus does not use "square pixels." As shown in

the pixel location drawing, the Argus is logically 256 pixels wide and 512 pixels high, but the physical dimensions of the screen are 2 units wide to 3 units high. Therefore, drawing from, say, coordinates 1,1 to 100,100 will NOT result in a negative 45-degree angle. It is your responsibility to take this into account when drawing geometric shapes.

Lines (and arcs) are, by default, drawn as unpatterned lines and with all pixels in the line turned on. This may be undesirable because the line will be invisible when crossing an already-filled area. You can elect to have the line perform one of various boolean operations when crossing a given pixel. If, for example, you select "XOR", a lighted pixel crossing another lighted pixel would turn that pixel OFF, thus drawing the line visibly across a block-illuminated area. The default mode is "OR":

<ESC>[70m Set the drawing mode to "OR".

<ESC>[72m Set the drawing mode to "XOR".

You can create lines with any desired pixel pattern using an escape sequence. The pattern is 32 bits long and will repeat every 32 bits. The least significant bit is drawn starting at the current cursor position. Here is an example of how to create a pattern:

- 1: Desired: Dash-dot-dot-dash.
- 2: Convert to binary pattern: Dash= 1111, Dot= 11, space= 00
- 3: Convert to long word (32 bits): 11110011001100111100110011001111
- 4: Convert to decimal: 80258255
- 5: Issue command CHR\$(27)&"[80258255b"

Note: In this example, the pattern will not be smooth, because it ends and begins with a dash, so the next repetition will also begin with a dash, giving a double-length dash between repetitions.

<ESC>[PPPPPPPPb Set the current drawing pattern to the longword "PPPPPPPP".
 The value is the decimal representation of the binary pattern.

As with an unpatterned line, you can select boolean operations to be performed on a pixel-by-pixel basis. The default is "PATTERN MOVE."

<ESC>[73m Set the drawing mode to "PATTERN MOVE".

<ESC>[74m Set the drawing mode to "PATTERN OR".

<ESC>[76m Set the drawing mode to "PATTERN XOR".

The following are the drawing commands, enabling you to create lines, arcs, and filled and empty boxes.

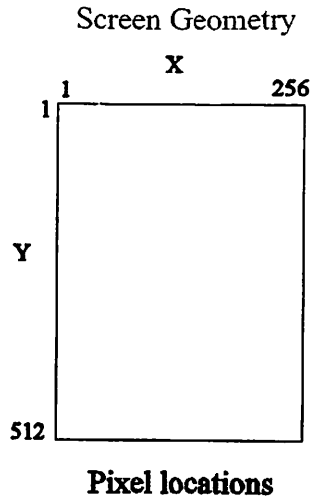
<ESC>[Y;Xa Set cursor to the pixel at X,Y. This sets the cursor on pixel boundaries instead of character boundaries. When drawing characters with the cursor set to something other than normal character positions, linefeed will still move down by 32 pixels and scrolling will still move the entire contents of the screen above the prompt (characters and graphics) up by 32 pixels.

<ESC>[Y;Xc Draw a line from the cursor position to the pixel located at X,Y. After drawing the cursor is positioned at X,Y. If character drawing causes the screen to scroll, the graphics will be scrolled as well.

<ESC>[S;E;Rd Draw an arc centered at the cursor, starting at angle "S", ending at angle "E" with a radius of "R" X pixels. The pixels have a 2:3 aspect ratio, thus the radius is specified in X pixels. The cursor is not moved.

<ESC>[Y;Xe Draw a filled box with one corner at the cursor position and the opposite corner at X,Y. After drawing the cursor is positioned at X,Y.

<ESC>[Y;Xf Draw an outline box with one corner at the cursor position and the opposite corner at X,Y. After drawing the cursor is positioned at X,Y.



You can set the drawable area of the screen using the "clipping limits" escape sequence. Once the limits are set, anything drawn outside the limits is protected. This allows you to place a prompt or other invariant information at, say, the bottom of the screen. The default prompt, PUSH "INFO" TO EXIT, is drawn below the clipping limits, so that when additional information is placed on the screen the prompt is unaffected. Here is an example of how to change the prompt:

1:<ESC>[80m	Disable scrolling
2:<ESC>[512;1;1,256g	Set clipping limits to full screen
3:<ESC>[16;1H	Move cursor to bottom of screen
4: Your Prompt Here	Output text of prompt
5:<ESC>[488;1;1;256g	Restore clipping limits to default
6:<ESC>[79m	Re-enable scrolling (optional)

Note that the clipping limits affect ALL operations. If you try to clear the screen after setting the clipping limits above the prompt, the prompt will still remain.

<ESC>[YLL;XLL;YUR;XURg Set the clipping limits of the screen. YLL;XLL are the pixel coordinates of the lower left corner of the clipping limits and YUR;XUR are the pixel coordinates of the upper right corner. Scrolling is not advisable when the clipping limits have been changed from their default values. The default values for the clipping limits are: YLL=488, XLL=1, YUR=1, XUR=256.

<ESC>[79m Enable scrolling when the cursor reaches the bottom of the screen. This is the default condition.

ESC>[80m Disable scrolling when the cursor reaches the bottom of the screen. This may be needed when combining graphics with characters or when setting up a new prompt at the bottom of the screen.

The Argus has 5 internal fonts. While these fonts follow ASCII conventions for numerals and uppercase letters, they are idiosyncratic in other respects. In particular, there are many symbols that are used in drawing the Argus map symbology. As discussed above, we recommend that you NOT use these symbols since they are subject to change in future revisions of Argus software. Below are "screen dumps" of the fonts available. When you print a sequence of characters, be aware that, although the fonts differ in size, each one is considered to be 32 bits high. Therefore, printing lines of small characters will leave them farther apart than expected; printing lines of "giant" characters will leave them abutting. If you must print characters in specific positions, you can use the pixel cursor location escape sequence instead of the character position sequence. Note that the "monospace" font has an almost complete ASCII uppercase character set.

<ESC>[81m Set the character height to one line (32 pixels.) This is the normal state where all characters from small font through giant font are 32 pixels high. Each character will overwrite anything on its line which will eliminate parts of characters remaining on

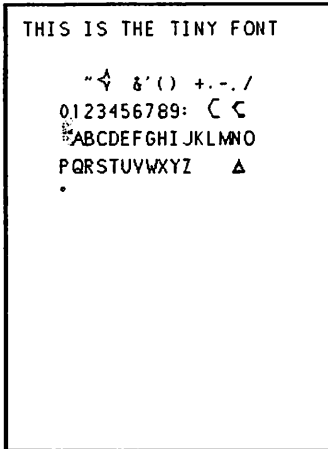
the screen when smaller characters overwrite larger ones on the screen.

<ESC>[82m

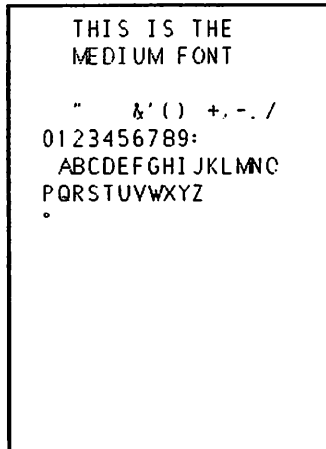
Set the character height to the minimum for the current font. This will allow the characters to create the minimum disturbance to the background over which they are written.

Argus internal fonts

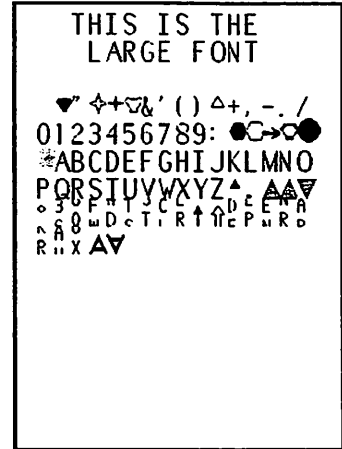
All fonts implement ASCII characters A (\$41) through Z (\$5A) and the numerals 0(\$30) through 9(\$39). Additional characters are implemented as shown in the screen dumps:



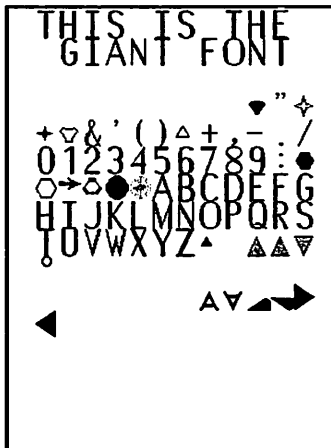
<ESC>[10m (small)



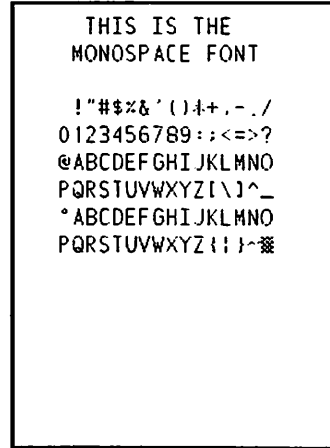
<ESC>[11m (medium)



<ESC>[12m (large)



<ESC>[14m (giant)



<ESC>[13m (monospace)

Programming and Debugging Hints

Notes on use of color

The Argus creates a color screen with "Liquid Crystal Shutter" technology. Much like very early color television which used a "color wheel" in front of the CRT, the shutter alternately allows green light and red light to pass through. By synchronizing the displayed information with the active shutter color, it is possible to display information in three different colors: red, green, and orange-yellow, which is the resultant of the red and green overlaid. When using the color features, you should know several important points:

- 1: Red is traditionally used for danger or other warnings. If you wish to alert the user to an out-of-range setting, especially one that could cause damage to the engine, aircraft, etc., red is the appropriate color. Otherwise, it is better to avoid it.
- 2: Because the yellow-orange results from the overlapping of red and green, it will be somewhat brighter than either color alone. If you are going to draw small features or other information that might be hard to see, this color will enhance visibility.
- 3: While the Argus handles the color separation automatically, if you deliberately draw a red object on top of a green object, the resulting overlapping area will also appear orange-yellow, which may not be intended. Likewise, if you erase red from a yellow-orange area (by using the EXOR drawing function, for example), then the erased area will appear green.
- 4: The Argus has an Amend setting that allows the user to select a monochrome display. This feature will seldom be used, but it does override the terminal colors you select with the escape sequence. If the user selects monochrome, all information will be displayed in the color he chooses. While no data or graphics will be lost, any information that is distinguishable only by color contrast will not be visible. Therefore, we recommend that some indicia other than color be used to contrast critical information. It would also be wise to warn the user against making a monochrome selection if you cannot avoid using color for information display.

Notes on screen brightness control

The Color Argus units have commands available to read and control the brightness of the Argus screen. This capability is provided in case you need to preemptively change the screen brightness, possibly as a method of informing the pilot of an urgent situation. Normally the user will adjust the screen brightness to his own liking, and this should not be changed unless necessary. If you do wish to change it, we recommend that you first read the brightness as set and save that value so that when your message has been acknowledged you can return the brightness to its original setting.

There is a time constant inherent in brightness setting. It takes about a second to go from full dim to full bright or back. Therefore, if you want to flash the screen to get attention, you should allow a second for it to reach the desired brightness, or 2 seconds per full cycle.

Graphic Programming Suggestions

There are several factors to be considered that are related to the technical characteristics of the Argus and of typical installations.

1: Unless you know that the Argus is mounted directly in front of the only user, it would be wise to consider parallax in your programming. The CRT is mounted behind the color shutter, which is mounted behind the front bezel. If you look at the unit from any angle other than straight on, it is possible that a small portion of the top, bottom or side of the CRT will be obscured by the physical construction of the Argus. Therefore, you should avoid presenting critical information at the very edges of the screen. (The bottom is usually safe since the Argus is rarely mounted above eye level.)

2: When the Argus is in map mode, there is a relatively small percentage of "fill" on the screen. If more than 10-20 per cent of the pixels are illuminated, the map is perceived as cluttered and the user will take action to reduce the range, eliminate displayed objects, etc. In the graphics mode, it is possible to illuminate as many pixels as you wish. We recommend that you attempt to keep the percentage of lighted pixels to about the same as the map. The CRT beam current is proportional to the number of ON pixels, the selected colors, and the brightness. As more are illuminated, the current increases, and the accelerator voltage decreases. Thus, with an excessive graphic fill and a user- or program-commanded change in brightness, the illuminated screen size may be observed to vary somewhat, getting larger as the brightness increases.

Debugging: The HEX PORT screens

The Argus provides a debugging facility called "hex port." When selected, characters sent to the Argus are displayed as hex digit pairs followed by a space. All characters, including the unprintable ASCII characters are displayed this way. For example, the characters "A<cr><lf>" would be displayed as "41 0D 0A." This facility is useful for determining why you may be getting unexpected results from terminal commands, as it can show whether there are missing or extraneous characters. It is possible to overrun the input buffer when using higher baud rates and scrolling the data.

Appendix 1: Database Update

The Argus has a database stored in "flash" read-only memory chips (ROMs) on the database printed circuit card. There can be up to three of these chips, and together they can store up to 12 megabytes of data. The data in these chips cannot be lost except under extraordinary circumstances, none of which should ever occur during normal Argus operation. Also, each time the Argus is turned on, a powerful software routine assures that the data hasn't changed from that programmed at the factory. Thus, if the Argus passes its selftest, you can be assured of database integrity.

Unfortunately, the real world doesn't exhibit the same stability as the Argus ROM database. Infrequently, new airports open. (More frequently, old ones close.) Frequencies change even more often. Thus, the Argus database will slowly become outdated unless it is updated. Eventide creates a new domestic database every 56 days, corresponding to the cycle in which we receive data from the government. Charted items, such as Class B airspace, become effective with the issuance of new Terminal Area Charts, Class C airspace with new sectionals. If you have an international database, updates are available every 28 days.

You are required by law to have current charts with you when you fly. These are your legal reference sources. And, depending upon how recently you purchased your Argus, they may have major and minor differences, which may affect your flight. You can determine your database "expiration date" simply by turning the Argus ON and waiting for the date display. The unit serial number is also displayed at this time.

To be certified for IFR use the database must be current. To permit this, Eventide provides a variety of database update and subscription services. If you are not concerned about legal issues of database currency because you are flying VFR or for other reasons, we herewith offer some commonsense guidelines for deciding when to update.

If you fly in a local area, you will know, perhaps from reading the papers, when an airport opens or closes. This is an excellent reason to get an update. If your local area is congested, and has a lot of special use airspace, changed Class B or C airspace boundaries should prompt you to consider an update.

If you fly over wider areas than you are likely to know about anecdotally, you probably want to update more frequently than does someone who knows the area well. And, if you fly in a sparsely populated area without too much happening, and use the Argus to help you find your friend's airport at night, you probably don't need to worry about updates 'til he sells the ranch.

The "half-life" of frequencies is shorter than that of physical facilities. If you find that tower and approach frequencies begin not to agree with those shown, it's time to think about an update. In other words, when the discrepancies between the Argus "map" and the real-world "territory" exceed your personal threshold, it's update time.

There are several methods of updating your database:

Let somebody else do it. You can bring it to your shop or send it to Eventide.

Do it yourself. We provide the cable and database file necessary to perform the update, either on a subscription or one-time basis. If you decide to do it yourself, you have three choices, in order of increasing price:

Least expensive: Download the database file from the World Wide Web and transfer it to your Argus using common terminal software. Our World Wide Web address is <http://www.eventide.com>, and instructions are on the Web site itself. You will need terminal software that can handle the "XMODEM" protocol.

More expensive: Order your subscription on floppy disk; we send you the disks as often as desired, and you transfer the data to the Argus. Refer to a current price list for information. Other than the source of the data, the procedure is the same as that used with the World Wide Web.

Most expensive: We send you a replacement database board that must be installed in the Argus. You return the expired board.

If you decide to "do it yourself" with an electronic download, you will need a special cable to connect the Argus to your computer serial port and software capable of supporting the "XMODEM" protocol. (This software comes with Windows and Windows95 at no charge, and is readily available for most platforms.) We provide a

cable at no charge with your first update (specify PC or Mac). The update may be performed using aircraft or bench power.

If you decide to send the Argus to us, here is the procedure.

1: Call for a return authorization and current price. When you call we'll need your unit's serial number as displayed on the screen. *There must be a return authorization number on the package or it will not be accepted.*

2: While we can usually schedule the return at your convenience, you should call to confirm that it's a good time. There are periods during the 28- or 56-day cycle during which the new database is being prepared, and if you can wait a few more days, you'll get the new version.

3: Pack the unit carefully, preferably in the box in which it arrived. If you don't have it, use enough cushioning so that if the box is dropped from a height (which it will be, perhaps several times), the unit won't break. We recommend foam rubber as a cushioning material.

4: If you have any special **shipping instructions**, be sure they're included, in writing, with the unit. If you want the unit returned by a premium method, please specify on paperwork.

Many avionics shops can perform field updates on Argus databases. If you would like to return the unit to your installation agency for an update, feel free to check with them first.

Appendix 2: Navigation Receiver Information

The Argus only operates in conjunction with a compatible GPS, LORAN, or other navigation receiver. Eventide has made every effort to ensure that the Argus is interoperable with all receivers that provide the requisite navigation data output and the minimum information required to enable the Argus to generate and orient a map. We have been quite successful at this; the Argus is compatible with the vast majority of general aviation NAV receivers, both in number of models and number in service.

While all of these at least provide the information we need to draw a map, there are differences that affect the Argus display. For instance, some provide multiple waypoints (i.e., "flight plan" modes), and some only have a single waypoint. Some provide the alphanumeric identifier, some only provide position or range and bearing. In addition, different receivers may perform differently in different areas, and, as with many types of complex electronic equipment, may have foibles or characteristics that make them more or less desirable to different people.

This Appendix lists compatible receivers and the information that they provide which affect how the Argus screen appears. **Eventide has made no investigation of the accuracy or sufficiency of these units except to determine that their data format is acceptable and usable for the Argus. Nothing said herein should be interpreted as our recommending any unit.** Also, receiver manufacturers sometimes change their software, and this can, deliberately or inadvertently, affect compatibility with the Argus. Known software version problems appear in the descriptions below. Eventide periodically publishes a "NAV SYSTEM STATUS BULLETIN" that identifies compatible receivers and advises of problems, differences, and idiosyncrasies. If your unit is not listed below, or if you have reason to believe it is acting differently from the description below and you can't find updated information on Eventide's Web site, contact the unit's manufacturer, or Eventide.

Unless otherwise noted, all receivers listed show a maximum groundspeed of 999 kts, a maximum crosstrack distance of +/- 99.9 nm, and provide alphanumeric waypoint identifiers to the Argus. For information on adjusting RS-232 parameters if necessary, refer to the individual unit's manual.

Model	Bendix/King KLN 88
-------	---------------------------

Software 125-00626-0000
Setup name KING KLN-88
Communications 9600 baud, 8-bit word, no parity, 1 stop bit
Number of waypoints Up to 32
Special notes NONE

Model **Bendix/King KLN89/KLN89B**
Software ORS Level 1 or later
Model **Bendix/King KLN 90**
Software 066-04031-0101, -0201, -0301, -0401
Model **Bendix/King KLN90A**
Software 066-04031-0111 through 0411 or higher
Model **Bendix/King KLN90B**

Software
Setup name KING KLN-90 GPS
Communications 9600 baud, 8-bit word, no parity, 1 stop bit
Number of waypoints Up to 32
Special notes The KLN90B with software version 2107 or earlier has an anomaly that results in an occasional brief loss of flightplan data when it changes waypoints. This has been corrected in version 2108. Contact Bendix/King for more information.

Model **B.F. Goodrich ANI-7000 (ONI-7000)**
Software Version 05.09/04.15 or version 05.10/04.16
Setup name BFG/ANI-7000
Communications 9600 baud, 7-bit word, ODD parity, 1 stop bit. Our default; see note.
Number of waypoints 1

Special notes The ANI-7000 has adjustable RS-232 parameters. Be sure that they are adjusted as shown above. If fuel flow or other instrument is attached, it may be necessary to adjust both the ANI-7000 and the Argus communication parameters to match it.
The ANI-7000 requires interface card P/N 10310263 -1,-2,-3,-4, or -8 to provide RS-232 data to the Argus.

ARNAV: Due to frequent changes in the output formats of Arnav software, please refer to the specific Arnav models listed below for special installation and setup instructions, or contact Arnav directly.

Model	Arnav R-15/B and R-30/A
Software	V150 through V153() or V154B or later. See note.
Setup name	R-15A/B or R-30/A as appropriate
Communications	1200 baud, 8-bit word, no parity, 1 stop bit. Our default, see note.

Number of waypoints 1

Special notes	The R-15 and R-30 have adjustable RS-232 parameters. In addition to adjusting them to the values shown above, they should be programmed with a "page width" of 1 and an "update rate" of 1. If the LORAN is selected to the FUEL COMPELS/ENABLED mode, the Argus must be adjusted to 9600 baud.
---------------	--

Model	Arnav R-21NMS or R-21DMS
Software	V212, V213, V215, V217, V218()

Model	Arnav R-40 (IFR or VFR)
-------	--------------------------------

Software	V405, V406, V408
----------	------------------

Model	Arnav R-40RDB
-------	----------------------

Software	V413 (see communications note)
----------	--------------------------------

Model	Arnav R-60
-------	-------------------

Software	V350
----------	------

Setup Name	ARNAV R21DMS, R40, R40RDB, R60 as appropriate
------------	---

Communications	1200 baud, 8-bit word, no parity, 1 stop bit. Our default, see note.
----------------	--

Number of waypoints 1

Special notes	No distance, waypoint, or ARR ival mode display until groundspeed is sufficient to give an ETE under 10 hours. These LORANs (except the R-40RDB) have adjustable RS-232 parameters. In addition to adjusting them to the values shown above, they should be programmed with a "page width" of 1 and an "update rate" of 1. If the LORAN is selected to the
---------------	---

FUEL COMP-ELS/ENABLED mode, the Argus must be adjusted to 9600 baud. If the R-40RDB is in use, the Argus must be selected to 9600 baud.

Model	Arnav R-25
Software	V-250A
Model	Arnav R-50
Software	V-500B or later
Setup Name	ARNAV R25 or R50 as appropriate
Communications	1200 baud, 8-bit word, no parity, 1 stop bit. Our default, see note.

Number of waypoints 1

Special notes	These LORANs have adjustable RS-232 parameters. In addition to adjusting them to the values shown above, they should be programmed with a "page width" of 1 and an "update rate" of 1. If the LORAN is selected to the FUEL COMP-ELS/ENABLED mode, the Argus must be adjusted to 9600 baud. These LORANs have "training mode."
---------------	---

Model	Arnav R-50i, R-50v
Software	See special notes
Setup Name	ARNAV R50 or R50i as appropriate
Communications	1200 baud, 8-bit word, no parity, 1 stop bit. Our default, see note. (R-50v version 5500J and higher-9600 baud.)

Number of waypoints See special notes.

Special notes	These LORANs have adjustable RS-232 parameters. In addition to adjusting them to the values shown above, they should be programmed with a "page width" of 1 and an "update rate" of 1. If the LORAN is selected to the FUEL COMP-ELS/ENABLED mode, the Argus must be adjusted to 9600 baud. These LORANs have "training mode."
---------------	---

Early versions of the R-50i software require connection to pin 3 of the R50i and the selection of "R50I" in the Argus. Later

versions returned to pin 5 and the data format of the R50 (no "i") with various degrees of success. If the RS-232 setup menu on the R-50i has selections for both "Deg" and "XTK" then the unit should be compatible with an Argus selection of R50 connected to pin 3. On the R-50i, "Deg" should be set to "MAG" and "XTK" should be set to "NORMAL". If the R-50i does not have these selections and does not function when R50i is selected, then the R-50i should be returned to Arnav for updating

An R-50i which requires the Argus to be selected for the R-50i and is connected to Pin 5 of the ARNAV will display only one waypoint. An R-50i which requires the Argus to be selected to R-50 and is connected to Pin 3 of the ARNAV may display the full flight plan with the addition of a wire from pin 4 of the R-50i to pin 8 of the Argus with software version 03.03 or higher only. This is also true with the R-50. However, some versions of the R-50 will allow complete flight planning by running the additional wire. Contact ARNAV for those specific versions.

Model	Arnav R5000
Software	V3600A
Model	Arnav FMS5000
Software	V5500L
Model	Arnav STAR5000
Software	V5700A
Setup name	ARNAV 5000 SER
Communications	9600 baud, 8bit word, no parity, 1 stop bit
Number of Waypoints	See special notes.
Special notes	Use the same connection as the R50 (pins 3-13), NOT the R50i. These units can operate at 1200 or 9600 baud. We default this series to 9600 baud, but it's a good idea to confirm that the Arnav unit is set the same.

These units will only allow one waypoint to be displayed in the PLAN mode of the Argus. However, all versions of the Arnav 5000 series can give complete flight plan information by running a wire from pin 8 of an Argus with software version 03.03 or higher to pin 4 of the Arnav. Because the "EDI Route Output" on the STAR 5000 uses a different format than the flight data, use of this feature may cause the Argus to display "LRN DATA INVALID" each time the data is sent. The "EDI Route Output" feature must be disabled in the STAR 5000 when it is interfaced with an Argus.

For Arnav R-50 or 5000 Series installed with an ALTITUDE ENCODER- connect Pin 8 of the Argus to P1 Pin 3 of the Altitude Encoder. The Encoder must have software version V540C or higher.

Model	II Morrow 604 and 604 TCA
Software	Version 1.0, 1.1, 1.2
Setup Name	II MORROW 604
Communications	1200 baud, 7-bit word, ODD parity, 1 stop bit.
Number of waypoints	1
Special notes	The 604 does not provide alphanumeric waypoint identifiers. Software versions 1.0 and 1.1 provide data too infrequently for rapid screen update on the Argus. We recommend that you update your 604 to version 1.2.

Model	II Morrow 611
Software	Version 21.(), 22.(), or 28.()
Model	II Morrow 612
Software	Version 1.(), 2.(), or 8.()
Model	II Morrow 612 IFR
Software	Version 2.6, 2.7
Model	II Morrow 612A IFR
Software	Version 4.2
Model	II Morrow 612B, 612C
Software	Version 1.(), 2.(), or 8.()
Model	II Morrow 614 (RCU)
Software	Version 1.(), 12.(), or 19.()
Model	II Morrow 614R (RCU)
Software	Version 4.2
Setup names	611, 612, 612A, 612B, 612C, 614R as appropriate
Communications	1200 baud, 7-bit word, ODD parity, 1 stop bit.
Number of waypoints	1
Special notes	These LORANs do not display alphanumeric waypoint identifiers.

Model **II Morrow 618, 618C, 618R**
Software Version 1.0, 2.0, 2.1, 2.2 or higher
Setup name 618
Communications 1200 baud, 7-bit word, ODD parity, 1 stop bit.
Number of waypoints See special notes.
Special notes Version 1.0 software provides 1 waypoint to the Argus, without alphanumeric identifiers. Versions 2.0 and higher provide flight plan mode in which several waypoints may be displayed.

Model **II Morrow 800 (Flybuddy)**
Software Version 1.0 or higher
Setup name IIMORROW 800
Communications 9600 baud, 8-bit word, no parity, 1 stop bit.
Number of waypoints Up to 32 waypoints and flightplans can be displayed with this model.

Model **II Morrow 819**
Software Version 1.2 or higher
Setup name IIMORROW 819
Communications 9600 baud, 8-bit word, no parity, 1 stop bit.
Number of waypoints Up to 32 waypoints and flightplans can be displayed with this model.

Model **II Morrow 820, 820+**
Software Version 1.2 or higher
Setup name IIMORROW 820/+
Communications 9600 baud, 8-bit word, no parity, 1 stop bit.
Number of waypoints Up to 32 waypoints and flightplans can be displayed with this model.

Model	II Morrow 2001
Setup name	IIMORROW 2001
Communications	9600 baud, 8-bit word, no parity, 1 stop bit
Number of waypoints	Up to 32
Special notes	NONE

Model	TI-9100
Software	A371
Model	TI-9100A
Software	L124
Setup name	TI9100/A
Communications	1200 baud, 8-bit word, ODD parity, 1 stop bit
Number of waypoints	1
Special notes	This LORAN transmits one waypoint to the Argus. It does not send an alphanumeric identifier, but rather the symbol WPT followed by the sequence number. Due to the absence of desired track information NO COURSELINE can be displayed.

Model	Northstar M1/A
Software	Version 175 or higher.
Setup name	M1/A
Communications	1200 baud, 8-bit word, no parity, 1 stop bit. (RS-422 interface.)
Number of waypoints	Version 175-194: 1, Version 195 and greater: up to 20
Special notes	Note multiple waypoint "flight plan" capability mentioned above. The M1/A has a "DEMO MODE" capability. See LORAN Training Modes. Early Northstar LORANs did not have the RS-422 interface installed. It may be necessary for you to return yours to Northstar for updating if it was built before 1988. The maximum crosstrack distance displayed is +/- 8 nm.

Model	Northstar M2
Software	Version 01.01 or higher.
Model	Northstar M2V, GPS600
Software	Version 01.05 or higher.
Model	Northstar M3
Software	Version 01.19 or higher
Setup name	Northstar M2/V, 600
Communications	1200 baud, 8-bit word, no parity, 1 stop bit. (RS-422 interface.)
Number of waypoints	20
Special notes	The M2/V has a "DEMO MODE" capability. See LORAN Training Modes.

Model	B.F. Goodrich/Foster F4 or F14 Phoenix / LRN-500 or LRN-501 with RS-232C output.
Software	
Setup name	BFG/FOST F4/F14, BFG/FOST 500/1
Communications	1200 baud, 8-bit word, no parity, 1 stop bit
Number of waypoints	1
Special notes	<p>This LORAN transmits one waypoint to the Argus. It does not send an alphanumeric identifier, but rather the symbol WPT followed by the sequence number.</p> <p>This LORAN has a "DEMO MODE" capability. See LORAN Training Modes.</p> <p>The maximum crosstrack distance displayed is +/- 4 nm.</p>

Model Trimble Navigation TNL1000, TNL2000 GPS and TNL3000 GPS/LORAN C.
Software 1.0, 1.1, 2.0, 2.1 and higher
Model Trimble Navigation TNL2100 GPS and TNL3100 GPS/LORAN C.
Software 2.509 and higher
Model Trimble Navigation 2000T, 3000T, 2100T, 3100T
Software 0212, 0218, 0312, 0318, or higher
Model Trimble Navigation 1000DC
Software 0611 or higher
Setup name TRIMBLE TNL1000, TRIMBLE TNL2000, TRIMBLE TNL3000
Communications 9600 baud, 8-bit word, no parity, 1 stop bit
Number of waypoints 32 (see below)
Special notes The 1.0 and 2.0 software versions transmit only one alphanumeric waypoint with up to five characters to the Argus. Versions 1.1 and 2.1 produce up to 32 waypoints if you have selected an active flight plan.

Model Garmin GPS-100 Standard version
Software 3.5 or above
Model Garmin GPS-100 Aviation Version
Software 2.5 or above
Model Garmin GPS-100 European Version
Software 1.5 or above
Model Garmin 150, 155, 165
Software 02.07 or above
Setup name GARMIN GPS-100
Communications 9600 baud, 8-bit word, no parity, 1 stop bit
Number of waypoints Up to 32
Special notes The GPS-100 when mounted in its avionics tray uses the GPS-100 setup name. If you connect the GPS-100 directly to the Argus without the tray, it uses the "NMEA 0183" setting, which accepts the "marine" output. Please note that it is necessary to have version 3.03 or higher of the Argus software to use the NMEA output. Accept the NMEA default settings: 4800 baud, 8-bit word, no parity, 1 stop bit.

Model	Garmin GPS-55 Marine Portable
Software	1.5 or 2.03 or above
Model	Garmin GPS-55 Aviation Portable
Software	1.05 or above
Setup name	NMEA 0183
Communications	4800 baud, 8-bit word, no parity, 1 stop bit
Special notes	These units have an NMEA 0183 output, and require Argus version 3.03 or higher software. As portable units, they may not be approvable for aircraft installation.

Model	Eventide ARGUS 5000 or ARGUS 7000 (slaved operation)
Software	3.0 or greater
Setup name	ARGUS (SLAVED)
Communications	9600 baud, 8 bit word, no parity, 1 stop bit (always use the default settings).
Number of waypoints	1
Special notes	This is a special mode that allows the Argus 5000 to "drive" the Argus 3000. The 5000 is capable of accepting heading and ADF data. This setting permits display of the Argus 5000 heading and ADF data on an Argus 3000, along with the map display. The Argus 3000 controls remain functional for selecting mode and range.

Model	Magellan Skynav 5000
Software	1.6 and higher
Setup name	Magellan 5000
Communications	9600 baud, 8 bit word, no parity, 1 stop bit
Special notes	NONE

Navigation Systems outputting ARINC data formats

Many navigation systems including Omega, Loran, and GPS output data in the ARINC 429 or 419 format. Eventide manufactures an adapter that allows data from these navigators to be sent to the Argus. Data from these units is "labelled," and certain labels are required for the Argus to draw and orient the map and present information such as flightplans and waypoints.

The following ARINC labels are supported by the Argus system when installed with the ARINC adapter, and units generating them should be compatible:

ARINC 429 Labels

Label	Description	Label	Description
251	Distance to go	116	Cross track distance
012 or 312	Ground speed	147	Magvar
314	Heading	310	Latitude
114	Desired track	311	Longitude
313	Track angle	075	From/To waypoint
		074, 300-307	Waypoints

ARINC 419 Labels

001	Distance to go	075	From / to waypoint
012 or 212	Ground speed	014	Heading
010 or 210	Latitude	004	Desired track
011 or 211	Longitude	115	Waypoint bearing
013 or 213	Track angle	003	Crosstrack distance
036 to 061	Waypoints	031	Magvar

Appendix 3: Differences Between The Argus 5/7000 and Argus 5/7000/CE

The Argus 5000 was introduced in 1987. The Argus CE models, introduced in 1996, have color displays, new features, and increased database capacity. With the introduction of the CE models, Version 5.0 software was made available for monochrome units, which provides as many of the CE features as the monochrome hardware can support.

Feature	Argus Mono-chrome Ver 3/4	Argus Mono-chrome Ver 5	Argus 5/7000/CE
Color Display	NO	NO	YES
Database Maximum	2MB	12MB	12MB
Database Update	Board Swap	Swap or Download	Download or Card
Flight Recorder	NO	Yes	Yes
Flight Planning	Optional	Standard	Standard
User Waypoints	Optional	Standard	Standard
Internal GPS	No	No	Optional
Internal Barometric Pressure Sensor	No	No	Standard
Database: Intersections, Heliports, Seaplane Bases, Airways	Separate options	Standard	Standard
"Take-Home" simulator mode	Optional (w/Flight Planning)	Standard	Standard

Terminal Mode	Optional & Limited	Mono-chrome Graphic	Full Graphic standard
Data Entry knob	No, buttons only	No	Yes

Regulatory Issues

The Argus 5000 and 7000 are "TSOd" and "STCd," which means that they meet specific FAA criteria for use in aircraft as a required instrument. A TSO (Technical Standard Order) requires that the unit meet certain requirements, such as electrical and environmental testing, and a truly remarkable amount of paperwork must be generated to prove this. The STC (Supplementary Type Certificate) indicates that the unit in question can be installed in the aircraft and meets FAA requirements for operation in the aircraft during instrument flight and can be used (in the case of the Argus 5000) as a required instrument under certain conditions. The Argus 5000 must be connected to the aircraft's gyroscopic heading system to be eligible for IFR approval.

Database Differences

The Argus 5000 Ver. 5.x database EEPROM holds 4Megabytes of data. This is two times the maximum capacity of the Argus 5000 with software versions through 4.x, and can be increased if need be.

This increased capacity permits making more database features, such as airways and intersections, standard, and eliminates the limitations on runway length previously encountered on the international database. Because the EEPROM is electronically erasable, no chip changes are required for updating, and, in fact data can be loaded from a PC. We encourage this by making databases available electronically and on disk at a significantly reduced price.

Upgrade Path

All Argus 5000 and 7000 models, no matter how old, can be upgraded to version 5.x. All units are upgraded by exchanging the old database board using EPROMs for a new one using EEPROMs. In addition, it may be necessary to modify (for recent) or exchange (for older) the CPU board.

Appendix 4: Theory Of Operation

Computers are so universal in our society that it is no longer necessary to explain what a CPU (Central Processing Unit) is or does, or why Memory is so important. This applies especially to pilots, who are more than ordinarily technical. We will spare you the usual "this is how a computer works" lecture.

That being said, let's talk about the Argus, which is, fundamentally, a computer. It uses a 68000 series CPU (as did the Apple Macintosh before the PowerPC, but not the IBM PC or clones). It has 1 megabyte of Random Access Memory (RAM), rather less than a respectable PC nowadays. We use a Non-volatile RAM (NVRAM) to store pilot preference and other setup information (such as GPS choice). This Flash EEPROM also stores user waypoints, flightplans, the database and the operating system. Navigation data enters the Argus through an RS-232 or RS-422 port, just like a PC, and there's a chip to interface our CPU to the data stream. Because there are only four buttons, no keyboard controller is necessary.

Normal computers get their data from disk drives, which are slow, potentially less reliable, and subject to vibration and other environmental stress. Our programs as well as data are in semiconductor chips, and they are checked very carefully for errors each time the Argus is turned on (see Selftest, below).

Because so many radios are operated in close proximity to the Argus, the unit is essentially a solid barrier to radio energy leaking in or out. The connectors have electromagnetic filters on every pin. Exquisite care had to be taken in design and layout of the power supply to assure reliability under adverse conditions (high voltage spikes, different aircraft electrical systems), and insulation at high altitudes, where the atmosphere is a poorer insulator. The supply also had to have high efficiency, since excessive power dissipation would make ventilation necessary. This is a nuisance for the installer, a potential hindrance to reliability, and a source of leakage of radio interference. Many contradictory requirements came together in the supply, which uses "switching" technology. Unlike some equipment which uses twice as much power on 28 volt aircraft as it does on 12 volts, the Argus has a constant power drain at any aircraft voltage, approximately 1 Amp at 12 volts, or 1/2 Amp at 28 volts.

The ruggedized CRT display uses a unique 256-horizontal by 512-vertical display dot (pixel) format, with vertical compression to assure circles don't become ellipses. The

display is so sharp because the CRT dot size on the Argus tube is drastically smaller than is possible with state-of-the art Liquid Crystal or Electroluminescent displays.

Of course the key to the system is the software, also known as the "operating system," which required many person-years to write, and for which a patent has been allowed. The software has to know what the data streams from the various compatible receivers mean, and "parse" that information. Ultimately, it is translated to set or reset locations in memory that are scanned to produce a graphic image that says "airport below" to the pilot.

Selftest

Each time the Argus is turned on, several tests are performed. These tests assure that the digital circuitry is working correctly. They confirm that the CPU is operational, the input/output circuitry is working (**INTERRUPT** and **RS-232**), the setup information is still valid (**SETUP**), and the operating system (**SYSTEM ROM**) and database haven't been corrupted (**DATABASE**). The A/D converter test confirms that the interface to the gyro and other sensors is functional and accurate. If any test fails, refer to the troubleshooting hints (Appendix 5) to decide what to do about it.

Appendix 5: In Case Of Trouble . . .

The Argus has been built and tested with careful attention to reliability. It meets FAA and Military specifications with regard to temperature, altitude, vibration, etc. Nonetheless, like any piece of equipment, it can fail. The Argus contains no user serviceable parts, and must be returned to Eventide for repair if it becomes defective. Because it is part of an avionics system, however, it is very important to determine what element of the system is defective! For instance, if the GPS isn't working properly, one could erroneously conclude that the Argus is defective, send it back, and have us not find a problem. This section is devoted to helping you determine whether a problem lies with the Argus or with something else. Please read it carefully before calling us for a return authorization number.

The very best way to find out if a unit is defective is to swap it. If there is another aircraft available with an Argus installation, or another Argus that can be swapped with the one suspected to be defective, doing so will almost always give you an immediate answer as to where the problem lies. Unfortunately, this isn't always possible to do. Next best is to find your problem in the list below, and try our suggestions.

PROBLEM: The Argus won't turn on.

Does your other avionics gear turn on? If not, check aircraft electrical system! Check the Argus circuit breaker. If possible, apply bench power to the Argus.

PROBLEM: The switches light up but the CRT screen doesn't.

Check aircraft electrical voltage. The Argus requires at least 11 volts. Confirm that the brightness control is fully clockwise. If selftest doesn't begin or pass, the Argus is defective.

PROBLEM: There is a bright vertical or horizontal line (or just a dot) on the CRT.

If a vertical line persists for more than two or three seconds, or there is a horizontal line or dot, **turn the unit OFF immediately!** There is a problem with the display circuitry, and the Argus must be returned.

PROBLEM: Selftest ends with a failure message.

Cycle power a few times to confirm that the message is repeatable, and make a note of it! If the message is anything other than **NVRAM FAILED**, the unit must be returned. If the problem is with NVRAM, and the message only occurs once, it means that you have lost your **SETUP** and **AMEND** data but the unit otherwise is *probably* OK. In this case you will have to re-enter your information.

PROBLEM: Selftest passes normally, but I get a message "LRN DATA LOST."

This means that the Argus is receiving NO data from the receiver. Confirm that the GPS is powered up and that it has acquired. This is almost always a problem with the GPS or with the wiring between the units. Your installation agency can confirm that no data is reaching the Argus.

PROBLEM: I get a message "LRN NAV INVALID, LRN COMM FAULT, or WRONG LRN SELECTED."

Confirm that the GPS is powered up and has acquired and is tracking. If this is an initial installation, confirm that the installation agency set the Argus for the correct model Loran, and that the communication parameters are correct. If a new accessory (such as a fuel-flow indicator) has just been installed, it may be necessary to readjust the communications parameters so that the GPS, accessory, and Argus all agree. If everything was working and suddenly stopped, it may mean that either the setup information in the GPS or in the Argus changed. (If you got an **NVRAM FAILED** message on the Argus, it changed in the Argus. If you didn't, it probably changed in the GPS.) If the Argus operating system has been changed, then check the LRN in **SETUP**.

A more remote possibility is that there is a hardware defect in the GPS or Argus that is corrupting the data. Have a competent avionics shop check the data signal with an oscilloscope. The **"LRN NAV INVALID", "LRN COMM FAULT" or "WRONG LRN SELECTED"** message almost never indicates a hardware defect in the Argus. These messages are covered in more detail in the Setup section.

PROBLEM: My Northstar M1 is an older model with a serial adapter board installed in it. I'm getting "LRN COMM FAULT" even though the data signal looks good and the Argus is set correctly.

We have seen occasional cases where the RS-422 signal coming from the M1/A had the wires reversed in the LORAN. Try reversing the connections to see if this is the problem.

PROBLEM: I just got my GPS back from service, and it works fine. However, the Argus no longer works.

If the GPS manufacturer changed the setup information in the GPS, the communication parameters may be wrong. If the GPS manufacturer changed the software in your GPS, he might have rendered it incompatible with the Argus. Get together the serial number and software version of your Argus, and the software version in the GPS, and call us. If we can help, we will.

PROBLEM: My nav data looks OK but I get no distance to waypoint.

If you're using an Arnav R21 or R40, the ETE (time to waypoint) must be less than 10 hours for a distance to waypoint display. If you're testing the system on the ground, temporarily choose a closer waypoint.

PROBLEM: My nav data looks OK in the upper and lower windows, but I get no map.

In order to get a map display, the aircraft must be moving! Without motion, there is no ground track; without ground track there is no orientation. Most GPS models will give a useful output after a few seconds of straight taxiing. (LORANs take longer.) See **NO HEADING OR TRACK** message.

PROBLEM: I am having trouble with the Argus front panel buttons. Modes and ranges change unreliably.

Make sure that the remote switches, if connected, are wired correctly and are not shorted or intermittent. The remote switches parallel some of the front panel operations and can interfere with the proper operation of the panel buttons. Set up the

Argus outside the aircraft with a bench power supply. If the problem goes away, it's probably due to defective remote switch wiring.

PROBLEM: I am having trouble with the REMOTE switches. They don't seem to do anything.

First, check the suggestions outlined in the answer above. Try manually shorting the contacts at the connector. In this case, it is more likely that there is an open circuit than that there is a short.

PROBLEM: The map works fine, but an airport/VOR/NDB seems to be missing.

In the case of an airport, confirm that it has a runway of at least 2000 feet. This is the minimum in the database. Confirm that all the **AMEND** categories related to the item have been selected to **Y**. Remember that the first **AMEND** page acts as a "master switch" for entire categories of facilities. Review operation of the **AMEND** mode.

PROBLEM: I've done that. It's still missing.

Check the expiration date of the database shown when the Argus is turned on. If the facility opened or was activated after this date, it may appear in more recent databases. If you're sure that it should be there and isn't, it's possible that for some reason it was omitted from our data tapes. Please write to us with information on the erratum; be sure to state facility type, identifier, latitude, longitude, and any other information that will help us find (or not find) it. We will notify the appropriate agency.

PROBLEM: The frequency (name, runway data) of a facility is incorrect.

See answer to previous question. This type of information changes more frequently than does the existence of a facility. With time, the cumulative effect of these changes might cause you to consider getting your database updated. See Appendix 1 for more information on the procedures.

PROBLEM: I have a question or difficulty not discussed here.

Before calling for assistance, please see the Eventide world wide web site,

www.eventide.com. You can also email questions to argus@eventide.com.

Appendix 6: Obtaining Factory Service

Before returning the unit to the factory, some commonsense precautions should be observed:

1: Make **absolutely sure** that the problem is with the Argus, and not with the aircraft systems. Suggestions on how best to do this are in Appendix 5.

2: Call us for a return authorization number. When you call, please have the Argus serial number handy, and software version or database effective date information, depending upon the reason for the return. Briefly describe the problem or reason for return to the customer service representative who takes your call.

3: Include a trouble report *with the unit* as well, and add any observations or other information that you think might be helpful. (And be sure to include your return shipping address!)

4: Pack the unit carefully! If you don't have the original container, pack it with at least 4 inches of cushioning material around each side, more if you use low density material such as paper. Use a larger or even a double-lined box in preference to a small one, and, if possible, line it with hard foam rubber.

5: Ship via UPS or other traceable method. If you must use the US Mail, be sure to get a return receipt. Eventide is not responsible for goods we don't receive.

6: If you have special return shipping instructions, **put them in writing.**

How Long Will It Take?

We endeavor to turn units around as quickly as possible. We don't want your Argus here any more than you do. However, due to varying workloads, exogenous factors such as database cycle dates, holidays, complexity of the repair, etc., *we cannot promise a specific return date*. No one is authorized to guarantee "we'll ship it back tomorrow," unless the word "try" is conspicuously present in the sentence.

If your unit has an *intermittent* problem, fixing it can be especially vexing for you and for us because it is frequently difficult to reproduce the problem on the bench. If this is the case, be especially explicit in describing the problem and the circumstances under which it occurs.

Appendix 7: Warranty

Eventide Avionics, Division of Eventide Inc. warrants Argus Moving Map Display models to be free from defects in workmanship and material under normal use and service for a period of two (2) years from the date of original installation within an aircraft, but in no case in excess of twenty eight (28) months from original shipment to buyer. Eventide Avionics, at its discretion, may elect to repair or replace any component(s) determined to be unairworthy or defective during that period. **In no event shall Eventide be liable for consequential or incidental damages due to failure of its product(s).**

Consequential damages shall include, but not be limited to, loss of anticipated profits, loss of use, loss of revenue, cost of capital, and damage or loss of other property or equipment. In no event shall Eventide Avionics (Seller) be obligated to indemnify Buyer in any manner nor shall Seller be liable for property damage and/or Third Party claims covered by umbrella insurance and/or indemnity coverage provided to Buyer, its assigns, and each successor interest to the goods provided hereunder.

Additionally, Seller shall not be liable for damages caused by delay in performance. The sole and exclusive remedy for breach of warranty shall be limited to repair or replacement under the standard warranty clause herein stated. In no case, regardless of the form of the cause of action, shall Seller's liability exceed the price to Buyer of the specific goods manufactured by Seller giving rise to the cause of action.

In consideration of the agreed-upon purchase price of the goods, Seller grants only the above stated express warranty; no other warranties are granted including, but not limited to, expressed or implied warranties of merchantability and fitness for a particular purpose.

It is the responsibility of the Installation Agency to properly complete and return to Eventide the Warranty Registration Form provided with each new Argus shipment, and a copy of FAA Form 337 for the installation within thirty (30) calendar days following the completion date of the installation. The Owner or Operator will be notified upon activation of the warranty. The warranty may be transferable upon written request to, and acknowledgement from, Eventide Avionics. All transportation charges for shipment to and from Eventide are the sole responsibility of the Owner or Operator. Eventide warranty will cover ground freight back only.

Section 9: SETUP and INSTALLATION

Before the Argus can be used, it must be installed in the aircraft and certain software operations, termed "setup," must be performed. These render the Argus compatible with the signals from which it receives navigational and other data. This section contains:

- ! A SETUP chart to allow recreation of previously selected settings
- ! Information on making the selections on the various SETUP screens
- ! Troubleshooting interconnection problems
- ! Argus product description, limitations, and specifications
- ! Installation overview and guidelines
- ! Installation mechanical and electrical drawings and worksheets
- ! Supplementary information giving interface data for many popular navigation systems, heading sources, and ADF instruments
- ! Interfacing hints for various signals and instruments

SETUP Functions

SETUP allows the installation agency to match the software characteristics of the Argus to the equipment to which it is connected in the aircraft. Many of these settings, if entered incorrectly, can prevent the Argus from functioning or cause it to give you incorrect information. Therefore, if you want to (or must) make a change in a SETUP function, be absolutely certain you know what you're doing. The table below, if filled out by you or by the installation agency, shows the critical settings of the Argus as delivered. It can serve as a reference should it ever become necessary.

SETUP Function table

SETUP ITEM	VALUE AS INSTALLED
LRN TYPE SELECTION	MFG: MODEL #
DATA FORMAT	BAUD____WORD LENGTH 7 / 8 PARITY NONE / ODD / EVEN STOP BITS 1 / 2
ACFT TYPE	FIXED WING / ROTARY WING GEAR: LAND / WATER / AMPHIB
ADAPTER TYPE / ADF	ADAPTER _____ ADF PRI / SEC
DATA FORMAT	BAUD____WORD LENGTH 7 / 8 PARITY NONE / ODD / EVEN STOP BITS 1 / 2
ADF TYPE / REF	NONE / DC SIN/COS / DC -SIN/+COS / AC SIN/COS AC SYNCHRO REF 0 / 180
REMOTE SWITCHES	SELECT Y / N INFO Y / N
HEADING SOURCE	VALID STATE LOW / HI HDG REF 0 / 180
TANDEM SETUP*	TANDEM__NORM__ MASTER__SLAVE__
APPROVAL CATEGORY	IFR / VFR / NONE / IFR/NPA
SCREEN SETUP	LEFT / CENTER / RIGHT

SETUP and Installation Drawings

The **SETUP** mode allows the installation agency to set various installation parameters of the Argus to match the characteristics of the aircraft, GPS, mounting position, etc. The **SETUP** mode is reserved for settings that should not be changed by the pilot. **SETUP** mode may be entered as follows:

- 1: Press and hold **ENR** and **AUX** simultaneously while applying power to the Argus.
- 2: Wait for selftest to complete. (You can release the buttons after the first screen is displayed.)
- 3: Press the **AUX** button 3 times, quickly, followed by the **INSTALL/SETUP** softkey.

When you have entered **SETUP**, the menus shown below are available. Please refer to the **AMEND** section of the Argus Reference Manual for information on using menus and making changes and selections.

IMPORTANT! For a change or selection to "take," it is necessary to exit the **SETUP** mode normally. Do this by pressing the **AUX** button. If you exit the **SETUP** mode instead by turning off power, any changes made will not be stored in the Argus' memory.

LRN TYPE SELECTION	
LRN/ADAP. MODEL →NORTHSTAR M1/A	PAGE
	LINE
	CHG
	RTN
LRN TYPE SEL. END	

The first displayed page is for nav receiver type selection. Each press of the **CHG** key will display a different manufacturer and model number. Please refer to Appendix 2, Receiver Information, for information on which setting to select for a particular unit. In most cases it will be obvious from the display. If you accidentally pass the correct entry, you can **HOLD** the **CHG** button to scroll backwards.

One entry, "NMEA 0183," is provided for compatibility with a maritime standard.

The heading of the menu, "LRN/ADAP. MODEL," refers to compatibility with external adapters and data sources.

The next page, DATA FORMAT SELECT, allows you manually to select RS-232 parameters to match those of the interfaced receiver. The Argus automatically selects defaults to match the receiver settings, as described in Appendix 2 of the reference manual. You should not have to adjust these settings unless the receiver is being used with an ELS or Fuel Flow system, or if the receiver cannot be set to the defaults for some other reason.

ACFT. TYPE SELECT			
AIRCRAFT TYPE → FIXED WING			
LANDING GEAR LAND			
PAGE	LINE	CHG	RTN

If you change the settings and want to get back to the defaults but don't remember what they were, do the following:

- 1: Select any other receiver model and Exit **SETUP**.
- 2: Re-enter **SETUP** and reselect the desired receiver. This will restore the defaults.
- 3: Don't forget to exit **SETUP** so that the defaults will "take."

DATA FORMAT SELECT	
BAUD RATE → 1200	PAGE
WORD LENGTH 8	LINE
PARITY NONE	CHG
STOP BITS 1	RTN
DATA FORMAT END	

The third **SETUP** page, at the left, tells the Argus what type of aircraft it's installed in. The choices are **FIXED WING** and **ROTARY WING**. Next, you select the landing capability of the aircraft from **LAND**, **AMPHIBIOUS**, and **WATER**. The implications of these choices are discussed under the **Seaplane Bases/Heliport** heading in the reference manual.

The ADAPTER SELECT page allows selection of various Eventide adapters. These are modules that can be mounted remotely or behind the Argus in its mounting tray. Available choices are NONE, WDA 5005, WDA 5007-05, and RAA 5007. They allow the Argus to display weather information from the BF Goodrich series of Stormscopes (WX-10, 11, or 1000E) or RMI information from external sources. Additional information on these adapters is available from Eventide. Another choice, although not an "adapter" is AUX. TERM. B. This allows the Argus to accept and display data from a third party product, such as a fuel flow indicator.

ADAPTER SELECT			
ADAPTER TYPE →AUX. TERM. B			
ADF USAGE SECONDARY			
PAGE	LINE	CHG	RTN

Finally, the ADF USAGE option should be set to determine whether the Argus display is the only ADF display visible to the pilot. When the Argus is used to substitute for the ADF, PRIMARY should be selected. This dictates that the Argus is powered up in ADF mode regardless of the AMEND selection, so that the ADF is available to a pilot unfamiliar with the aircraft. If SECONDARY is selected, the ADF will obey the dictates of the AMEND page at all times.

ADF SELECT			
ADF SOURCE →DC SIN/COS			
ADF REFERENCE 0 DEGREES			
PAGE	LINE	CHG	RTN

The ADF SELECT page settings are determined by the technical characteristics of the ADF to be interfaced. Both AC and DC type ADFs can be used, and the ADF reference can be selected to 0 or to 180 degrees as necessary.

HEADING SOURCE			
VALID STATE			
→LOW			
HEADING REF.			
0 DEGREES			
PAGE	LINE	CHG	RTN

HEADING SOURCE, like the ADF SELECT page, should be set to conform to the technical characteristics of the heading information supplied by the slaved compass or HSI.

REMOTE SWITCHES should be selected to "Y" only if the appropriate switch is wired to the Argus.

REMOTE SWITCHES	
→N SELECT	<div>PAGE</div> <div>LINE</div> <div>CHG</div> <div>RTN</div>
N INFORMATION	
REMOTE SWITCH END	

The next **SETUP** page allows the installer a limited amount of control over the centering of the displayed image on the CRT. The choices are **RIGHT**, **LEFT**, and **CENTER**. If the **ARGUS** is mounted to the right of the pilot, **RIGHT** should be selected. This moves the display slightly to the right, which in turn reduces any shadowing effect of the bezel on the pilot's view. Of course, the converse is true if the **Argus** is mounted to the pilot's left, and the screen should be **CENTERed** if mounted directly in front.

SCREEN SETUP	
SCREEN CENTERING	
→CENTER	PAGE
	LINE
	CHG
	RTN
SCREEN SETUP END	

CLEAR USER WPTS/FP	
→N CLEAR WPTS	
NOTE - IF "Y" IS SELECTED WHEN "PAGE" OR "RTN" IS PRESSED, ALL USER WAYPOINTS AND STORED FLIGHT PLANS WILL BE ERASED.	PAGE
	LINE
	CHG
	RTN
CLEAR WPTS END	

There is an additional page, not actually a SETUP item, that allows you to erase all user waypoints and flightplans. If you are installing a new unit, there should be none in the memory. If the unit was purchased used, the previous owner may have neglected to delete these items, which will almost certainly be of no interest to the new owner. While the owner can delete them himself, this page, the operation of which is self-explanatory, is a convenient shortcut.

FACTORY DEFAULTS	
→N RETURN ALL SETTINGS TO DEFAULTS	
NOTE - IF "Y" IS SELECTED WHEN "PAGE" OR "RTN" IS PRESSED, SETUP AND AMEND VALUES WILL BE LOST.	PAGE
	LINE
	CHG
	RTN
FACTORY DEFAULT END	

The Argus is originally shipped from the factory with default settings. While these settings may not be correct for your installation, they are a convenient starting point for beginning the SETUP process. You can return the Argus to the factory default settings from this page.

Selecting **Y** for RETURN ALL SETTINGS TO DEFAULTS returns the AMEND and SETUP values to those set on original shipment from the factory.

Note that if an Argus is returned for factory service, we do NOT reset the default values unless it is necessary. Rather, we do our best to assure that the unit is returned with the same settings it had when sent in.

Option Pages

Additional SETUP pages pertaining optional features and products may appear in SETUP. If they do, they are described in Section 7, Option Information, or in separate manuals.

SELFTEST DISPLAY

Each time the Argus is turned on, it goes through a "selftest" program designed to give confidence that the hardware is working correctly and that the database hasn't been corrupted. This selftest is very comprehensive except with regard to such things as display appearance, which must be monitored by observation, and for interface physical connections. If the selftest passes, you can be sure that the program and the database have not changed, e.g., there are no "bad bits." Normally, selftest progress isn't displayed unless a button is pressed between the time the Argus is turned on and the time it completes. (The results are displayed only very briefly before the screen with the chart/approval statement and program version and database expiration date comes on.)

SELF-TEST IN PROGRESS.

SYSTEM RAM PASSED
RS-232 PASSED
INTERRUPT PASSED
SYSTEM ROM PASSED
CLOCK PASSED
A/D CONV. PASSED

DATA BASE PASSED
SETUP PASSED
FLIGHTPLANS PASSED

ALL TESTS PASSED

Please refer to the Theory of Operation section in the Reference Manual for information on selftest. It is important to note that, if selftest FAILS, it generally means the Argus must be returned to Eventide for service. The two exceptions to this are the **SETUP** and **FLIGHTPLANS** tests. If improper data is found in the non-volatile RAM (which holds **SETUP** and **AMEND** and user data settings), it is erased. A failure message is displayed, and it will usually be necessary to go through the **SETUP** and **AMEND** process again. If the failure repeats, the unit should be returned for service. (Please refer to Appendix 6 of the Reference Manual for return information.)

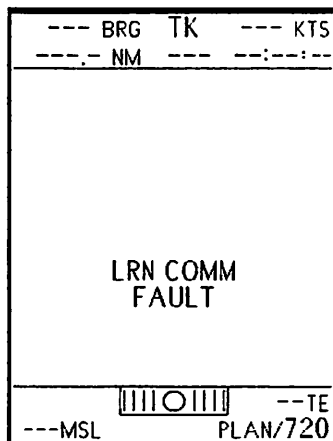
Troubleshooting

If the Argus passes its selftest but does not work or works incorrectly with the connected Loran or GPS receiver, the following troubleshooting tips, aided by built-in diagnostic software, should help you set things right. There are four distinguishable reasons why the moving map display may not appear on the Argus screen. Three of them are briefly explained in "A Sample First Flight with the Argus" at the beginning of this manual. They are covered in more detail here, along with the fourth message.

LRN DATA LOST Message.

This screen message indicates that no data is being received over the data link. Besides the obvious reason (GPS turned OFF), additional possibilities are that the receiver output isn't setup properly, or there is a wiring error. The Argus input is optically coupled, and it is vital that the two pins shown in our installation drawing be connected. Do NOT rely on aircraft ground for a signal return; our input is not grounded and it won't work. If you see this message and everything does seem to be connected correctly, attach an oscilloscope probe between pins 16 and 4 on the Argus (at the Argus tray connector) and visually verify that the data signal is present across those pins. It is *very* unlikely that the Argus input is defective, as this is obviously vital to its operation and is checked most carefully.

LRN COMM FAULT Message



This message indicates that there is a communications failure between the Argus and the navigation receiver. The most likely problem is incorrect parity or baud rate. When you select a GPS on the setup page, these data communication parameters are automatically defaulted to the values that the receivers are shipped with. However, most nav receivers have adjustable parameters and these could have been changed, deliberately or accidentally, by the factory, previous owner, etc. It is frequently necessary to change the receiver parameters when using a fuel flow display or ELT that cannot itself be adjusted. If this has been done, the Argus defaults may be incorrect. Regardless of the cause of the error, all

devices on the data bus *must* have the same settings. The Argus settings are adjustable as described earlier in this section; the receiver settings may be adjusted as described in the associated manual. Other possible causes of this message include reversed data lines or poor signal levels. It is not *always* possible for the Argus to distinguish an RS-232 error from one caused by the GPS sending invalid data (see below).

WRONG LRN SELECTED Message

This message indicates that you have probably selected the wrong LRN model on the first setup page. Unlike the above message, which implies that data is not being received correctly by the Argus, this message indicates that data is being received correctly, but the Argus does not comprehend it. Depending upon the LRN selected, the Argus expects to receive data in a certain format so that it can "parse" the data into usable information. If the data cannot be parsed, this message appears. If you have just upgraded to a new operating system version, it may be necessary to reselect the correct LRN since new ones may have been added between the beginning of the list and your current selection.

---	BRG	TK	---	KTS
---	NM	---	---	---
WRONG LRN SELECTED				
---	MSL	○	---	TE
			PLAN/720	

The Argus cannot infallibly distinguish between the cause of this message and that of the INVALID message, below.

LRN NAV INVALID Message

This message indicates that the Argus probably is receiving data correctly but cannot use it to display a map. The most likely reason is that the Loran or GPS receiver is flagged, e.g., hasn't acquired a signal yet. If this is the case, wait until it does. Other causes for this message include incorrect receiver selection, or incompatibilities between the Argus and the receiver software. Occasionally, receiver manufacturers change their output format, sometimes without notifying us. If a working installation suddenly stops working and gives this message after the receiver has come back with an update from its manufacturer, this may well be the problem. Frequently there is little you can do about this other than to call Eventide or the receiver manufacturer for help. If this is a new Argus installation with an old Loran, please refer to Appendix 2, as we probably are aware of the problem and have a note about it. If this is an old Argus installation with new receiver software, you should first call the receiver manufacturer and ask if they are aware of any recent changes to their software that might affect their data output. In any case, you will help your fellow installers if you mention the problem and resolution information when you return the warranty form. Another possible cause is a mismatch of RS-232 parameters between the receiver and the Argus. Although this is normally indicated as a **COMM FAULT** (see above),

certain mismatches do not create actual errors, but rather cause the Argus to interpret the data as gibberish, which will show up as **INVALID** data.

NO HEADING OR TRACK Message

This message will be encountered when the aircraft is not moving if the Argus is not integrated with the aircraft compass system or TRACK has been selected in **AMEND**. It is impossible to orient the map display without knowing which way the aircraft is pointing. When the aircraft is moving (forward, we hope) at taxi or greater speed, the nav receiver calculates the track and sends this to the Argus. The minimum speed varies with the type (Loran or GPS) and model of receiver. Of course, position information is still available whether or not the aircraft is moving.

Product Description, Limitations, and Specifications

Product Description and Limitations:

The Eventide ARGUS Moving Map Display is a pictorial navigation instrument that provides visual reference of aircraft position relative to landing facilities, navigational aids, and special use airspace. The ARGUS requires present geodetic position and other navigation information from LORAN C, or Global Positioning Satellite receivers. An optional adapter is available for display of weather mapping information from a B.F. Goodrich Stormscope® WX-10 (), WX-11 () or WX-1000E (with 429 EFIS option) Weather Mapping System. The ARGUS may also display signal and dual bearing pointers and magnetic bearing readout from compatible ADF receivers and composite VOR sources with an optional RMI Adapter. Map graphics orientation can be provided by the aircraft's gyroscopic directional heading system or indicator with the RMI Adapter.

The ARGUS uses a database of information obtained and implemented from various sources. Eventide has taken extensive steps to ensure the translational accuracy of the resource information, however, undetectable errors or inconsistencies may exist which could affect the navigation accuracy. Since the ARGUS relies upon sources of position and other navigation data from a LORAN C or GPS receiver position accuracy, orientation, and related directional guidance must be assured by other means of navigation equipment required for the particular type of flight.

Approval of the Argus for navigational use is not authorized solely by this Reference manual. Acceptance for the installation and use must be sought through the appropriate offices of the Federal Aviation Administration or other certifying agency. All approvals for use as supplemental navigation displays under Visual or Instrument Flight Rules (VFR or IFR) may be limited to the same acceptance classification or LORAN C or GPS receiver approved by the certifying agency. Although the graphics screen symbology is similar to that depicted on aeronautical charts, the ARGUS is not intended to substitute for, nor to replace, approved aeronautical charts, as required by law for appropriate flight operations. The ARGUS is not to be used as a primary flight guidance instrument except when in ADF mode or when interfaced with an Eventide RMI adapter for ADF/VOR bearing displays presented in the RMI MODE while conducting VFR or IFR Non-directional Beacon approaches. The ARGUS must be installed within the Operator's field-of-view. The map graphics display of the ARGUS

is not to be used with other primary instruments while conducting instrument approaches to or departures from landing facilities.

The Eventide ARGUS Moving Map Display, Eventide WDA series Adapter, or Eventide RAA series adapters must be installed in accordance with Eventide Avionics Drawings. Only those LORAN C or GPS receivers in Appendix 2 or supplements thereto are considered compatible. Information on ADF receivers and indicators which are compatible and have been determined to meet or exceed the minimum operating performance standards for integration with the ARGUS when installed with the Argus (and adapters, as appropriate) are listed in associated documentation. Strict adherence to installations instructions is suggested for alteration acceptance by the FAA or other certifying agency.

Specifications

Weights:

ARGUS 5000 Moving Map Display	3.5 lbs. (1.6 kg)
ARGUS 7000 Moving Map Display	4.5 lbs. (2.1 kg)
ARGUS 5000 Mounting Tray	.55 lbs. (.25 kg)
ARGUS 7000 Mounting Tray	.80 lbs. (.37 kg)

Sizes:

ARGUS 5000 Moving Map Display	3" ATI x 10.25"
ARGUS 7000 Moving Map Display	3" x 4-3/4" x 10.75"
ARGUS 5000 Mounting Tray	3" ATI x 10.25"
ARGUS 7000 Mounting Tray	3" x 4-3/4" x 10.75"

Power Input:

ARGUS 5000+ARGUS 7000	11 to 33 Vdc. @ 15 watts nominal
-----------------------	----------------------------------

Data Compatibility:

- (1) EIA Standard RS-232/RS-422 LORAN, GPS, NMS or ARINC Adapted Data, NMEA
- (2) EIA Standard RS-232 Auxiliary Data Input/Output

Compass System Compatibility:

ARINC 407 Synchro

ADF Instrumentation or Receiver Compatibility

ARINC 407 Synchro, AC or DC Sine/Cosine

Environmental Categories:

RTCA/DO-160B, Environmental Conditions and Test Procedures for Airborne Equipment (Fixed and Rotary-Wing, Non-Pressurized)

Temperature: -20° C to +55° C (continuous)	F1
Altitude: to 55,000 feet	
Temperature-Variation	C
Humidity	A
Vibration/Shock	P, A, S
Magnetic-Effect	Z
Power-Input	B
Voltage-Spike	A
Audio Frequency Conduction/Susceptibility	A
Induced Signal Susceptibility	A
Radio Frequency Susceptibility	A
Radio Frequency Energy Emission	A

Regulatory Compliance:

TSO-C113, Airborne Multipurpose Electronic Displays
RTCA DO-179 Paragraph 2.2.6 (station Passage - ADF Function)

Software Disciplines:

RTCA/DO-178A, Software Considerations in Airborne Systems and Equipment Level 2, Essential Category

System Components

Installation Kit (Part Number 5001 (5000) & 7001 (7000)):

Item	Part Number	Description	Quantity
1	300176	MSP 64555-Clamp Tray 3ATI (Argus 5000)	1
		OR	
1	300250	MSP 64574-Clamp Tray 3" x 4-3/4" (7000)	1
2	321085	Washer, Nylon .031" for clamp tray	4
3	312101	AMP Special Products-205441 Connector-DB-25S	1
4	311040	AMP Special Products-205090-1 contacts(Banded)	20
5	300169	Eventide Avionics-Tray Plate (Argus 5000)	1
		OR	
5	300254	Eventide Avionics-Tray Plate (Argus 7000)	1
6	321079	MS-51957-17 Screw, 4-40 x 1/2"	3
7	321081	MS-35355-57 Washer, External Tooth Lock	3
8	321082	MS-51957-5 Screw, 2-56 x 3/8	2
9	321083	ESNA 22NTM-26, Elastic Stop Nut	2
10	412023	Resistor, 2.2K 1/4W 5% (for Remote Switches)	3
11	410034	Resistor, 11.8K, 1/4W 5% (AC Source ADF)	2
12	141003	Argus 5/7000 ver 5.xx Reference Manual	1

Required, but not supplied

1	-----	MS-22520/2-01 Crimping Tool	1
2	-----	MIL-M-22520/2-08 Positioner	1
3	-----	MIL-M24308/18-12 Insertion/Extraction	-
4	-----	MIL-W-22759-Tefzel Wire or Equivalent	-
5	-----	MIL-C-27500-Multiple Conductor Shielded	-
6	-----	Klixon-7277-2-2 Circuit Breaker or Equivalent	1
7	-----	SPST Pushbuttons/SPDT Toggle Switch,(SEL/INFO)	2
8	-----	3PDT ADF/REMOTE Switch	1
9	-----	Resistor,1K 1/4W (ADF-AC Sin/Cos or Synchro)	1
10	-----	Post Lamp, Grimes A 8970B-30 or Equivalent	1
11	325002	Combo Signal Pin Removal Tool	1

Optional, but helpful

1	324168	C&W Aero CW100 Radio Removal Tool	1
---	--------	-----------------------------------	---

Versions and Optional Databases

5000-25-15	Argus 5000 Standard U.S. Database
5000-25-26	Argus 5000 w/ North American Database
5000-25-29	Argus 5000 w/International Database
7000-25-15	Argus 7000 Standard U.S. Database
7000-25-26	Argus 7000 w/ North American Database

Installation Overview and Guidelines

Installation Overview

Installing the Argus requires three distinct steps:

- 1: **MECHANICAL** installation, in which the Argus is mounted to the aircraft panel in an appropriate location,
- 2: **ELECTRICAL** installation, in which the Argus is connected to aircraft power and interfaced to the instrument(s) from which it derives information.
- 3: **SETUP**, in which the Argus software is instructed as to the type and configuration of instruments, switches, etc., from which it is deriving information. (SETUP is covered earlier in this section.)

Mechanical Installation

The Argus should be installed where the pilot can see it most easily. Ideally, it should be in his direct field of view. If it is to be certified for use as an ADF indicator replacement, it **MUST** be in his direct field of view. If at all possible, mount the Argus in the panel at or near the top row of instruments, and as close to the center of the cluster as possible. Avoid mounting the Argus immediately adjacent to electrically-powered Turn-and-Bank indicators, WX1000 Stormscope displays, or other instruments that have strong external magnetic fields.

Electrical Installation

First, determine the instruments to which the Argus will be interfaced. On the Standard Installation worksheet, write the name of the manufacturer, instrument model, and type of data expected in the appropriate boxes. Note that some of these fields may not apply to your particular installation.

Second, refer to the Source Detail pages to determine the connector pin numbers on the external data sources that correspond to the Argus input data pins, and write those numbers in the appropriate boxes. If the connection information is not available on these sheets, refer to the manual of the instrument in question.

Once you have filled out the worksheet, proceed with the installation using the balance of the information below.

Installation Guidelines

This section contains considerations and recommendations for installation of an ARGUS 5000 or 7000 Moving Map display. Interconnect harness wiring, remote switching, unit mounting, ADF and heading and final testing references are discussed. Adherence to the instructions contained herein should ensure a satisfactory installation. Where connections with other manufacturers' equipment are considered, the Installer must verify that the information provided is correct and properly understood. Eventide Avionics assumes no responsibility for miswiring to represented equipment or to other equipment.

Note: Except for connector orientation, interconnection of the Argus 7000 is identical to that of the Argus 5000.

Unpacking and Inspecting Equipment:

After unpacking the ARGUS or accessory and its appropriate installation kit, a thorough visual inspection should be conducted for evidence of any damage which may have occurred during shipment. If damage is observed, a claim should be promptly filed with the transportation company. The shipping carton must be retained in order to substantiate the claim. It is recommended that the recipient retain all shipping cartons and materials for future requirements.

Electrical Installation:

Interface details for the ARGUS are referred to in covered in the installation worksheets and details in this section. FAA Federal Air Regulation, Part 43, and practices expressed within FAA Advisory Circulars 43.13-1A and 43.13-2A, must be adhered to in order to ensure proper alteration to the airframe.

Determine a suitable location on the aircraft's instrument panel and examine vertical and horizontal dimensions, and Clamp Tray depth for adequate clearances. Caution: Avoid locating the ARGUS directly adjacent to, or in the vicinity of an electrically powered Turn-and-Bank, Directional Gyro, Horizon or Weather Display, since

magnetic fields created by these instruments may cause CRT electron beam deflection. If such location is necessary and display interference is likely to be experienced, Eventide has a magnetic shielding kit available. If the ARGUS is used for optional ADF bearing display, it must be placed within the Operator's field-of-view.

Fabricate all interconnect harnesses to the ARGUS from the appropriate equipment. In addition, connect the remote SELECT and INFORMATION toggle switch or pushbuttons. Dress, strip, and crimp Eventide P/N 311040 socket contacts to all appropriate interconnect wiring and insert within the DB-25S connector 1P1 and 1P2. NOTE: The remote switch or pushbuttons should be installed in the yoke, cyclic or collective for user convenience.

Mechanical Installation and Checkout:

For installation of an ARGUS refer to Dwg. 300261 (Argus 7000) or Dwg 300262 (Argus 5000).. Drill the required mounting holes and mount the appropriate MSP Clamp Tray, with the screws provided. The ARGUS was designed for continuous operation at temperatures up to +55° C., however, it is suggested that the unit be mounted within an area of the instrument panel which provides adequate air circulation. Forced air cooling is not required but is recommended.

Attach the DB-25 connector to the Tray Plate, Eventide P/N 300169 with Eventide P/N 321082, 2-56 x 3/8" stainless steel screws and Eventide P/N 321083, 22NTM-26 elastic stop nuts, in two places. The connectors must be secured to the front of the Tray Plate to ensure proper connector engagement. The connectors should be checked for a "floating" action in order to allow satisfactory unit-to-connector mating. If the "direct mount" installation of an adapter is considered, follow the instructions on the Drawings for the particular adapter to be installed. (Direct mounting an adapter may preclude certain Argus features from being used.) Attach the Tray Plate, with the previously fabricated interconnect harness, using Eventide P/N 321079, 4-40 X 1/2" screw and Eventide P/N 321067, split lock washers in three places.

Install the remote **SE**lect and **IN**formation toggle or pushbutton switches. If necessary, install a Grimes A 8970B-30 or equivalent Post Lamp Assembly for illumination of the switches.

Install a Klixon P/N 7277-2-2, or equivalent two (2) ampere resettable circuit breaker within the aircraft circuit breaker area. Route the interconnect harness to avoid contacting or chafing, and secure the entire harness with appropriate cable/wire tie materials.

Proceed to the **SETUP** instructions and configure the ARGUS in order to match its characteristics to the equipment to which the unit is interfaced. The **SETUP** section contains troubleshooting instructions to assure proper communications between the ARGUS and its associated GPS or Nav system.

Perform a complete operational test of the ARGUS. Turn on all systems and equipment within the aircraft. Open the squelch controls and listen to the audio component of the VHF communications receivers, navigation receivers and ADF

receiver. Confirm that there is no objectionable Radio Frequency Interference (RFI) caused by the ARGUS affecting other equipment or components installed within the aircraft. Likewise, confirm that there is no radiated RFI or Electromagnetic Interference (EMI) affecting the ARGUS. Note any sources of interference and notify Eventide Avionics if it is unacceptable. If the unit fails to function in any manner, refer to "In Case Of Trouble..." in Appendix 5.

Installation Drawings

Argus 7000 Clamp Tray panel cutout

Argus 3000/5000 Clamp Tray panel cutout

Argus Standard Installation Worksheet

Argus Alternate Installation Worksheet

Navigation Information Source Detail

Heading Source Wiring Detail

ADF Detail 1 of 2

ADF Detail 2 of 2

ADF/REMOTE Switch Alternate Install

3.210 \pm 0.005

3.060

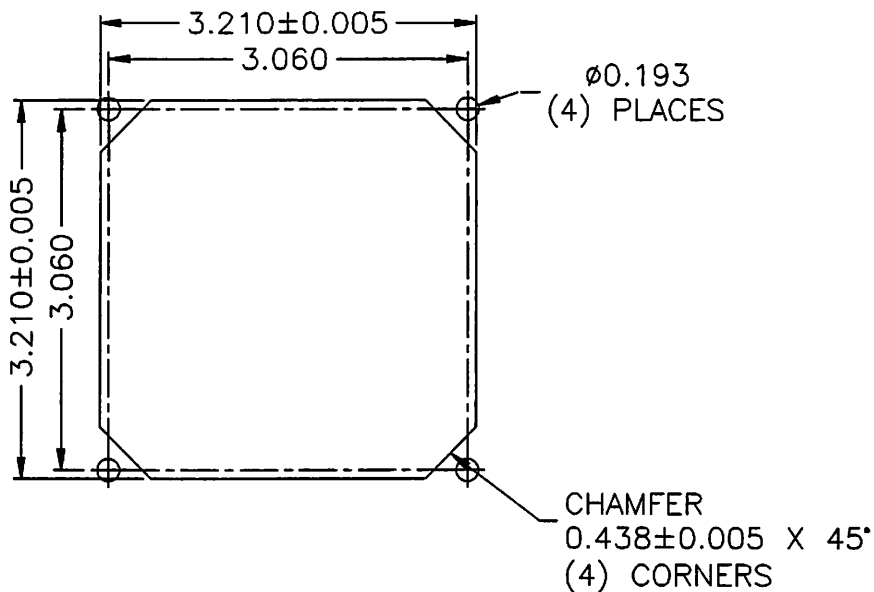
4.800 \pm 0.005

4.685

ϕ 0.193
(4) PLACES

CHAMFER
0.438 \pm 0.005 X 45°
(4) CORNERS

-1	-2	-3	-4	ITEM	PART No.	NOMENCLATURE OR DESCRIPTION
QTY REQUIRED					LIST OF MATERIALS	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES					DRAWN G. FLEMING	DATE 15 DEC 95
TOLERANCES ON					DATE	DATE
FRACTIONS DECIMALS ANGLES					DATE	DATE
\pm 1/32 \pm 0.010 \pm 2°					DATE	DATE
\pm 1/64 \pm 0.005 \pm 1°					DATE	DATE
REMOVE ALL BURRS					DATE	DATE
BREAK ALL SHARP EDGES					DATE	DATE
MATERIAL					DATE	DATE
FINISH					DATE	DATE
PROJECT ARGUS					DATE	
Eventide Little Ferry, New Jersey 07643					DATE	
7000 CLAMP TRAY PANEL CUTOUT					DATE	
A DWG. No. 300261 A					DATE	
SCALE FULL					DATE	DATE
SHEET 1 OF 1					DATE	



-1		-2		-3		-4		ITEM		PART No.		NOMENCLATURE OR DESCRIPTION	
QTY REQUIRED										LIST OF MATERIALS			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		DRAWN G. FLEMING		DATE 15 DEC 95		Eventide		Little Ferry, New Jersey 07643					
TOLERANCES ON FRACTIONS DECIMALS ANGLES		BYT SPV/CHECK		DATE		3000/5000 CLAMP		TRAY PANEL CUTOUT					
±1/32 ±.010 ±2°		ENGINEER		DATE									
±1/64 ±.005 ±1°		APPROVAL		DATE									
REMOVE ALL BURRS BREAK ALL SHARP EDGES		APPROVAL		DATE									
MATERIAL		APPROVAL		DATE									
FINISH		APPROVAL		DATE									
PROJECT ARGUS		DWG. No.		300262		A		A					
SCALE FULL		DWN		22621RA		SHEET		1 OF 1					

300262

The Standard Installation Worksheet

This drawing is the master installation drawing, and shows all connections to the Argus unless optional adapters are being installed, in which case their documentation must be used.

Please refer to the individual "source" detail sheets for considerations with regard to the different signal sources. For convenience, we recommend that you use the boxes in the diagram and the space below to detail the installation. This will provide a convenient summary should maintenance be necessary or any difficulty be encountered.

INSTALLATION SUMMARY

Aircraft Make _____ Model _____ S/N _____ N# _____

Installation Agency _____

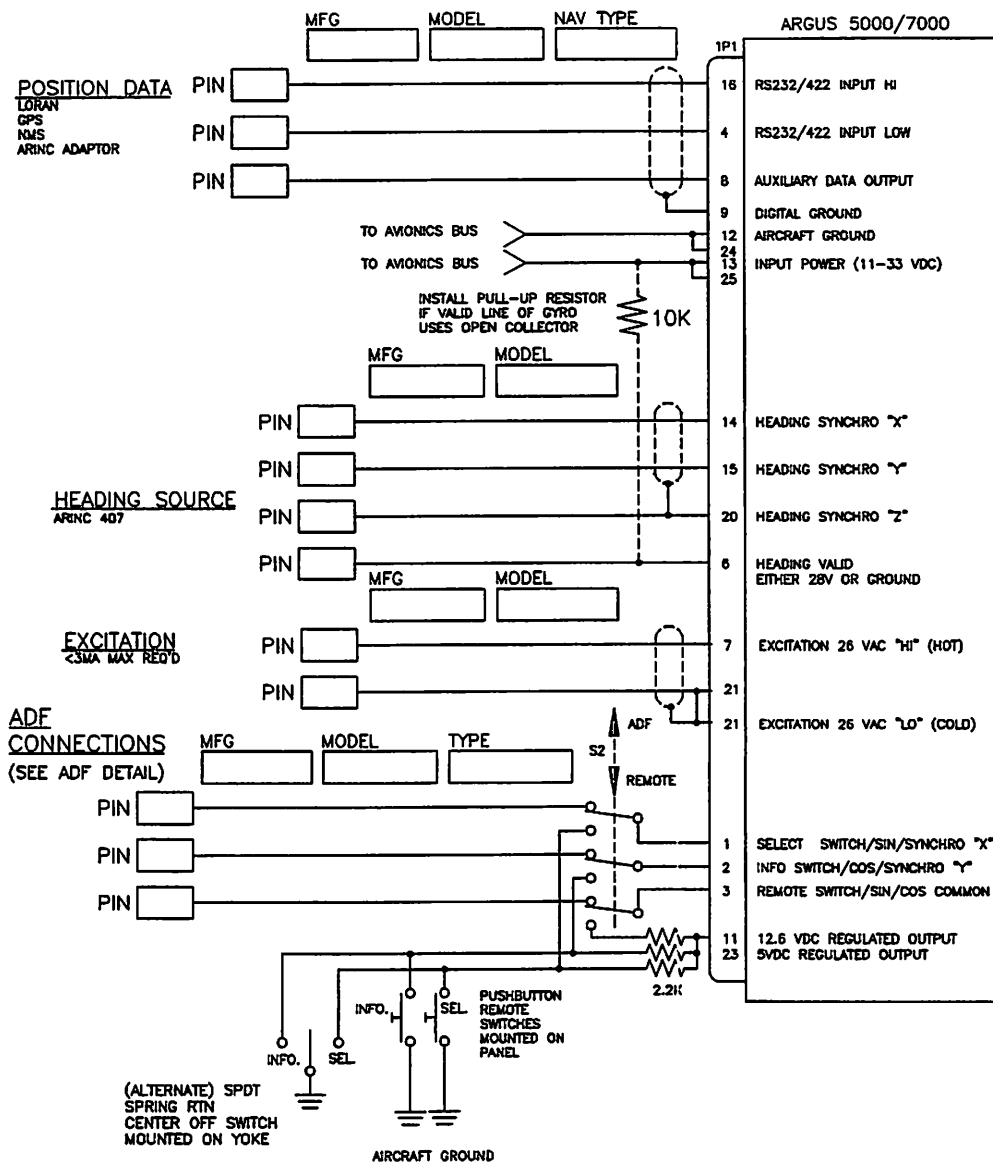
Installation Date _____

Installed By _____

Checkout/Test Flight By _____

Alternate Installation Worksheet

Write the pin numbers of your equipment in the boxes provided



Navigation Information Source Detail

This page shows how to connect the output of a GPS or other navigation receiver to the Argus, and includes pin connections for many popular models. If the pinout you need is not on this drawing, you will need to refer to the manual for the product in question. Because Eventide has no control over other manufacturer's products, we strongly recommend that you confirm this information before relying on it. Update information, if available, will be on our world wide web "page" <http://www.eventide.com>. If you need information on models not listed here, or can provide such information to help your fellow installers, please check this source, or email update information to "argus@eventide.com."

Some navigation receivers provide output in ARINC 419/ARINC 429 format. To use such a receiver with the Argus, the Eventide ARINC Adapter must be used, and installation data provided with that adapter should be referenced.

The majority of GPS and other nav receivers have RS232 or RS422 data outputs. The Argus is compatible with both. The DATA HI and DATA LO lines must be connected to the Argus input. The Argus input is optically isolated, and the DATA LO MUST be connected to the proper pin on the Argus. You cannot rely on "aircraft ground" for a data return. We recommend using 2-conductor shielded cable for noise suppression, and grounding the shield at the source end.

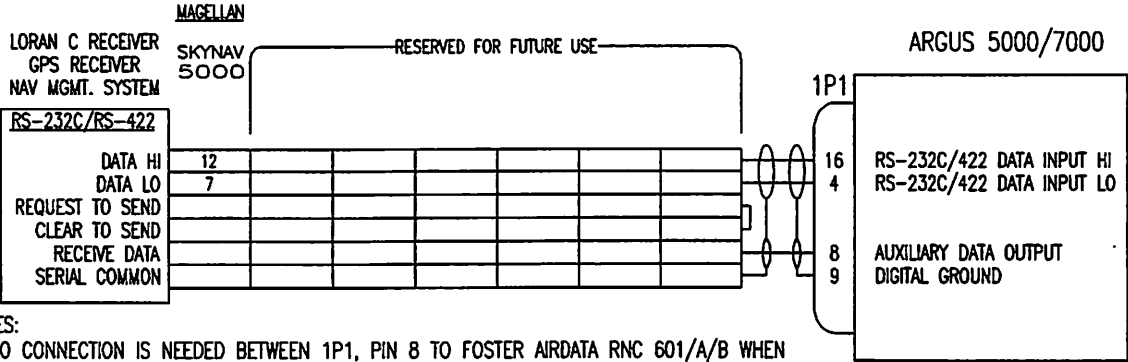
Some receivers require RTS and CTS to be connected to each other at the receiver. If this is not done, no data will be output.

The nav receiver connection is the most critical because the Argus cannot provide a map without this data. There is troubleshooting information in Appendix 5 and also in the troubleshooting portion of this section. The Argus provides several helpful diagnostic messages to assist in case of any problem.

Navigation Information Source Detail

LORAN C RECEIVER GPS RECEIVER NAV MGMT. SYSTEM	BF GOODRICH			ARNAV						BENDIX/KING	
	FOSTER PHOENIX F-4/F-14 500/501 RNC 601/A/B (P2)			SEE NOTE 1. R-21 NMS/ DMS (P1)	SEE NOTE 2. R-40 (P1)	SEE NOTE 2. R-40 RDB (J2)	R-15/B R-30/R-50 R-501-GPS 5000 SERIES (P1)	R-501 (P1)	R-60 REC (P2)	KLN 88 (P881)	KLN 90/A (P901)
	MODEL 7000 (2PG)	500/501 (P5001)	RNC 601/A/B (P2)	(P1)	(P1)	(J2)	(P1)	(P1)	(P2)	(P881)	(P901)
RS-232C/RS-422											
DATA HI	A	1	15	3	3	8	3	5	B	13	13
DATA LO	f	2	11	13	13	9	13	13	V	35	27
REQUEST TO SEND				1	16				A		
CLEAR TO SEND				17	17				G		
RECEIVE DATA			4								
SERIAL COMMON											

LORAN C RECEIVER GPS RECEIVER NAV MGMT. SYSTEM	II MORROW				TRIMBLE			TEXAS INST	NORTHSTAR	GARMIN	
	604/612 618/800 819/820 820+ APOLLO II (P1)	612C/618R APOLLO II (P1)	614 SERIES CPU (BNC)	APOLLO NMC 2001 (P1)	TNL 1000/DC (P1)	TNL 2100T TNL 3100T TNL 2000/T TNL 3000/T (P1)	TNL 2100 TNL 3100 (P1)	TI-9100/A (P1)	GPS-60 GPS-600 M1/A M2/V M3 (P1)	GPS 100 (J100)	GPS 150 GPS 155 GPS 165 (J100)
	6	12	SOCKET	19 OR 37	3	3	5	8	6	13	24
RS-232C/RS-422	10	13	SHELL	20	15	15	37	5	11	15	26
DATA HI								7			
DATA LO								25			
REQUEST TO SEND											
CLEAR TO SEND											
RECEIVE DATA					18		1				
SERIAL COMMON											



- NOTES:
1. NO CONNECTION IS NEEDED BETWEEN 1P1, PIN 8 TO FOSTER AIRDATA RNC 601/A/B WHEN INSTALLED WITH FOSTER DB 680 OR DI 681 DATABASE/INTERFACE UNITS. SINCE THE RNC 601/A/B DOES NOT OUTPUT TRACK, THE ARGUS MUST HAVE A GYRO INPUT IN ORDER TO SHOW A MAP.
 2. IF NAV RDB IS INSTALLED, CONNECT THE ARGUS TO 8 & 9 OF THE REMOTE DATABASE, NOT TO THE R40. IF R40 WITHOUT THE REMOTE DATABASE IS USED, CONNECT TO THE R40 AS SHOWN.

Heading Source Wiring Detail

Heading information, if available, is used by the Argus to orient the moving map in the direction the aircraft is travelling. The Argus can also use GPS or Loran ground track information for this purpose, and if heading is not connected or goes invalid, this is the only source of orientation. Heading is valuable when:

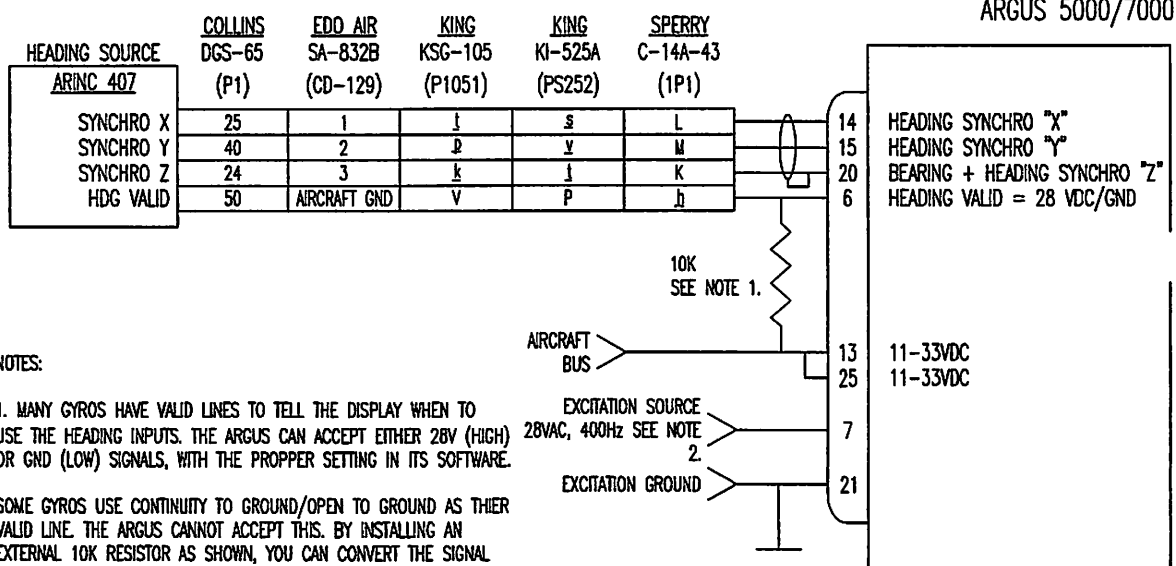
- ! The aircraft is not moving, moving slowly, or hovering, because there is no ground track or track is unreliable.
- ! A non-GPS source (Loran) is being used, because there's a significant time lag between aircraft maneuvering and Argus updating.
- ! It is used to orient the heading "card" behind the ADF needle. Heading **MUST** be used for an installation to be IFR-approvable.

For the Argus to use heading information, it requires ARINC 407 Synchro output from a bootstrap unit. (You cannot connect it directly to a heading gyro.) It also requires a 28VAC 400Hz excitation signal to provide a reference for the synchro, and the heading must be valid, as determined by the heading source.

Most heading problems are a result of using an excitation (reference) signal that is not derived from the same source (frequency and phase) as that which drives the bootstrap. If the needle slowly rotates or flips back and forth between one position and one 180 degrees opposite, this is the first thing to suspect. If the needle doesn't rotate with the heading indicator, but suddenly flips 180 degrees as the compass is rotated, it usually indicates that one synchro phase isn't connected. If there is a constant offset between the compass and the Argus heading, it could mean that the bootstrap synchro is offset on its shaft. An oscilloscope connected directly to the Argus pins is usually the best way to troubleshoot heading problems.

If you cannot obtain a HDG indication, it may mean that the VALID line is "flagged." The Argus is looking for, as determined in SETUP, either 28V or ground on this line. If the line is floating or at the wrong voltage, the Argus reverts to TK (track). If the heading source cannot be made to switch between these voltages when flagged and valid, then the Argus valid line should be grounded and "LOW" should be selected in SETUP.

HEADING SOURCE	<u>AERONETICS</u> 8100 (P1)	<u>AERONETICS</u> 9100 (P1)	<u>AIM</u> 289 SERIES (P1)	<u>ARC</u> 200-3 (P1)	<u>BENDIX</u> SG-832C (P1)	<u>COLLINS</u> 331A-3G (P1)	<u>COLLINS</u> 328A-2A (2P1)	<u>COLLINS</u> 328A-5 (P1)
<u>ARINC 407</u>								
SYNCHRO X	14	25	D	D	K	S	11	32
SYNCHRO Y	13	26	E	E	L	T	4	22
SYNCHRO Z	12	27	H	H	M	U	3	12
HDG VALID	16	32	AIRCRAFT GND	AIRCRAFT GND	U	Y	25	11



NOTES:

1. MANY GYROS HAVE VALID LINES TO TELL THE DISPLAY WHEN TO USE THE HEADING INPUTS. THE ARGUS CAN ACCEPT EITHER 28V (HIGH) OR GND (LOW) SIGNALS, WITH THE PROPPER SETTING IN ITS SOFTWARE.

SOME GYROS USE CONTINUITY TO GROUND/OPEN TO GROUND AS THIER VALID LINE. THE ARGUS CANNOT ACCEPT THIS. BY INSTALLING AN EXTERNAL 10K RESISTOR AS SHOWN, YOU CAN CONVERT THE SIGNAL FROM CONTINUITY TO A VOLTAGE LEVEL THAT THE ARGUS CAN USE. SOME GYROS DO NOT HAVE A VALID LINE, IN THAT CASE TIE PIN 6 OF THE ARGUS TO AIRCRAFT GROUND. THE ARGUS SHOULD BE SET TO VALID LOW IN SET UP AND IT WILL ALWAYS ASSUME THE HEADING IS VALID.

IF YOUR GYRO USES NEGATIVE VOLTAGE ON THE VALID LINE, DO NOT CONNECT THE VALID LINE TO THE ARGUS. TREAT IT AS A UNIT WITHOUT A VALID LINE, TYING PIN 6 OF THE ARGUS TO AIRCRAFT GROUND.

2. MUST BE THE SAME SIGNAL (SAME FREQUENCY & PHASE) THAT DRIVES HEADING BOOTSTRAP, ARGUS REQUIRES 3mA MAX.

ADF Detail (1 of 2)

The Argus is compatible with four different formats of ADF signal, AC SIN/COS, AC SYNCHRO, DC SIN/COS, and DC -SIN/+COS. In order to properly interface these different formats and voltage levels, several points should be noted.

- 1: The Argus measures the voltage on connector 1P1 Pin 3. This pin serves both as an indication that the ADF is connected, and as the ADF voltage reference when a DC ADF is being used. For the first reason, when using an AC ADF of any type, a resistor must nonetheless be connected to this pin as shown in the drawing. If you cannot obtain an ADF indication, verify that 1P1 Pin 3 has approximately 4.5 volts.
- 2: If you encounter problems with the needle rotating in reverse on DC systems, be sure you have selected the correct type in SETUP. Do likewise if you encounter a 90 or 120 degree error in the needle indication.
- 3: AC Systems have a much higher voltage output than the DC systems. To avoid overloading the Argus input, the supplied 11.8K resistors must be connected in series with the X and Y leads.
- 4: In the case of AC systems, and as with the heading system, the excitation (reference) signal must be connected and be of the same frequency and phase as the signal driving the ADF bootstrap synchro. Refer to the heading suggestions if the ADF needle is not displaying correctly.

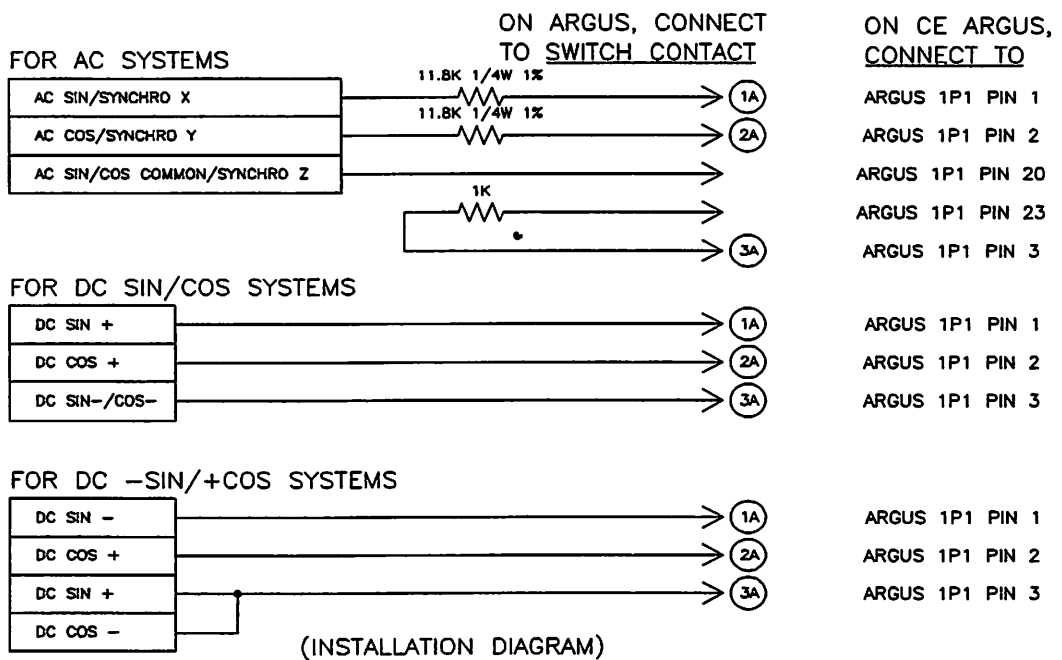
If any problems are encountered with the needle pointing off by 180, 90, or 120 degrees, or rotating in reverse, it is usually some combination of incorrect X/Y Sin/Cos wiring and improper selection in SETUP.

ADF Connections – Standard install.
The exact configuration depends on your ADF.

For AC systems (AC SIN/COS or AC SYNCHRO)
Pin 3 is provided with 5 volts by the ARGUS, pin 23, through 1K resistor.
Install scaling resistors (provided) in line with the ADF. Ground SYNCHRO Z, or the SIN/COS COMMON to the Argus pin 20.
The same excitation must be used for for ADF & HEADING.

For DC systems (SIN/COS OR –SIN/+COS)
Pin 3 is supplied by the reference voltage. Be sure to set the ARGUS to your ADF type in the set up mode.

When using the RMI adapter, do not install resistors. See drawing 138012.



ADF Detail 2 of 2

This drawing shows the connection of the compatible ADF units of which Eventide is aware. If the pinout you need is not on this drawing, you will need to refer to the manual for the product in question. Because Eventide has no control over other manufacturer's products, we strongly recommend that you confirm this information before relying on it. We are planning to have update information on our world wide web "page" <http://www.eventide.com>. If you need information on models not listed here, or can provide such information to help your fellow installers, please check this source, or email update information to "argus@eventide.com."

There are some ADF models which are KNOWN TO BE INCOMPATIBLE. Those include all models that provide ARINC outputs, as well as the Bendix King KR86

Some models, such as the Narco ADF-841 and the Collins ADF-462 can be rendered compatible by shifting the level of their output signals.

ADF Detail

(2 OF 2)

ADF RECEIVER	<u>BENDIX</u> 551E (P1)	SEE NOTE 1. <u>CESSNA/ARC</u> RA-446 (P1)	<u>COLLINS</u> ADF-60A (P1)	<u>COLLINS</u> ADF-60B (P1)	SEE NOTE 1. SEE NOTE 2. <u>KING</u> KI-225-01 (2251)		<u>KING</u> KDF-800 (P8001)	<u>KING</u> KDF-805 (P8051)	<u>KING</u> KDF-806 (P8061)	<u>ARINC</u> ADF (P101)
AC SIN+/SYNCHRO X	3	H	40	32	A	J	K	13	19	
AC COS+/SYNCHRO Y	4	N	36	2B	B	K	M	12	20	
/SYNCHRO Z	9	P	45		C	M		11	21	
AC SIN-/COS COMMON				33			P			

ADF RECEIVER	<u>BENDIX</u> DF2071A (P101)	<u>KING</u> KR-87 (P871)	RESERVED FOR FUTURE USE							
DC SIN-	2	A								
DC COS+	5	B								
DC SIN-/COS-	3	D								

ADF RECEIVER	<u>COLLINS</u> RCR-650 (P1)	<u>COLLINS</u> RCR-650A (P1)	RESERVED FOR FUTURE USE							
DC SIN-	12	14								
DC COS+	11	3								
DC SIN+	10	16								
DC COS-	9	15								

NOTES:

1. THE KING KI-225 AND THE CESSNA/ARC IN-X46 SERIES ADF INDICATORS CAN BE MODIFIED BY INSTALLING SYNCHRO TRANSMITTERS FOR AC SYNCHRO COMPATIBILITY (REFER TO ORIGINAL EQUIPMENT MANUFACTURER'S SERVICE MANUALS FOR DETAILS).

2. A KING KDF-800 ADF RECEIVER WITH SELF CONTAINED INVERTER IS NOT COMPATIBLE.

The connection information herein contained is believed accurate. Eventide, Inc. is not responsible for the accuracy of connection data pertaining to equipment made by other manufacturers.

ADF/REMOTE Switch Installation Details

The ADF/REMOTE switch allows the Argus, with a limited number of connector pins, to accept data from either the ADF receiver or from the remote switches. The pilot uses this switch to select which feature he wishes to have available at any given time..

In the ADF position, Argus connector 1P1 pins 1 and 2 are connected to the ADF X and Y signal source through the ADF/REMOTE switch. Argus connector 1P1 pin 3 is connected either to the ADF reference voltage (about 4.5V) of a DC model ADF or, in the case of an AC model, to the Argus 5-volt output, 1P1 pin 23, in which case there is also about 4.5 volts on 1P1 pin 3. This voltage tells the Argus to interpret the voltage at pins 1 and 2 as ADF inputs.

In the REMOTE SWITCH position, Argus connector 1P1 pins 1 and 2 are connected to the REMOTE SWITCHES through the ADF/REMOTE switch. In this case, Argus connector 1P1 pin 3 is connected through a 2.2K resistor to 1P1 pin 11, which provides a 12 volt output that biases pin 3 to approximately 7 volts. This voltage tells the Argus to regard pins 1 and 2 as the remote switch inputs. At the same time, the other two 2.2K resistors bias pins 1 and 2 above ground, so that closing either remote switch produces a voltage change at these pins that can be detected by the Argus.

Note that the presence of the remote switches must be registered in the SETUP mode in order for them to be recognized. In an installation in which the ADF/REMOTE switch is used, correct operation of ADF and improper operation of the remote switches or vice versa almost inevitably points to defective wiring or external hardware, as they both use the same set of Argus inputs.

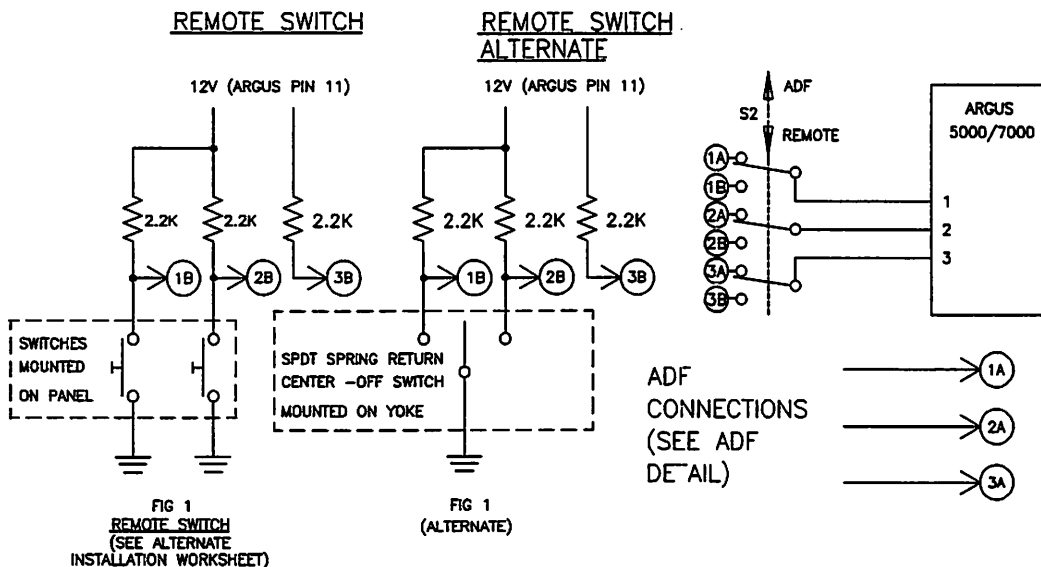
Switch S2 Detail

The ADF/REMOTE switch – Alternate install

Circuit description:

Pins 1 & 2 of the Argus do double duty. When pin 3 is connected, through a resistor, to 12 volts (pin 11), then pins 1 & 2 accept information from the remote buttons. See fig 1. When pin 3 is connected, through a 1K resistor, to 5 volts, pin 23, or to ADF reference voltage, then pins 1 & 2 accept information from the ADF. If ADF only (no remote switch) or remote only (no ADF) is to be installed, ADF/remote switch is not necessary.

N.B.: When using the RMI adapter, no ADF/REMOTE switch is installed. See drawing 138012.



Index

Adapters	
ARINC	1-25, 1-131
ARINC compatibility	1-170
RMI	1-25, 1-131
weather display (Stormscope)	1-24, 1-131
ADF Display	1-23, 1-27
vectors in arrival mode	1-30
with no heading source	1-28
Airport traffic areas	1-118
Airspace fixes	1-64
categories to display	1-123
Airways	1-61
MOCA and MEA	1-62
selection for display	1-123
Amend mode	1-119
access	1-8, 1-119
airspace fix categories	1-123
CDI scale	1-119
courselines	1-119
data transfer settings	1-128
flight recorder page	1-127
heliport selection	1-126
letter size	1-119
master display categories	1-119
navaid display selection	1-124
non-volatile RAM	1-119
override in emergency	1-129
runway and airport selection	1-124
SUA display selection	1-124
time/date setting	1-127
Approvals	1-v
GPS approaches	1-v
IFR enroute navigation	1-v
NDB approaches	1-v, 1-24
screens	1-vi

Argus models	
table of differences	1-171
upgrade availability	1-171
ARINC data compatibility	1-170
Arrival mode	1-39
access	1-7
autoranging	1-15, 1-39
ranges	1-39
use vs. Departure mode	1-34
waypoint centering	1-32, 1-39, 1-44, 1-115
AUX button	1-7
Bearing to WPT display	1-16
Caveats	
Argus use in approach	1-3
Arrival not "approach plate"	1-39
charts are legal reference	1-155
LORAN choice	1-158
Cleaning	1-6
Courselines	1-52
in "direct to"	1-52
Plan mode	1-32
CRT	
characteristics	1-7, 1-174
Data "windows"	
Lower window	1-18
Upper window	1-16
Database	
access without nav receiver	1-99
accuracy and resolution	1-42
expiration date	1-10, 1-155
hardware	1-174
missing data	1-178
Database update	
data transfer protocol	1-156
guidelines and frequency	1-155
how to obtain	1-155
price	1-155

Date	
setting	1-127
Defaults	
data format	1-189
resetting factory defaults	1-193
waypoint selection	1-72
Demo mode	1-128
Departure mode	1-34
access	1-7
ranges	1-34
use vs. Arrival mode	1-34
Distance to WPT	1-16
Emergency mode	1-46
access	1-8
amend selections overridden	1-129
ATC/airport frequencies	1-46
heliports	1-64
no access to Amend mode	1-119
position reporting	1-46
seaplane bases	1-63
summary of operation	1-49
Enroute mode	1-36
access	1-7
ranges	1-36
screen clutter	1-36
Estimated Time Enroute (ETE)	1-16
in emergency mode	1-46
Estimated Time of Arrival (ETA)	1-17
External navigation	1-96
FAA Form 337	1-183
Factory service	1-181
how to return	1-181
time-to-repair	1-181
warranty	1-181
Flight recorder	1-103
automatic restart	1-107
flight display	1-105

selection in amend	1-127
Flightplans	1-79
activating	1-86
adding waypoints	1-79, 1-91
copying	1-80
copying from nav receivers	1-84
creating	1-79
cumulative distance	1-86
deleting	1-101
from navigation receivers	1-53
inserting waypoints	1-80
menu structure	1-69
modifying	1-89
reversing	1-84, 1-86
Front panel	
controls	1-7
CRT	1-7
GPS/LORAN	
accuracy	1-3
crosstrack distance	1-52
differences in data output	1-18
imprecision in WPT location	1-52
software and version changes	1-158, 1-178
specific model information	1-158, 1-160, 1-165
training mode	1-4
with fuel-flow or ELS	1-158
Great circles	1-55
Ground navigation ranges	1-42
Ground speed display	1-16
Ground track display	1-16
Heading	1-23
advantages to using	1-26
magnetic heading vs. track	1-17
Heliports	1-64
selection	1-126
Information mode	1-113
access	1-8

Airports	1-113
runways	1-115
VORs & NDBs	1-113
Installation	
drawings	1-210
electrical	1-206
guidelines	1-205
mechanical	1-208
Introduction	1-1
Latitude/longitude display	1-118
Limitations	1-iv
Manual Revisions	1-iii
Memory usage	
WPT/flightplan capacity	1-102
Menu structure	1-69
Messages	
First Select Object	1-113
LRN COMM FAULT	1-176, 1-195
LRN DATA LOST	1-10, 1-176, 1-194
LRN NAV INVALID	1-10, 1-176, 1-196
NO HEADING OR TRACK	1-10, 1-11, 1-197
Non volatile RAM failed	1-176
PARTIAL VIEW	1-44
WRONG LRN SELECTED	1-195
Minimum safe altitude	
how calculated	1-21
MSA display	1-18
reverse video	1-22
Mode/Range display	1-18
MODIFY ACTIVE FP	1-89, 1-93
Navigation	
crosscheck sources	1-13, 1-110
data display	1-9, 1-16
resolution vs accuracy	1-42
Navigation receiver	
model display	1-118
models and compatibility	1-158

Night flight	
deselecting airports	1-36
Plan mode	1-32, 1-55
courselines	1-32
flight plans	1-32
out-of-range waypoints	1-52
waypoint	1-32
Plan view mode	1-44
access and exit	1-44, 1-115
true north up selection	1-44, 1-119
which runways displayed	1-44
PPTO (CENTER CDI)	1-70, 1-94
Product description	1-198
Product limitations	1-198
Range ring	
departure vs. other modes	1-35
Remote switches	1-8, 1-117
troubleshooting	1-178
Removal from panel	1-6
Screen	
cleaning	1-6
example screen	1-9
Seaplane Bases	1-63
Select mode	
access	1-7, 1-110
airport reference point	1-110
VORs & NDBs	1-110
Selective availability	1-3, 1-42
Selftest	1-175, 1-194
Setup mode	
before shipping	1-iii
enabling setup	1-188
function table	1-186
Simulated CDI	1-18, 1-52
Argus vs. external navigation	1-68
crosstrack distance	1-54
in flight plan mode	1-52

TO/FROM indication	1-52, 1-54
Simulated flight	1-128
Soft keys	1-70, 1-119
Software version	1-iii
Special use airspace	1-57
ADIZ	1-57
altitude restriction display	1-57
boundary line appearance	1-57
Class B airspace	1-57
Class C airspace	1-57
MOAs	1-57
overlapping class B and C airspace	1-59
Prohibited areas	1-46, 1-59
selection in Amend mode	1-124
Warning and Alert areas	1-57
Specifications	1-198
Station passage	1-13
System components	1-202
Taxiing	
ETE display	1-16
fractional mile ranges	1-43
map display during	1-10
Terminal mode	1-25, 1-131, 1-133
accessing	1-134
Theory of operation	1-174
hardware	1-174
selftest	1-174
Time	1-17
timezone setting	1-127
Track error	1-18
DTK-TK vs BRG-TK	1-19
mode selection	1-121
Training	
Argus sample flight	1-10
GPS/Loran "take home mode"	1-4
simulated flight	1-128
Troubleshooting	1-176, 1-194

LRN COMM FAULT msg	1-195
LRN DATA LOST message	1-194
LRN NAV INVALID msg	1-196
NO HEADING OR TRACK message	1-197
WRONG LRN SELECTED msg	1-195
User waypoints	1-97
capacity	1-102
copying from database	1-75
creating	1-75
creating offset waypoints	1-76
modifying	1-76
search and rescue grid	1-97
sorting and storing	1-78
Warranty	1-183
exclusions	1-183
transfer	1-183
Waypoint identifier	1-18
Waypoints	1-52
accuracy from external sources	1-53
copying to save memory	1-102
deleting	1-101
finding by name	1-80
from external navigation receivers	1-53
legal names	1-73
navigating direct to	1-77
types	1-71
World wide web	
downloading data	1-156
navigation receiver compatibility	1-158

