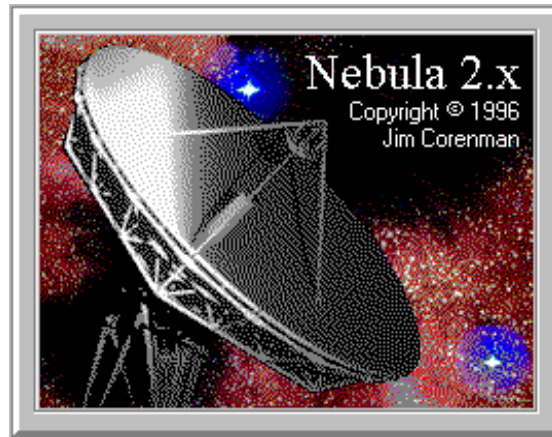# Nebula

Communications program for
Trimble® Galaxy® Inmarsat-C/GPS System

Installation and Operations Manual

(Version 2.0)

Contents

Welcome!

Nebula is a Windows-95 communications program written specifically for the Trimble Galaxy Inmarsat-C/GPS transceiver that offers a number of advantages over Trimble's DOS-based Galaxy program.

- A real Windows application allowing data exchange and use of other programs concurrent with Galaxy communications.

- The multi-threading features of Windows-95 are used to provide Galaxy communications without interference with the user interface.

- A central Message Index window provides easy access to incoming and outgoing messages, and Message Icons provide feedback on message type and status. An optional split window provides Explorer-style access to the folders in use.

- Use of the Windows MDI (Multiple-Document Interface) allows multiple Messages and the Message Index to be viewed and arranged as desired, and the usual Windows features can be used to copy text between applications.

- A comprehensive Address Book stores Inmarsat addressing information for each Ocean Region as well as header lines required by email messaging systems (e.g. Comsat's C-Link email headers).

- An OLE interface and a NMEA output provides access to the Galaxy's GPS information for other applications.

Nebula has been designed as a single program file, Nebula.exe, with no .DLL extensions in order to simplify installation, de-installation and maintenance. Similarly, program setup is stored in a Windows 3.1-style initialize (.INI) file in the Galaxy directory rather than being buried in the system registry.

Note: Nebula is not intended as a complete replacement for Trimble's DOS-based Galaxy program, and certain features of Galaxy have not been implemented in Nebula. Specifically, there is no support for Fleetnet messages or Data Reporting, and service features such as the Performance Verification Test (PVT) are not implemented.

Installation

Installing Nebula for the first time

Installing Nebula is straightforward. An Install.bat batch file is provided on the floppy to automatically create the required directories and copy the relevant files.

To install, insert the Nebula floppy disc in the floppy disc drive, click the **Start** button, select **Run...** and enter `a:install↵.` The install batch file will create the required directories and copy the files from the floppy disc. Attempts to use an alternate directory will be completely unsuccessful at this time.

A start menu entry is not created automatically, to do this manually follow these steps:

- click **Start** at the left end of the Taskbar at the bottom of the screen
- click **Settings**
- click **Taskbar**
- click the **Start Menu Programs** tab
- click the **New** button
- enter `c:\Galaxy\Nebula.exe` as the Command Line and click **Next**
- Select the desired program group, or create a new group by clicking **New Folder**
- Enter `Nebula` as the name of the program and click **Finish**.

If you want Nebula to start automatically each time the computer is booted, Nebula can be added to the **StartUp** program group following the above procedure. Each program in the **StartUp** group is executed automatically when Windows boots. A program can be in the **StartUp** group in addition to any other group.

A Desktop shortcut is also a convenient way to start commonly-used programs. To create one:

- Right-click on a blank area of the Desktop (i.e. click with the right mouse button)
- select **New** and then **Shortcut** from the pop-up menu
- enter `C:\Galaxy\Nebula.exe` as the Command Line and click **Next**
- Enter `Nebula` as the name of the program and click **Finish**.

if there are Galaxy messages already in the `\Newmail` and `\Messages` folders when Nebula is run for the first time, then Nebula will scan the folders and the log files and build a new Message Index (saved in `MsgList.txt`). This may take some time if there are a large number of messages on first start-up. If archive log files have not been written by Galaxy, then the information in the Message Index will be sketchy but all of the files will be represented. Nebula maintains archive logs in the same format as Galaxy.

Re-installing or updating Nebula

If you have already installed and used Nebula, it can be re-installed or an update installed by re-running the Install batch program as described above. The install program will detect the presence of `Nebula.ini` and not copy this file from the floppy disc (otherwise all setup information would be lost). If you copy files manually, **DO NOT** copy `Nebula.ini` from the floppy.

Note that the Address book, template and LES files (**AddrBook.txt**, **AddrTemp.txt**, **LESlist.txt**, **LESequiv.txt**) are used for initial startup only, and once Nebula has been run for the first time the data is stored in the **Nebula.ini** file. When Nebula is updated, new copies of these files will be placed in the Galaxy directory but will not be used unless the corresponding section of **Nebula.ini** is deleted. This avoids corruption of user data, but on occastion it may be desirable to incorporate an updated list of address templates (**AddrTemp.txt**) for example. Changes can be made directly in **Nebula.ini**, but be careful to preserve the correct format.

Files

Files that Nebula uses or generates are as follows:

On the distribution floppy:

Nebula.exe	- the main execution file (self-contained, no .DLL's)
Nebula.hlp	- help file
Nebula.cnt	- help contents
Nebula.ini	- skeleton initialization file (with a temporary password)
NebTest.xls	- A simple Excel macro to test the OLE link for Galaxy position

The following files are distributed on the floppy, but are stored in Nebula.ini once the program has been run the first time.

LESlist.txt	- the list of all known LES numbers and their locations *
LESequiv.txt	- list of equivalent LES's in each ocean region *
AddrBook.txt	- the initial address book (a smaple is on the floppy) *
Addrtemp.txt	- Address templates for creating new address book entries *

Not on the distribution floppy, but generated by Nebula:

MsgIndex.txt	- the message index, saved between sessions
Debug.txt	- The debug file if Options/Debug is set
Distress.txt	- Distress message boilerplate text, if entered
Nebula.gid	- Help index, generated when Help is used the first time
Nebula.kwd	- Help Keyword directory, generated if **Help/Find** is used.

You should also check that an **Trash** folder is added under **\Galaxy**, to store deleted mail messages (**Install.bat** does this). If this folder is not present then the files will be deleted outright.

Installation Options

There are some Nebula options that may be of interest:

Alarm Silence:

The Trimble Galaxy firmware is configured to sound the audio alarm whenever an "Urgent" or "Distress" priority EGC message is received. This alarm will normally sound until manually acknowledged by pressing the Galaxy's "Quiet" button for two seconds.

An Alarm Silence option is available when Nebula is running to turn off the EGC alarm automatically. If the Alarm Auto-Silence option is enabled (**Galaxy/Options** menu) and Nebula is running then the alarm will beep for a few seconds and shut off automatically.

NOTE: This Alarm Auto-Silence feature contravenes the GMDSS requirements for ships and must not be used on vessels that are obligated to participate in the GMDSS, generally vessels over 300 gross tons.

COM Port:

The COM port can be set to COM1-COM8 via the **Galaxy/Options** Menu. The recommended port is COM1 and this is the default.

Message Numbering:

You may also want to define a starting number for Send messages. Send messages are numbered sequentially, in the same manner as the Galaxy program. The Nebula program maintains the last number used in the **Nebula.ini** file, so numbers are not reused even if the files are deleted. The file number is also incremented if a file of the same name is found, irrespective of the last number used by Nebula, in order to avoid conflicts with use of the Galaxy program.

By default Nebula starts numbering outgoing messages at 1001 to avoid the Galaxy file numbers which start from 1. If you want to start numbering at some other point then the next sequential file number can be set by making an entry of the following form in the **Nebula.ini** file:

```
[Messages]
LastSaved=2000
```

The next send message (in this example) will be named **00002001.C01**.

Nebula will save the full file name as **LastSaved=** and increment it for each message, but the above form works also.

OLE Position Interface:

If you want to use the Nebula OLE server feature to make lat/lon information available to another application, it will be necessary to register Nebula as an OLE server. This is done by choosing **Run** from the Windows **Start** menu and entering the command

```
c:\Galaxy\Nebula.exe /Regserver
```

If you want to un-register Nebula as an OLE server, enter the command

```
c:\Galaxy\Nebula.exe /Unregserver
```

Note that this is required only if you want to access lat/lon information via an OLE link (Refer to "OLE" in the Nebula help file).

Passwords:

A password is required to enable Galaxy message communications. Without a valid password, basic Galaxy communications remain enabled but message send/receive is disabled (including EGC messages).

Two types of passwords are provided for. The normal password is keyed to the Inmarsat Serial number, which is located on the label on the top of the Galaxy, and also read by the program via the RS-232 port. A normal password is prefixed by `IPW-` followed by the Inmarsat serial number and a check code.

For demo use a temporary password is supplied, prefixed by `UB-`. The next six digits is a "Use-by" date in the format `YYMMDD`, and the remaining digits are a check code for the date code. Don't bother trying to crack it, just pay the asking price and take comfort that it goes to a good cause.

Passwords are stored in the `Nebula.ini` file and can be entered with the **Options** dialog under the **Galaxy** menu. It is not necessary to exit and restart if passwords are changed, but if an invalid password is corrected then it may take some time (less than a minute) for full communications to be reestablished.

Introduction to the Inmarsat-C System

The Inmarsat-C system is a world-wide messaging system providing global coverage between latitudes 70° north and 70° south. Coverage is divided into four overlapping Ocean Regions, called AOR/E, AOR/W, IOR and POR, each served by a geostationary satellite under the control of a Network Control Station (**NCS**). The role of the NCS is that of a referee, and all message communications are handled by one of a number of Land Earth Stations (**LES**) that service each Ocean Region. The LES's are the commercial service providers, transferring messages between mobile users and their shoreside contacts. Messages are sent on a store-and-forward basis, and can be delivered by telex, fax, or email, depending on the capabilities of the LES.

The mobile terminal is called a Mobile Earth Station (**MES**), and must be logged into one of the four ocean regions in order to send or receive messages. There is generally no provision to store message and allow a user to log in at a later time and download messages. This means that the Galaxy DCE (the box) must be kept powered up to receive messages, but the computer and software can be shut down, and the "Mail" light on the Galaxy's front panel will alert the user that new mail is waiting.

Each mobile user of the Inmarsat-C system is assigned a 9-digit identification number starting with a "4". This number, prefixed by a country code representing the Ocean Region, serves as a telex number for receiving messages over the international telex system. This mobile identification number also forms the basis for email addresses for messages sent over the Internet via one of the Internet-to-Inmarsat-C gateways (e.g. Comsat's C-Link and Station-12's SAT.400).

Each mobile user has an affiliation with one LES, usually the primary service provider for the country of registration, but any mobile user is free to use any LES for communication. Unless an account is established with the LES, charges are billed through the national billing authority, the FCC in the USA, with additional service charges. Most service providers will set up a credit card account, may be the best option for non-commercial users.

The code most commonly used for message transfer is 7-bit ASCII, although 8-bit binary transfers can be made through some LES's. Messages sent over the telex system are transmitted via a 5-bit code, however, and lower case characters and all but the most basic punctuation are lost irrespective of which code is used between the LES and the MES. Messages sent to an email gateway generally use the 7-bit ASCII code. Sending 8-bit binary messages is possible in theory, but most email systems (including the Internet) are not capable of transmitting binary information with 8-bit codes.

Other connections available, depending on the LES, are PSTN (Public Switched Telephone Network, i.e. the regular phone lines) and PSDN (Public Switched Data Network). Both have limited utility for the average user. PSTN connections are used to send faxes, and most LES's offer a text-to-fax service for outgoing faxes. Note that inward faxes aren't so easy, as manual transcription is required, but some companies (e.g. Comsat) do offer that service for an additional fee. PSDN connections allow data transfers between systems, and are used by some service providers to provide a link to an LES outside their own service area (e.g. Comsat uses a PSDN connection to provide service to the IOR).

Although some information is provided here with regard to the various services provided via Inmarsat-C, remember that all service arrangements must be made directly with the service provider.

Getting Started

Overview of Nebula Windows and Features

The "heart" of the Nebula program is the Message **Index Window**, which combines the functions of a message directory and a transaction log. An optional split window provides Explorer-style access to the message folders that are included in the index. Individual messages can be viewed in **Message Windows**, along with Galaxy Event Messages and Transmission Logs. Nebula is an MDI (Multiple-Document Interface) application, which allows these windows to be open together, and arranged in various ways within the main program window. **Keyboard Shortcuts** are available to simplify common tasks.

Additional windows are provided for the **Address Book** for sending mail, for setting program options, and for new mail alerts; these windows appear for a specific task and are not part of the MDI structure.
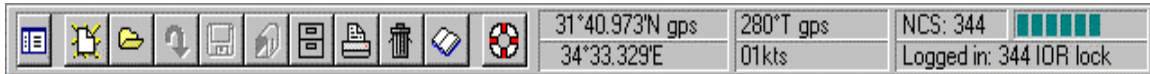
The Nebula program window has a **Toolbar** with an information box across the top and a status panel along the bottom, with the central area used by the Message Index and Message windows. The tool buttons (from left to right) are Show Folders, New, Open, Reply, Save, Send, File, Print, Delete, and Distress, and can operate in both the Message Index and Message Window where appropriate. The information area to the right of the toolbar displays the Galaxy GPS position and communication status.

Status boxes at the bottom show (from left to right) Hints and Galaxy Transfers, Galaxy communication state, and UTC time and date.

Toolbar buttons:

Show/Hide Folder Tree. Click once (or type **Ctrl/T**) to split the window and show both the Message Index and Folder Tree; click again to restore single window for the Message Index. This button is active at all times, but the results are only visible when the Message Index is displayed.

New Message. Opens a new blank Message Window, and opens the Address Book to allow selection of a recipient.

Open Message. If selected from the Message Index window, opens a new Message Window for the currently selected message(s). If selected from the Message Window, displays the Windows Open-file dialog window.

Reply. Formats a reply to the message selected in the Message Index, or the current message opened in a Message Window. This function is only enabled for incoming messages with a recognized address.

Save Message. Only works for an outgoing Message from a Message Window, and saves any changes. If no other file name has been assigned (with the File/Save menu) then a sequential numerical file name is generated automatically. If a message has already been sent and then is subsequently changed it will be saved as a new message.

Send Message. Works for the selected messages in the Message Index, or the current message in a Message Window. Marks the selected messages with the Send icon ( ) in the Message Index, and transfers them to the Galaxy for transmission.

File Message. Works for the selected message(s) in the Message Index, or the current message in a Message Window, and transfers messages to the folders defined by the **Tools/Options/Folders** setup window.

Print Message. Works for the selected message(s) in the Message Index, or the current message in a Message Window. Displays the Print dialog and then prints the message(s) on the selected Windows printer.

Delete Message from Index. Works for the selected message(s) in the Message Index, or the current message in a Message Window. If there is a **\Trash** folder, deleted mail messages (not EGC) are transferred there.

Open Address Book. Opens the Address Book window, works from either the Message Index or Message Window.

Distress. Opens a new Distress Message and displays a dialog window to select an LES as a destination.

The remainder of the tool panel shows the vessel's position and course and speed over the ground from the Galaxy's integral GPS receiver. If the information is current it will be suffixed with a "**gps**" notation, and if the data is old it will appear with a "**>4hr**" or "**>24h**" notation indicating that the data is more than 4 hours or 24 hours old. (In this case the GPS processor is most likely hung and a Galaxy reset is required).

The right-hand portion of the tool panel shows the received signal strength from the satellite, the LES that is currently connected, and the ocean region that the Galaxy is logged into. "**NCS:**" indicates the current LES and will normally be the appropriate control station, 044, 144, 244 or 344. When data is being sent or received the indicated NCS will indicate which LES is connected. The "**Logged in:**" indicator will continue to indicate the currently logged ocean region, followed by the lock status: "**lock**" for phase locked and synchronized, "**phase**" for locked but not synchronized, and "**----**" for not locked.

Menus

Nebula menu commands are divided into seven groups, **File, Edit, Galaxy, Distress, Tools Window** and **Help.**

File Menu:

New	Opens a new message
Open	Opens selected message, or brings up File-Open dialog
Save	Saves current message, assigning file name automatically
Save As	Saves current message, bringing up file-save dialog
Close	Closes current message window
Move	Brings up file-move dialog window
Send	Send selected or open message to the Galaxy for transmission
Reply	Opens a new message as a reply to selected or open message
File	Moves selected or open message to designed "save" folder
Delete	Deletes the selected or open messages (i.e. moves to Trash folder)
Print	Prints the selected or open message
Exit	Closes Nebula and returns control to Windows

Edit Menu (for Index Window):

Delete	Deletes the selected message(s) (i.e. moves to Trash folder)

Edit Menu (for Message Window):

Cut...................................Moves selected text to clipboard and deletes it
Copy...............................Moves a copy of selected text to clipboard without deleting
Paste..............................Adds text from clipboard to message at the insertion point
Delete............................Deletes selected text
Select All ....Selects all text

Galaxy Menu

Log In ....Logs the Galaxy into the specified Ocean Region
Log Out ....Logs the Galaxy out of the current Ocean Region
Preferred OR................Allows selection of the Preferred Ocean Region for scans and login
EGC Setup ....Brings up EGC Setup Window
Forced Clear.................Sends a Forced Clear command to the Galaxy to abort current send
Request Status.............Sends a Status Request message to the NCS (updates status icons upon reply)
Reset Galaxy.................Resets Galaxy firmware (choice of hard or soft reset for 4.20 firmware)
NCS Scan ....Initiates scan of all NCS channels (normally done automatically)

Distress Menu

Distress Alert ....Brings up window to format Distress Alert
Send Distress Message Creates new distress message, incorporating distress text

Tools Menu

Options ....Opens Options window for Galaxy and program options
Rebuild Index ....Initiates a rebuild of the message index for all (non-hidden) folders
Scrub Log Files ....Scans log files and deletes redundant and obsolete entries
Check "From" Addr ....Compares selected message to Address Book and updates "From" entry in Index
View Debug File ....Opens the debug file for viewing
View Logs ....Opens the selected log file for viewing

Window Menu

Tile Vertically ....Arranges all open Message Windows and the Index Window as vertically-oriented panels
Tile Horizontally ....Arranges all open Message Windows and the Index Window as horizontally-oriented panels
Arrange Icons ....Reduces all windows to icons and arranges across the bottom.
Address Book ....Opens the Address Book window
Distress Text ....Opens the Distress Text for editing
Event List ....Opens a window for the most recent Galaxy Event messages
Window List ....A list of open child windows

Help Menu

Contents ....Opens the Contents window for Nebula Help
Search for Help on ......Opens the Search window for Nebula Help
How to use Help ....Opens the help-on-Help window

About ....Displays revision and copyright information about Nebula

Logging In

The first thing to do when starting up Nebula is to set the Preferred Ocean Region and log in to the NCS. Once the Preferred Ocean Region has been set with the **Galaxy/Set Preferred OR** command, it will be saved and used for subsequent scans and log-ins.

It is recommended that mobile users periodically log in, even when a log out is not required in order to keep the information about the MES that is stored at the NCS up to date. If a **Galaxy/Log In** menu command is issued while the Galaxy is logged in, a log-out operation is performed automatically.
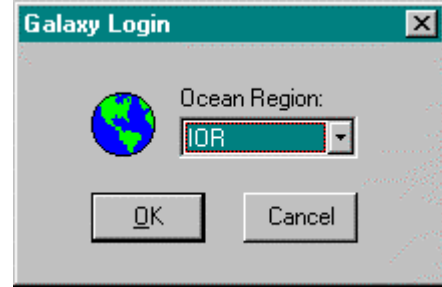
EGC Setup

In order to receive EGC messages correctly, use the Galaxy/EGC Setup command to access the EGC Setup dialog window. EGC messages are transmitted on the NCS channel and are available to all mobile users. EGC messages include Notices to Mariners, Weather Bulletins, and Inmarsat service messages.
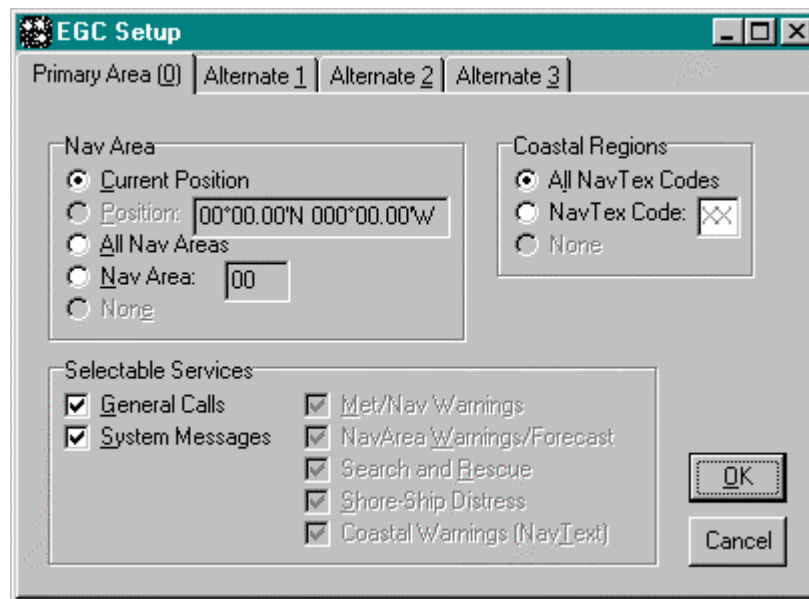
EGC messages are addressed by the originator to a geographic area, either the entire Ocean Region, a specific Nav Area within the O.R., a rectangular area defined by lat/lon, or a radius around a specific lat/lon point. Service messages are typically sent to the entire O.R., weather messages and Notices to Mariners are addressed by Nav Area, and relayed distress messages are often addressed to a specific lat/lon area.

The Galaxy has the ability to screen certain messages according to the parameters defined by the EGC Setup window. One primary and three alternate setups are available, each with a separate page. The recommended setup for the primary region is shown, with the current position defining which message will be received. The translation to Nav Area is made by the Galaxy. Alternately, messages for all Nav Areas (within the logged O.R.) can be selected.

To receive messages for other Nav Areas, for example the area to which you are headed, use one of the alternate setup pages, click the **Nav Area** button and enter the appropriate Nav Area code. (Nav Areas are often defined as Roman numerals but must be entered here as a conventional 1 or 2-digit numbers). Alternately, click **Position** and enter a lat/lon within the desired Nav Area.

Under **Selectable Services**, the only choices available are **General Calls** and **System Messages**. For maritime applications the other message types are enabled and cannot be de-selected. It is recommended that General Calls and System Messages be left enabled, as they are few in number and include potentially important service announcements.

Under the Coastal Regions headings, an option is provided to select a specific Navtex code. Some coastal forecasts on Inmarsat-C are formatted according to the Navtex format, with a two-letter code for the type of message. However, the coding by the originating stations is not consistent, and it is strongly recommended that the **All Navtex Codes** option be selected.

Sending and Receiving Messages

Reception of mail and EGC messages is automatic, and messages are added to the **Message Index** as they are transferred from the Galaxy. If the Nebula program is not running when a message is received, then it is saved in the Galaxy box and transferred when the program is started. When a mail message is received, a "New Mail" window pops up as an announcement, and a sound can be played (see Sound Options).

An Outgoing Mail Message is created by opening a new message window, choosing an address from the Address Book, and composing the message. Outgoing messages can be sent immediately, or saved and sent later. The Message Index shows the status of outgoing messages, indicating whether they have been sent and the delivery status if sent.

Sending a **Distress Message** is similar to sending a regular Outgoing Mail Message except an LES selection box appears instead of the Address Book. A **Distress Alert** is not a text message, but a coded alert, also sent to a specific LES.

Saving Power

The Galaxy DCE unit must be left powered on continuously in order to receive and store mail and EGC messages, but the computer may be shut down in order to save power. If the Nebula program is not running then messages will be accumulated in the Galaxy's memory and will download automatically when Nebula is restarted. The memory in the Galaxy DCE box is limited and if it fills then the "Mailbox Full" light will come on and an alarm will sound. If the program is not restarted then the messages will be lost, starting with the oldest. Note that Nebula's alarm silence feature only operates when the program in running.

For more information on sending and receiving messages, see the following sections.

Message Index Window

The Message Index is a separate window within Nebula that is used to view the status of messages that have been sent or received, and to provide an easy means of accessing the messages themselves.
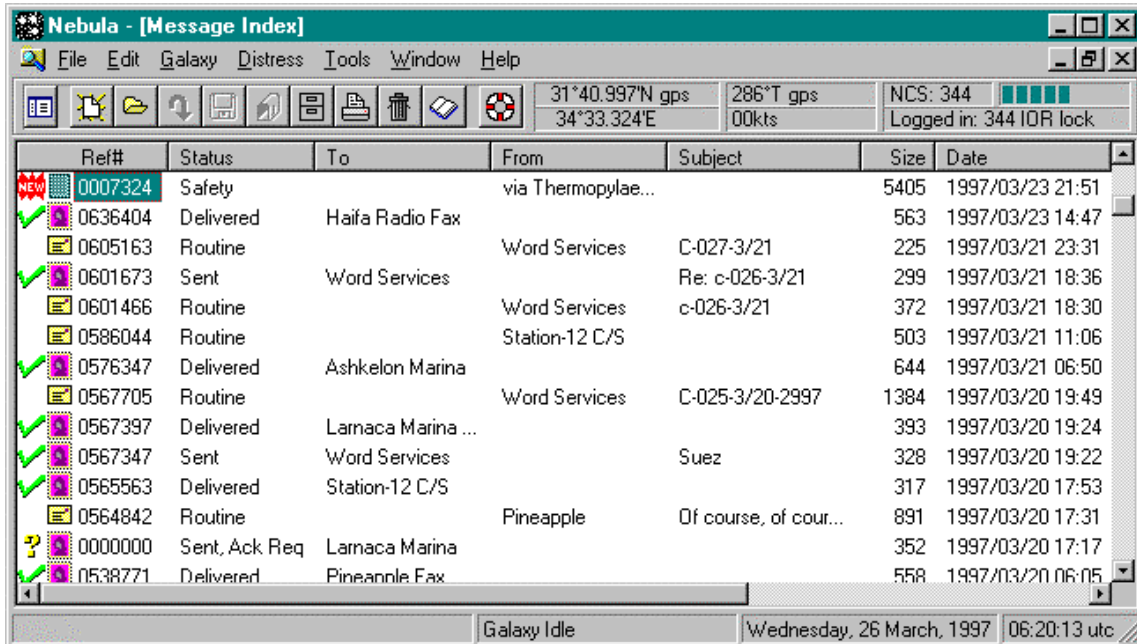
The index window is divided into rows and columns, with each row representing one message. The format is similar to that used by the Windows Explorer, and most keyboard and mouse operations are the same. Messages can be sorted in either order by any column by clicking the column header; clicking the same column again reverses the sort order. Pressing the **Esc** key restores the default sort by date.

Messages can be selected by either keyboard keys or the mouse, and multiple messages can be selected for most operations. See the following sections for more information.

Message Index Layout

The layout of the Message Index columns, from left to right, is as follows:

Ref#............ Reference Number and Icons for Message Type and Status
Status......... Send Status for outgoing messages, priority for incoming messages
To................Addressee for outgoing messages
From........... Originator for incoming mail messages
Size ....Message Size in bytes
Date ....Message Date and Time
File..............File Name

Note that the last column or two of the message index may not be fully visible, depending on the column widths and the size of the window. The width of individual columns can be changed by positioning the cursor between the column headings (so that it becomes a "split" icon) and dragging the column divider left or right.

The index is normally sorted by date, most recent message first. Clicking on any of the column headers changes the sort key to that column, and clicking the same column again reverses the sort order. To revert back to a date sort, click the Date header button or hit the ESC key on the keyboard.

Sorting by the "To" or "From" columns provides an easy way to find sequential messages to or from the same person. If you select a representative message first, then click the "From" column header (for example), the selected message will remain visible and the other messages from the same address will by displayed above and below (in chronological order if that was the previous sort).

Message Index Operations

Once one or more messages are selected (using any of the usual Windows selection methods), a number of operations can be performed either by menu selection, using a button on the **Toolbar**, or in some cases via menu operations or a keyboard key.

Open: A Message Window can be opened to view or edit the selected message(s) by pressing the Enter key, double-clicking the Reference number, clicking the button on the toolbar, or selecting Open from the File menu. EGC and Incoming Mail Messages will be opened read-only and cannot be edited, but all or part of the text can be selected and transferred to a new outgoing message by selecting Copy and Paste from the Edit menu or using the right mouse button to access a pop-up menu.

Reply: The (first) selected message can be replied to by clicking the button on the toolbar or selecting Reply from the File menu. The reply function is only enabled for incoming mail messages with a "from" address that matches an entry in the address book.

File: The selected incoming message(s) can filed (stored in the designated archive directory) by clicking the button on the toolbar or selecting **File** on the **File** menu. Filing an incoming message cleans up the Message Index and provides some protection against accidentally deleting it.

Print: The selected messages(s) can be printed on the selected Windows printer by clicking the button on the toolbar, or selecting Print on the File menu.

Send: The selected outgoing messages(s) can be sent by clicking the button on the toolbar or selecting Send from the File menu.

Delete: The selected messages(s) can be deleted (or moved to the **\Trash** folder if there is one) by clicking the button on the toolbar, selecting Delete from the File menu, or typing the Del key on the keyboard. Mail messages will be moved to the **\Trash** if there is one, otherwise deleted. EGC messages are always deleted. Messages that have not been read are only deleted or moved after confirmation.

Reference Number:

The message reference number is assigned by the Inmarsat-C system when a message is originated. Reference numbers are nominally unique, but duplicates can occur. File

names for incoming messages are created from the Reference Number with a **.E01** extension for EGC messages and **.D01** for mail messages. In the event of duplicates, the extension is incremented, e.g. **.E02**. Note that EGC messages are typically transmitted two or three times, but the duplicates are trapped by the Galaxy DCE box and will only be seen if the first is incomplete.

Message Icons:

Two icons indicate message type and status. The first indicates Message Status, and the second, Message Type.

Message Status for incoming messages:

indicates a new (unread) message

indicates a filed (saved) message

Message Status for outgoing messages:

indicates that a transmission is pending

indicates that the Galaxy is waiting for delivery confirmation

indicates that the message was delivered (or sent without confirmation)

indicates that a transmission failed (open the **Event List** under the **Window** menu for more information).

Message Types:

indicates a outgoing Send Message

indicates an incoming Mail Message

indicates a complete EGC message.

Alternately, EGC messages can be indicated by

for a partial EGC message or

for an Urgent or Distress EGC message.

Message Index Columns:

The following columns are provided in the message index:

Status: The current status of the message, the message priority for incoming messages (Routine, Safety, Urgent or Distress), and the delivery status for sent messages (Sending and Sent if no delivery confirmation was requested, or "Sending", "Ack Req", "Delivered" or "Not Del" if delivery confirmation was requested). An abbreviation for a non-delivery code may be included, see "**Abbreviations and Service Codes**" in the appendix.

To: The message recipient's name for outgoing send messages (i.e. the familiar name from the address book).

From: The sender's name for incoming mail messages, either the familiar name if a match is found in the address book, or the Inmarsat number or email address if the format cannot be decoded, or blank if the format is unknown.

Size : The message size in characters as indicated by the Inmarsat system. Does not include embedded status or address codes used by Nebula (enclosed in square brackets).

Date: The date and time stamp for the message. For incoming messages (mail and EGC), the date and time the message was received from the LES; for not-yet-sent outgoing messages, the date and time the message was first saved; and for transmitted messages, the date and time it was sent to the LES.

File: The folder and file name that the message is stored in. The folders for the various message types are as defined by the **Tools/Options/Folders** setup window.

Using the Folder Tree

The Message Index window can be split to show a Folder Tree view. To show the Folder Tree, click the left-most Folder Tree button on the toolbar or type Ctrl/T. To move between the Folder Tree and Message Index windows, either click on the appropriate window or hit the Tab key. To close the Folder Tree window, press the Folder Tree button or type Ctrl/T again, or press the ESC button while the Folder Tree is selected.
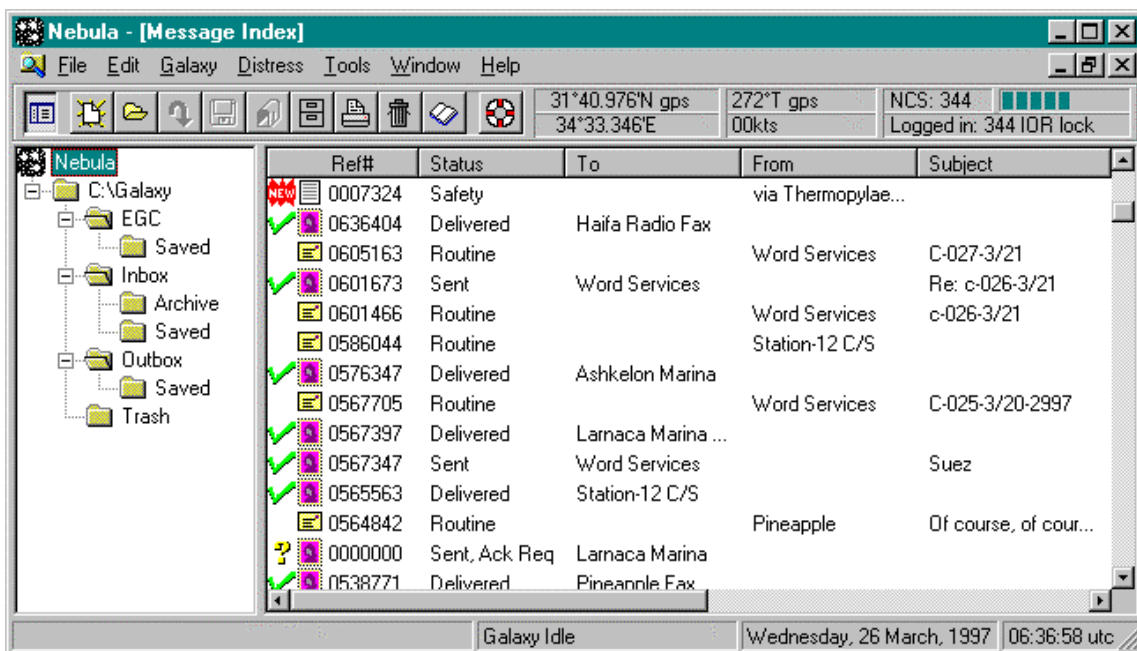
The folders that are included in the displayed Message Index are indicated by an open-folder icon (▨) and folders that are available but not included in the displayed index are indicated by a closed-folder icon (▨). To select one folder alone for the Message Index, simply move the mouse pointer to its folder icon and click once. This closes all other folders and displays the index for the selected folder. To include more than one folder (as in the example above) hold down the **Shift** key while clicking the folder; this will toggle the status of the selected folder without changing the others. To hide the Folder Tree again, hit **Esc**, type **Ctrl/T**, or click on any part of the Message Index.

 The Folder Tree window shows all folders that are under the designated folder for Nebula (usually `\Galaxy`) except for those that are designated as "hidden". Folders can be hidden using the **Tools\Options\Folders** setup window. Alternately, right-click any part of the Folder Tree window and selecting **Show Hidden**. This will show the hidden folders in the Folder Tree with a "hidden folder" icon (▨). Generally the hidden folders include those not used for any incoming or outgoing messages, which simply serves to clean up the Folder Tree. The contents of those folders will not be altered, but they will not be

accessible from the message index unless they are unhidden (right-click the Folder Tree, then click **Show Hidden** again).

See **Routing** and **Folders** in the **Setting Options** section for more information on message routing and folders.

Receiving a Mail Message

Mail messages are received automatically by the Galaxy and transferred to the PC if Nebula is running. If Nebula is not running then the messages are stored in the Galaxy memory and transferred when Nebula is started.

When a new Mail Message is received, the "**New Mail**" window will appear alng with an audio alert if enabed (using the **Galaxy/Options** menu). In order to view the new message,

> Click the "**Thanks**" button or press the ESC or Enter keys to close the New Mail window.

> Find the new message on the Message Index for the new Mail Message. (The newest messages will be at the top of the index (if it is sorted by date, the default; if sorted by some other column, press ESC to return to the sort-by-date format). New, unread messages are marked with a NEW icon.

> Select the message to be read, and press **Enter** or click the "Open" button to display the message in a new Message Window.

> As an option, when you are viewing one message you can press the **Alt + PgUp** keys together (or **Alt + ↑**) to view the previous message on the index (one line higher on the index, however it is sorted), or **Alt + PgDn** keys (or **Alt + ↓**) to view the next message.

> To close the message window, press the **Esc** key, click the "**X**" (window-close icon), or select **File/Close** from the menu when you are finished reviewing your messages.

> To return to the Message Index without closing the Message Window, press the **Alt + Home** keys together. To sequence through the open Message Windows (and the Index) press **Ctrl + Tab** together.

EGC Messages

EGC messages are viewed in the same way as new mail Messages, except the "New Mail" announcement window does not appear. There are two special icons associated with EGC messages:

> Partial EGC messages are represented by a 🖥 icon. (This occurs, for example, if the signal fades or a message send interrupts EGC reception).

> "Urgent" or "Distress" EGC messages are represented by a 🟥 icon with an exclamation mark (and also by an audio alarm from the Galaxy unit. To silence the alarm automatically, see **Options**).

If the "**Show Header Info**" option is selected in the **Tools\Options** window, the originating LES will be extracted from the message header and shown in the Message Index in the "From" column, i.e. "via Perth, Australia". Note that this is not the originating organization but simply the LES that transmitted the message.

Sending a Mail Message

To send a message, follow these steps:

- Select File/New from the menu, or press the [icon] toolbar button.

- A blank message will be created, and the **Address Book** opened. Select the recipient's name or add a new entry, and click OK.

- Compose the message in the Message Window.

- To save the message and send it immediately, click the [icon] button (or select **Send** from the **File** menu). To save the message for sending later, click the [icon] button or select **Save** from the **File** menu.

- Press the ESC key, or select **Close** from the **File** menu to close the Message Window.

The send status of the message will be shown by the icons on the Message Index.

See **"Introduction to Distress Messages and Distress Alerts"** for information on sending distress messages.

Printing Messages

Messages can be printed by clicking the [printer icon] button on the toolbar, or selecting **Print** from the **File** menu. A Print dialog window will be opened, allowing selection of the desired printer and setting of print options.

Printer: Use the pull-down list to select from a list of currently installed printers. (To install a new printer, select Printers from the Window Control Panel). To change the settings for the selected printer, click the **Setup** button or type **Alt/S**.

Margins: Set the margins appropriate for the selected printer and paper size. The default margins are the unprintable regions for the selected printer, and in most cases at least the left margin will want to be increased. Note that the margins are measured from the paper edge and are inclusive of the unprintable regions, which may differ from other Windows programs for certain printers.

Font: The print font and size can be different from that used for the screen (10-point Courier New), and an alternate font may be chosen from the fonts list if desired. The fonts list includes printer fonts for the selected printer as well as TrueType fonts. While either will work, the printer fonts will generally result in faster printing. (The example above shows the use of the 12 char/inch printer font for an HP Thinkjet printer).
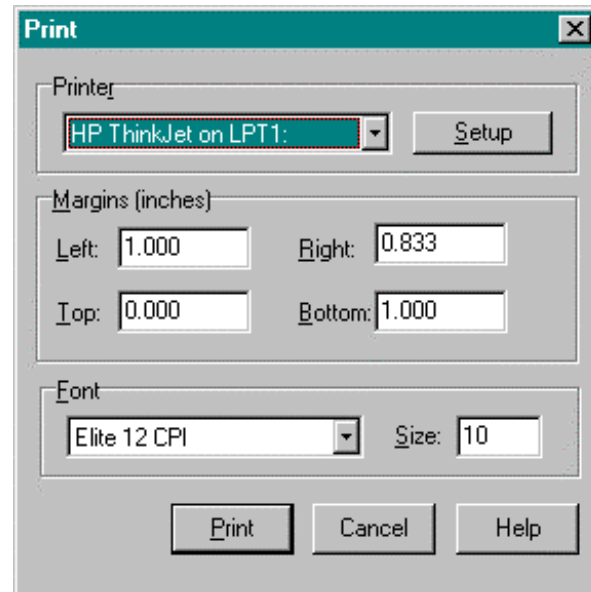
Correct printing depends on correct installation of the printer, and on the correct settings being made. In the even of problems, check the printer settings carefully. Select **Printers** from the Windows **Control Panel** and open the **Properties** window for the desired printer (select **Properties** under the **File** menu or right-click the printer and select **Properties**). The setup varies with the printer, but special attention should be paid to **Unprintable Area** if it is available as an option, as the default setting will often not match the printer specs.

Address Book

The Address Book window is opened whenever a new outgoing message is created (New Message button or **File/New** menu), or via the **Window/Address Book** menu. A list of names is shown on the left side in the **Name** box, these are familiar names or nicknames assigned to each address. The address parameters for the currently selected name are shown in the remaining boxes. All parameters except the Message Preamble are stored separately for each Ocean Region, and are displayed as tabbed pages, one per OR. Clicking the appropriate tab will select the address parameters for that Ocean Region. The default tab is the Ocean Region currently logged into, or the most recent if not logged in.
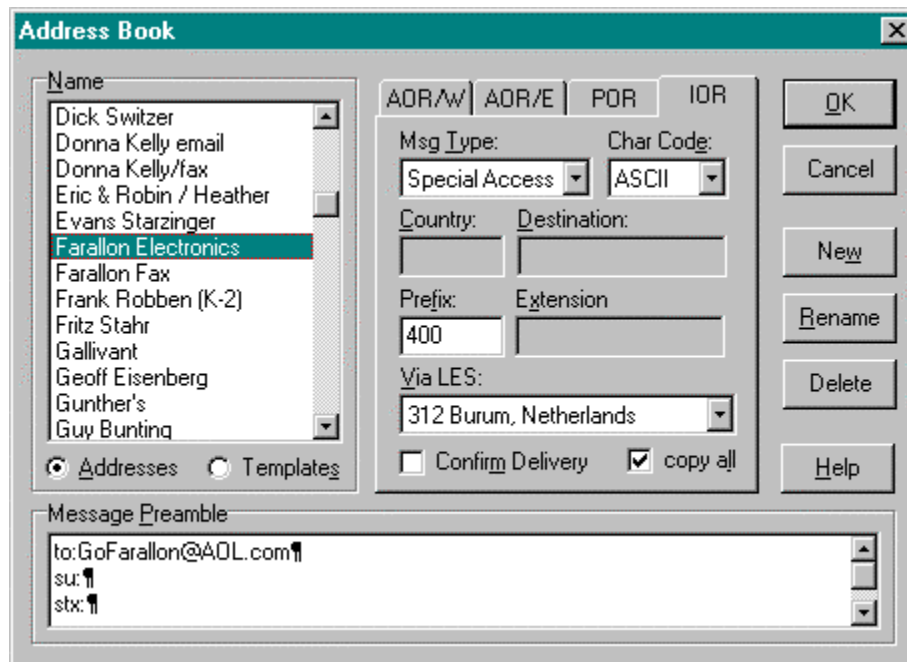
- **Msg Type:** Select from Telex, PSTN, CSDN, PSDN, X.400, Closed Network, Special Access Code or Other. The most commonly used are Telex, PSTN for outgoing fax messages, and Special Access Code for Internet email.

- **Char Code:** Select from ASCII (7-bit alphanumeric) or Binary (8-bit) codes.

- **Country:** Enter the telex or fax Country Code, or X.25 DNIC for PSDN data transfers.

- **Destination:** Enter the telex number, fax area code and number, or X.25 Called Address for PDSN.

- **Prefix:** Used for Special Access Code, not generally used for other formats.

- **Extension:** Set to "T30" for sending an outgoing fax via PSTN, or to a modem code for certain modem connections.

- **Via LES:** Select a **LES** station from a list of available stations.

- **Confirm Delivery:** Check if Positive Delivery Confirmation is desired. This is usually an extra charge, and may not always be available or meaningful.

- **copy all:** Determines whether changes made to one tabbed Ocean Region page are copied to the other Ocean Regions. If **copy all** is checked then any changes are copied

to other Ocean Region pages that initially had the same value; address parameters that were initially different are not changed. LES changes are never copied to another page.

- **Preamble:** Allows optional entry of multiple lines of text to be attached to the beginning of each message sent to the corresponding address, typically used for **Email Addressing**. Note that each line is terminated with a paragraph symbol indicating the end-of-line; do not delete these or lines will be run together. A preamble for a Comsat C-Link email address would have the following form:

  To: name@domain.com¶
  ¶

Buttons are provided to create a new address and to delete or rename an existing entry, as well as the usual OK and Cancel buttons. New address entries are created from a template selected from a list, see **Address Templates** for information on modifying or creating templates.

Two "radio buttons" are provided to allow changes to be made to the address templates. By selecting **Templates**, a list of address templates is displayed which may be changed or added to in the same way as mail addresses. Any parameters defined in template will be copied into a new mail address when a new address is created. Note that any existing addresses based on that template will NOT be changed. The "|" character has a special meaning in templates, and the cursor will be automatically positioned at the first "|" character when a new address is created using that template.

Email Addresses

There are at least two Service Providers that will transfer messages between Internet email and the Inmarsat-C system. Comsat offers their C-Link service to all four ocean regions (via a PSDN connection to the IOR), and Station-12 offers their Sat.400 service to all four regions. The addressing requirements differ between the systems, and up-to-date information should be obtained upon registration. The following is offered as a guide and was correct at the time of publication.

Comsat C-Link Email Gateway:

Outgoing messages are sent to Special Access Code **INET** in all regions except the IOR, where a PSDN connection to 3110-2027183670 can be used. The beginning of the message defines the destination address, and the **Address Book** Preamble can be used to simplify addressing. The first line of the message must contain the email address in the following format:

    To: name@domain.com
    (blank line)

If it is desired to send to more than one address, or to include a subject line, the following format can be used:

    To: name1@domain.com, name2@domain.com
    cc: name3@domain.com
    Subject: subject line (optional)
    (blank line)

Note that a blank line must always follow the C-Link header.

Incoming messages (to the Inmarsat-C station) are simply addressed to the Inmarsat mobile number @C-Link.Net, for example **436742510@C-Link.Net**

Station-12 Email Gateway

Station-12 in Burum, Netherlands, offers Internet access via their SAT.400 email gateway. This is a X.400 gateway with Internet capability, and a simple "To: name@domain.com" style of addressing has been provided.

Outgoing messages are sent to the Special Access Code "400" in all regions, or alternately via a X.25 connection to the PSDN number 2041-255010. Again, the beginning of the message defines the destination address, and the Address Book Preamble should be used to avoid errors. The first message line is a "**To:**" line, followed (optionally) by a "**su:**" line for subject, and finally an "**stx:**" line to indicate start-of-text. The **"To:"** line contains the internet address as follows:

to: name1@domain.com   (required, one address only)
cc: name2@domain.com   (optional, one address per line, multiple lines permitted)
su: Message Subject   (optional subject)
stx:
(text starts here)

Note the "**stx:**" start-of-text code on a line by itself, this is required by the gateway to separate the header from the message text itself.

To receive messages from an Internet user, that user must be registered at Station-12, either with their own account or as an authorized address for your account. Messages sent by an Internet user are addressed by to **mobile#@station-12.unisource.nl**, for example:

436742510@station-12.unisource.nl

Address Templates

With the Address Book open (e.g. **Window/Address Book** menu), a new address can be created. Click the **New** button or Type **Alt + N**, and a new-address dialog window appears with an edit box for the familiar name (nickname), and a pull-down list for the address template. These templates define as many address parameters as possible, and define the Insertion Point when control returns to the Address Book.

Changes to the Address Templates can most easily be made by opening the Address Book (e.g. **Window/Address Book** menu), and then clicking the **Template** button. A list of available templates will be shown, and they can be edited and new templates created in the same fashion as addresses. Note the use of the "|" character to define where the insertion point should be positioned when the template is used for a new mail address.

The templates themselves are saved in the **Nebula.ini** file, and initially loaded from the file **AddrTemp.txt** which is included on the distribution floppy. The address templates are organized as four lines per template (one line per ocean region), with fields separated by semicolons. While changes can be made directly to the stored formats, it is recommended that the templates be maintained through the Address Book with the Template button selected as errors in the .ini file can cause serious and unpredictable malfunctions. Each template contains 12 semicolon-delimited fields, as follows:

`;LES;Type;;Code;PDN;;Prefix;Country;Destination;Extension;Preamble`

The position for the Insertion Point (cursor) is indicated by a "|" character, and "¶" is used to mark new lines in the preample field.

Distress Messages and Distress Alerts

There are two means of sending a distress signal from an Inmarsat-C unit: Distress Messages and Distress Alerts. In the Nebula program, both are accessed by selecting the **Distress** entry on the Main Menu, or typing **Alt+D**. Sending a Distress Messages can also be initiated by clicking the button.

The difference between a Distress Alert and a Distress Message is that an Alert sends the vessel position and an indication of the specific distress (if selected from the PC), but no text, while a Distress Message contains a text message but does not automatically indicate the vessel's position. A Distress Alert sent from the PC is the same as one initiated by pressing the Distress buttons on the Galaxy transceiver, except that the Alert initiated from the Galaxy is generic and indicates an unspecified distress (unless a distress type was previously specified and updated from the PC).

> **In an emergency, first send a generic Distress Alert by pressing (and holding) the two red buttons on the Galaxy transceiver, then (optionally) activate a specific Distress Alert from the PC, and then send a Distress Message with the relevant details.**

A **Distress Alert** is a coded distress signal sent to a specific **NCS** or **LES** indicating the vessel's current position and a code for the nature of the distress. A Distress Alert is not stored as a message, and is not shown on the Message Index.

A **Distress Message** is similar to a regular Outgoing Mail Message, except it is not sent to a specific address, only to a NCS or LES, and is sent with Distress priority. A Distress Message is saved and appears in the Message Index the same as an outgoing message with a **To:** address of DISTRESS: LES, with an icon to indicate its status. Distress Messages are always sent with a confirmation request. Remember that a Distress message does not automatically include the vessel's position. A Distress Message can only be sent if the Galaxy is logged into the Inmarsat system.

When a Distress Message or Distress Alert is sent, it is received by the operating personnel at the NCS or LES and forwarded with top priority to the Rescue Coordination Center (RCC). A return message should be received within minutes, and if none is received in 5 minutes then repeat the Distress Alert or Message.

Sending a Distress Message

A Distress Message should always be sent after a Distress Alert is activated in order to communicate details of the situation to the rescue authorities. A Distress Message does NOT indicate the vessel's position, and that information should be included with the text of the message unless it is confirmed that the position was received with a Distress Alert. A Distress Message can only be sent if the Galaxy is logged into the Inmarsat system.

If a text file **Distress.txt** is found in the **C:\Galaxy** folder, then it will be pasted into the text of the Distress Message. It is strongly recommended that a **Distress.txt** file be created and maintained with a description of the vessel and her crew and details of the current voyage. (The **Distress.txt** file can be accessed by selecting **Distress Text** from the **Window** menu).

To send a Distress Message, exit any dialog boxes that may be open (such as the address book), and either click the [button icon] button, select **Send Distress Message** from the **Distress** menu, or type **Alt+D** and then **M**. A blank Message Window will appear, and over it a dialog box for selecting a destination LES. The default LES will be the last one selected for a Distress Alert or a Distress Message, or the NCS. If the LES indicated is the nearest or most appropriate, select it by clicking **OK** or hitting the enter key; otherwise, select a more appropriate station with the mouse or up/down arrow keys, then click OK or hit the Enter key.

If a **Distress.txt** file was found, that text will appear in the Message Window and can be edited or deleted in the same manner as editing any text. If you simply start typing, additional text will be entered immediately following the text from the Distress.txt file.

When the message is complete, click the Send button or choose Send from the File menu. A dialog box will appear asking you to confirm that a distress message should be sent; select **Yes** if this is for real. You can also attempt to close the Message Window, and a dialog box will appear asking if you want to send the Distress Message; again select **Yes** if you want the message sent (otherwise it is stored in the message index without being sent, and can be sent later).

Note that a Distress Message is always a Distress Message, even if it is stored in the Message Index and sent later (one of the funny codes at the top of the message flags it as a distress message). Whenever a Distress Message is sent, a dialog box will appear asking for confirmation. There is no way to send a stored distress message as an ordinary message, except by pasting its text into another message.

Activating a Distress Alert

A Distress Alert is a coded message that indicates the vessel's position, speed, heading, and an indication of the nature of the distress. A Distress Alert is activated by pressing and holding the two red Distress buttons on the Galaxy transceiver for 5 seconds, or by activating a Distress Alert from a Remote Alert Panel if so equipped. Activating an Alert from the PC is not permitted by Inmarsat specs, and is disabled.

A Distress Alert signal includes provision for a code indicating the nature of the distress, such as "Sinking" or "Piracy/Armed Attack". A Distress Alert activated at the Galaxy transceiver will indicate "Unspecified Emergency" unless a distress category is previous selected and updated from the PC.

To update the Distress Alert parameters, select **Distress Alert** from the **Distress** menu, or type **Alt+D** and then **A**. A dialog box will appear showing the distress type, LES, and vessel position. Select the most appropriate coded distress type by clicking with the mouse or using the up/down arrows. These codes are fixed, and if none are appropriate then leave the selection at "Unspecified".

The LES indicated will be the one most recently used for a Distress Alert or a Distress Message, or will be the current NCS. If this choice is not appropriate, then choose another with the mouse or by typing **Alt+L** and then using the up/down arrow keys to select from the list.

Verify that the position information is correct. If the Galaxy's GPS position is current, then the figures will appear gray instead of black and cannot be changed. If the Galaxy's GPS is inoperative for any reason, the position figures will be enabled and should be corrected as required.

To send the updated parameters to the Galaxy, click the **Update** button or type **Alt+U.** To activate a Distress Alert, press and hold both red buttons on the Galaxy transceiver for 5 seconds

Keyboard Shortcuts:

From any window:
- **Alt + Home** returns to the Message Index (except for the Address book, which is not an MDI window).
- **Esc** closes any window, except for the Message Index where it restores the default Sort-by-Date.
- The **Alt** key by itself accesses the menu bar, starting with the control menu under the logo icon at the upper-left corner. Use the arrow keys to move around the menu choices; use **Esc** to cancel the menu-access mode.
- **Alt** with a letter key opens the corresponding menu selection.

From the Message Index:
- ↑ and ↓ select the next or previous message.
- **Shift + ↑** and **Shift + ↓** extend a selection up or down.
- **Ctrl+Home** and **Ctrl+End** move the message selection to the top and bottom of the index.
- **Any letter key** selects the next message with a **To** or **From** address beginning with that letter.
- **F3** finds and selects the next message with the same **To** or **From** address.
- **Enter** opens the selected message(s).

From a Message Window:
- Press **Alt + PgDn** or **Alt + ↓** to view the next message (i.e. the message referenced by the previous line in the Message Index).
- Press **Alt + PgUp** or **Alt + ↑** to view the previous message (i.e. the message referenced by the previous line in the Message Index).
- The usual windows editing keys are active, the most common are: **Home** and **End** position the Insertion Point at the beginning and end of the line; **Ctrl + Home** and **Ctrl + End** position the IP at the beginning and end of the message; **Ctrl+** any arrow key moves the cursor by one word horizontally or one line or paragraph vertically; **Shift +** any of the insertion-point-moving keys extends a selection from the IP; **Ctrl + C** copies text to the clipboard; **Ctrl + P** pastes text from the clipboard; **Ins** toggles the insert/overwrite mode.

In the Address Book:
- **Ctrl + P** pastes the clipboard into the Destination number or Preamble
- **F1** calls up a Country Code reference if the insertion point is positioned in the Country Code box.

Note: The Windows "Insertion Point" is the vertical bar that marks the point where text will be inserted. The IP is not the same as the mouse cursor, which is an I-beam when over a text window, but if the left mouse button is clicked while the mouse pointer is

over text, then the IP will jump to that point in the text. Holding the left mouse button down and dragging the mouse will extend a selection from the initial click point.

Setting Options

Selecting **Options** from the **Tools** menu brings up the Options dialog window, which contains five pages for setting various options.

Galaxy Options

The fist page is for setting Galaxy options and is shown at right.

Inmarsat Mobile #: The mobile terminal number assigned by Inmarsat, 9 digits starting with "4".

Max Send Length: The largest message that will be accepted for transmission by the Galaxy. The upper limit of the Inmarsat-C system is 31,616 characters but setting a lower limit may be desirable to prevent the costly error of sending a long file by mistake.

Status Update: Time interval between updates of the Galaxy status and position displays, in seconds (default is 2 seconds).

Galaxy Serial port: The communications port used for the Galaxy serial connection. The default is COM1, and use of this port rather than an add-on port is suggested for reliability.

Galaxy Password: A cryptic **Password** supplied with the Nebula program that identifies the particular Galaxy transceiver that it is connected to.

Diagnostic Events: Checking this box enables Diagnostic Event Messages in addition to the regular Event Messages. Open the Event Window (Events under the Window menu) to view all event messages. **Note:** This appears to conflict with Nebula's poll of the Galaxy clock and causes the DCE to hang under DCE version 4.20. **It is therefore recommended that Diagnostic Events NOT be enabled for normal use.**

Auto NCS Scan: Checking this box enables the Galaxy DCE box to periodically scan the NCS for the strongest channel.

Auto Alarm Silence: Checking this box allows the Nebula program to automatically silence the Galaxy alarm after 3 to 5 seconds when an "Urgent" or "Distress" EGC message is received. Note that the alarm will only be silenced if the program is running (the alarm cannot be permanently silenced on a Galaxy Marine unit), and silencing the alarm automatically is not permitted for vessels obliged to participate in the GMDSS.

Write Debug File: Checking this box causes Nebula to maintain a chronological log of debug information in the file **\Galaxy\Debug.txt**. This is only useful if software or hardware difficulties are encountered.

Log Galaxy I/O: For diagnostic use only.
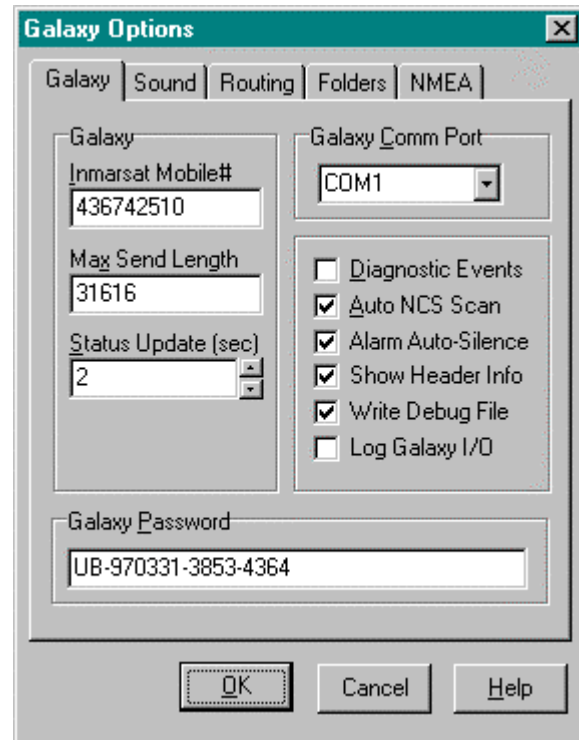
Show Header Info: Checking this box causes a header line to be added to each incoming message, showing the originating LES, and for EGC messages, the Service Code. This is cute but generally useless.

Note that the **Inmarsat Mobile#, Max Send Length, Diagnostic Events** *and* **Auto NCS Scan** *are stored in the Galaxy DCE box and will not be available if there is no Galaxy connected.*

Sound Options

The second option page controls the sound alerts for new mail and EGC messages, and can be selected by typing **Ctrl/Tab** or by clicking on the **Sound** page tab.

Systems without a sound card are limited to the default Windows "beep", but with a sound card any .WAV file can be used for audio alerts. Three files are included with Nebula. **EGCclick.wav** produces a distinctive "thunk" for new EGC messages,

NewMail1.wav produces a particularly obnoxious warble for new mail messages, and **NewMail2.wav** produces a slightly less obnoxious warble for repeated alerts. Any other **.wav** can be used, or you may wish to demonstrate good taste be selecting **Quiet**.

Message Routing Options

Routing of incoming and outgoing mail messages and incoming EGC messages is controlled by the options on the Routing page of the Options Window. To view the Routing options, open the Options window as above and either press **Ctrl/Tab** twice or click the **Routing** page tab.

Note that the Root Folder is shown at the top. This is set during installation and cannot be changed here, and all other folders must be under the designated root folder.

Although any folder scheme can be used, two are recommended. If Nebula is to be used interchangeably with Trimble's Galaxy DOS program, then it may be desirable to stick with the DOS program's file folder (directory) layout. For general use with Nebula, however, the fact that the DOS program used the same folder for multiple message types limits the usefulness of Nebula's Folder Tree and makes message management more difficult. For that reason the folder arrangement shown at right is the recommended one.

Note that if the folders are not set appropriately then messages can be lost.

Incoming Messages: The first selection defines the "Inbox" folder where incoming mail messages are stored when received from the Galaxy, normally \Inbox. To use the folder arrangement defined by the Galaxy DOS program, this would be set to \NewMail. The second selection is the folder that messages are moved to when "Filed", normally **\Inbox\Saved** as shown, or \Messages to match the DOS program usage. .

EGC Messages: The first selection defines the folder where incoming EGC messages are stored when received from the Galaxy, normally **\EGC**. (or \NewMail to match the DOS program usage). The second selection is the folder that EGC mesages are moved to when "Filed", normally \EGC\Saved, or \Messages to match the DOS program usage.

Outgoing Messages: This selection defines the folder that newly created outgoing message are stored into, normally **\Outbox**, or \Messages to match the DOS program usage.
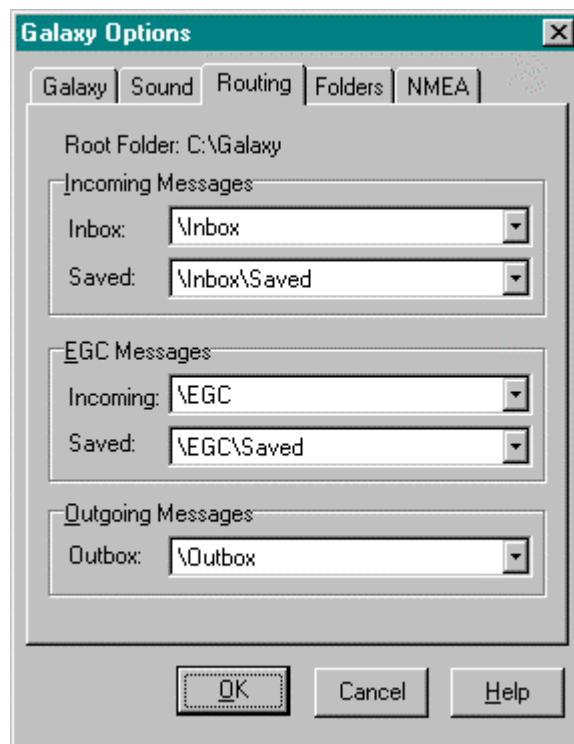
Folder Options

The next page of the Options window shows Folder options. A view of the Folder Tree is displayed, showing all folders including folders that are normally hidden from the Folder Tree.

Hidden folders are indicated by a draped folder icon, [icon], and include any that are not normally used for messages. In the example at right, hidden folders include those for log files as well as folders used by the DOS program but not by Nebula as configured on the Routing page, namely the Newmail and Messages folders. The Recvfrm, Xmitfrm, and Xmitfdo folders would also normally be hidden if retained.

To hide a folder, select it with the mouse or arrow keys and then click the **Hide** button or type **Alt/H**. Similarly, to show a hidden folder, select it in the same way and click **Unhide** or type **Alt/U**.

To create a new folder, first select the existing folder that the new folder will be under by using the mouse or arrow keys, and then click the **New** button or type **Alt/N**. A new folder will be created with the name "NewFolder" selected and open for editing to a new name.

To rename a folder, select it as above and either click on the name again to open it for editing (in the same fashion as Explorer), or click the **Rename** button or type **Alt/R**. Hit the **Enter** key or select another folder to finish editing and save the changes, or press the **Esc** key to abandon any changes.

To delete an existing folder, first be sure that it does not contain any files that you want to save, and then select the folder as above and click the **Delete** button (or hit Tab repeatedly until Delete is outlined and then hit Enter).
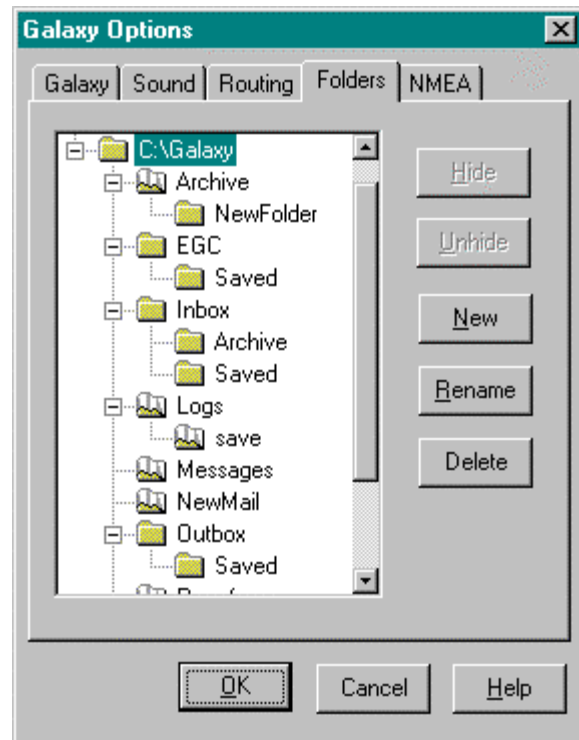
NMEA Output Options

The last page of the Options Window is used to set up an optional NMEA output, so that the Galaxy can be used as a source of GPS information to a plotter or instrument system. The Galaxy box provides an NMEA output on a rear-panel connector, but the GGA sentence used for GPS position is not recognized by many plotters and no provision is made for waypoints. The Nebula interface extracts the GPS information from the Galaxy status messages and formats a series of NMEA sentences on a separate RS-232 port. There are limitations to the use of the Galaxy as a GPS source which are outlined below and must be understood.

NMEA COM Port: This selects the output port for NMEA sentences, or blank to disable NMEA output. This must not be the same port as is used for Galaxy communications, and cannot be a port used by any other device. It is possible to connect this port to another on the same computer, for example to supply GPS information to a plotting program.

COG/SOG Average: This defines the averaging period for the COG/SOG NMEA output. If set to zero, SOG is output as received by the Galaxy which is only to the nearest knot. The averaging used in a least-squares fit on Lat/Lon to thousandths of a minute, but due to the realities of measurement and timing uncertainties (to say nothing of SA) an averaging period of at least 60 seconds should be used.

Waypoint: This defines the Lat/Lon position that is used as the destination for waypoint calculations (BWC, BWR, WCV and ZTG sentences).

Magnetic Variation: The current variation should be entered in order that magnetic bearings be reported correctly.

The NMEA sentences that are output are GLL, BWC, BWR, VTG, WCV , ZTG, ZTA, and ZLZ, all with a $GP prefix.

Note: Trimble does not support the use of the Galaxy GPS for routine position-fixing, because the Galaxy's GPS receiver can be interrupted for arbitrarily long periods by the requirements of the Standard-C transceiver, particularly when transmitting or automatically responding to incoming messages.

Passwords

The Nebula program uses a password that is keyed to the Inmarsat Serial Number of a particular Galaxy unit (identified by the label on the top of the box). The normal password is 10 digits prefixed by "**IPW-**" (Inmarsat Password) and normally never needs to be dealt with. The password is stored in the **Nebula.ini** file or in the system registry, and will be automatically accessed when the program is started, even when software updates occur. The password is keyed to the Inmarsat Serial number, not the Trimble Harware serial number, and this number remains the same for a particular unit (even if the box electronics are swapped by Trimble Service).

An alternate date-coded password can be supplied to allow demo use or temporary use of a program on another box. A dated or "Use-by" password is prefixed by "**UB-**", followed by six digits for the expiration date (YYMMDD), followed an eight-digit code. Use-by passwords are valid until 23:59UTC on the expiration date.

OLE Position Interface

An OLE Automation Server interface provides access to the Galaxy's GPS position if desired. One ClassID is provided, Nebula.Position, and one function in that class, GPSposition, which returns a comma-delimited string variant with Fix Time, Latitude, Longitude, Course-Over-Ground (COG), Speed-Over-Ground (SOG), and fix status.

Data is presented as received from the Galaxy, Lat/Lon to thousands of a minute, COG to the nearest degree, SOG to the nearest knot, and with no averaging. Latitude and longitude are presented as DDD.MMmmm, where DDD=degrees, MM=minutes, and mmm=thousanths of minutes, and south latitudes and East longitudes are negative. COG is degrees true, SOG is in knots, and fix status is "0" for a good fix, "1" for more than one minute old, "2" for more than 4 hours old, and "3" for more than 24 hours old.

Before Nebula can be called as an OLE Automation Server, it must be registered as such with Windows. This is done by executing the command line
C:\Galaxy\Nebula.exe /Regserver using the Run command from the Windows Start Menu. To remove the registration, execute the command
C:\Galaxy\Nebula.exe /Unregserver. When called to register or unregister, Nebula returns without starting the program proper. Registration need only be done once (unless classes or functions are added in a future release).

An EXCEL macro follows that demonstrates Nebula's OLE Server function by storing data in successive rows at 10 second intervals. The basic method is to establish an OLE link to Nebula by creating a "Nebula.Position" object, then make calls to the GPSposition function at intervals to get the position string. Here, this string is first stored in a single cell and then Excel's TextToColumns function is called to parse the comma-delimited string. The critical steps are shown in bold type.

```
Option Explicit
Public Galaxy As Object
Public MaxCols, CurrentRow
Public DataPeriod
'
'Anything named Auto_Open gets called automatically
'when the form is loaded...
'Create link to Nebula and initialize header line.
'then get first line of data (which will start timer)
'
Sub Auto_Open()
   DataPeriod = TimeValue("00:00:10")
   Set Galaxy = CreateObject("Nebula.Position")
   Sheets("Data").Cells.ClearContents
   'Make header by storing string and then parsing in the same fashion as data
   Sheets("Data").Cells(1, 1).Formula = "Fix Time,Latitude,Logitude,COG,SOG,
      status"
   Sheets("Data").Cells(1, 1).TextToColumns comma:=True, DataType:=xlDelimited
   CurrentRow = 2
   GetData
End Sub
'
'Spreadsheet closing, chop link to Nebula
'
Sub Auto_Close()
   Set Galaxy = Nothing
End Sub
'
```

```
'Get a tab-delimited line of data, convert to cells, set timer to call again
'
Sub GetData()
   Dim icol
   Static runtime
   If CurrentRow = 0 Then CurrentRow = 2
   Sheets("Data").Cells(CurrentRow, 1).Formula = Galaxy.GPSposition
   Sheets("Data").Cells(CurrentRow, 1).TextToColumns comma:=True, DataType:=
     xlDelimited
   CurrentRow = CurrentRow + 1
   runtime = DataPeriod + Int((Now + DataPeriod / 2) / DataPeriod) * DataPeriod
   Application.OnTime runtime, "GetData"
End Sub
```

Technical Matters

Windows Performance Issues:

Nebula is written for Windows-95, and will not run under Windows 3.1 or 3.11. It has not yet been tested under Windows NT but there are no known limitations. The minimum practical configuration to run Windows-95 is 8 megabytes of memory, and Nebula has been extensively tested in that configuration and runs without any performance degradation as the sole real-time application. Note that Nebula sets its priority two steps above normal, and the priority of its Galaxy communications thread one step above normal in order to minimize communication time-outs that otherwise occur on small configurations running multiple large applications. The effect is that if resources are constrained, Nebula will get what it needs but other non- real time applications may suffer.

To run Nebula concurrently with a weather fax program or data logging, it is recommended that at least 12 megabytes of memory be provided. Providing additional RAM memory, up to 16 or 20 megabytes, will provide a much greater performance boost for Windows than a faster processor. It is also important that at least 5 megabytes of disc space, and preferably two to three times that, be free for Windows to use as a swap file.

Debug File:

A debug file, `C:\Galaxy\Debug.txt`, is optionally written with status information for significant events detected by the program. Writing the debug file is controlled by the **Options** window under the **Tools** menu. If the debug file is enabled, then it can be examined by selecting **Debug File** under the **Tools** menu. If the debug file is left enabled, it will grow without bounds and must be trimmed from time to time.

Galaxy Event Messages:

The most recent 100 Galaxy event messages are stored in `C:\Galaxy\Events.txt`, and can be examined by selecting the Events under the Window menu. The events are listed in chronological order as received from the Galaxy, with a date and time stamp appended to the beginning (taken from the computer clock). If Diagnostic Messages are selected from the Options window, then Diagnostic Event Messages are stored in the event list also. Note that there is a bug in the Galaxy DCE firmware that generates D0000 diagnostic events, and these appear to interfere with message transfers. **It is therefore strongly recommended that Diagnostic Events *NOT* be enabled for normal use.**

Galaxy Communications:

Serial communications with the Trimble Galaxy DCE unit are handled via a dedicated execution thread to avoid conflicts with the user interface. The standard Windows serial device drivers are used, with 32K buffers in each direction to accommodate the largest possible message.

A 10-second time-out is provided on Galaxy messages in response to queries, and a 30-second time-out is provided on loss of status information. If a status time-out occurs, the Galaxy will be disconnected and a reconnect attempt made at 10-second intervals. Nebula and its communication thread run with slightly higher-than-normal priority so timeouts are not expected, even on a heavily-utilized computer. Problems can occur if

Nebula is minimized (which reduces priority) and a compute-intensive program is run in the foreground.

The most common problem with Galaxy communications is selecting the wrong serial port. It is recommended that COM1 be used if there are any difficulties. If difficulties continue, check the Settings and Drivers under the Windows-95 Device Manager (right-click "My Computer" and select "Properties"); the drivers should be Serialui.dll and Serial.vdx.

Computer Clock:

If the computer's clock is set to UTC and off by a small amount, it will reset by Nebula from the Galaxy's satellite-based real-time clock. The clock is checked at one-hour intervals, and errors of less than 10 seconds or more than 10 minutes are not corrected. Note that the system time zone must be set so that the Windows API call GetSystemTime reports the correct UTC time. One way to do this is to set the local computer time to UTC and the Time Zone to GMT/Monrovia (The GMT/Dublin…London setting gets messed up with Daylight Saving Time even when you tell it not to). The other option is to set the system clock to local time and set the Time Zone appropriately. Refer to the Windows Control Panel Date/Time settings.

Telex Country Codes

Note: While this list was compiled from sources believed to be correct, mistakes get made and things change. Some errors and omissions are certain and codes should be verified wherever possible. Updates are most welcome.

Inmarsat Regions:
Inmarsat AOR/E 581
Inmarsat POR 582
Inmarsat IOR 583
Inmarsat AOR/W 584

Country:
Afghanistan 79
Alaska, USA (RCA) . 200
Albania 604
Algeria 408
Andorra 590
Angola 991
Anguilla 391
Antigua 393
Argentina 33
Ascension Is. 939
Australia 71
Austria 47
Azores (Portugal) 404
Bahamas 297
Bahrain 490
Bangladesh 780
Barbados 392
Belgium 46
Belize 371
Benin 972
Bermuda 290
Bolivia 309
Botswana 962
Burkina Faso 978
Brazil 38
Brunei 809
Bulgaria 67
Burundi 903
Cameroon 970
Canada 21
Canary Is. 52
Cape Verde Is. 993
Cayman Is. 293
Central African Rep ......
 971
Chad 976
Chile 34
China 85
Christmas Is. 766
Cocos Keeling Is. 766
Columbia (Republic of) .
 35
Congo PR 981
Cook Is. 772
Costa Rica 376
Cuba 28
Cyprus 605
Czechoslovakia 66
Denmark 55
Djibouti 979

Dominica 394
Dominican Rep 202
Ecuador 308
Egypt AR 91
El Salvador 373
Equatorial Guinea ... 999
Ethiopia 980
Falkland Is. 306
Faeroe Is. 502
Fiji 701
Finland 57
France 42
French Guiana 300
French Polynesia
(Tahiti) ....
 702
Gabon (Gabonese Rep)
 973
Gambia 996
Germany (ex- DDR) .. 69
Germany (ex- FDR) .. 41
Ghana 94
Gibraltar 405
Greece 601
Greenland 503
Grenada 395
Guam 700
Guatemala 372
Guinea 995
Guinea Bissau 969
Guyana 295
Haiti 203
Hawaii (RCA) 704
Hawaii (AACR) 705
Hawaii (Data Tel) 773
Hawaii (WUH) 709
Honduras 374
Hong Kong 802
Hungary 61
Iceland 501
India 81
Indonesia 73
Iran 88
Iraq 491
Ireland 500
Israel 606
Italy 43
Ivory Coast 983
Jamaica 291
Japan 72
Jordan 493
Kampuchea 807
Kenya 987
Kiribati 761
Korea PDR 899
Korea Rep 801
Kuwait 496

Laos 804
Lebanon 494
Lesotho 963
Liberia 997
Libya 901
Liechtenstein 45
Luxembourg 402
Macao 808
Madagascar 986
Malawi 904
Malaysia 84
Maldive Is. 896
Mali 985
Malta 406
Mariana Is. And Saipah .
 760
Marshal Is. 765
Martinique 298
Mauritania 974
Mauritius 966
Mexico 22
Micronesia 764
Monaco 42
Montserrat 396
Morocco 407
Mozambique 992
Myanmar 83
Namibia 908
Nauru Is. 775
Nepal 891
Netherlands 44
Netherlands Antilles 390
New Caledonia 706
New Zealand 74
Nicaragua 375
Niger 975
Nigeria 905
Niue Is. 776
Norfolk Is. 766
Norway 56
Oman 498
Pakistan 82
Panama 379
Papua New Guinea . 703
Paraguay 305
Peru 36
Philippines 75
Poland 63
Portugal 404
Puerto Rico 206
Qatar 497
Reunion 961
Romania 65
Rwanda 909
St. Helena 960
St. Kitts-Nevis 397
St. Lucia 398

St. Pierre/Miquelon .. 204
St. Vincent/Grenadines .
 399
Samoa (US) 770
Samoa (Western) 779
San Marino 505
Sao Tome/Principe .. 967
Saudi Arabia 495
Senegal 906
Seychelles 965
Sierra Leone 998
Singapore 87
Solomon Is. 778
Somalia DR 900
South Africa 95
Spain 52
Sri Lanka 803
Surinam 304
Swaziland 964
Sweden 54
Switzerland 45
Syria 492
Taiwan 785
Tanzania 989
Thailand 86
Togo 977
Tonga 777
Trinidad & Tobago ... 294
Tunisia 409
Turkey 607
Turks & Caicos Is. ... 296
Uganda 988
UAE 893
UK 51
Uruguay 32
USA 23
USSR 64
Vanuatu 771
Vatican City 504
Venezuela 31
Vietnam 805
Virgin Is. (British) 292
Virgin Is. (US) 208
Yemen AR 895
Yemen PDR 806
Yugoslavia 62
Zaire 982
Zambia 902
Zimbabwe 907

Telephone/Fax Country Codes

Note: While this list was compiled from sources believed to be correct, mistakes get made and things change. Errors and omissions are certain and updates are most welcome.

Afghanistan 93	France 33	Montserrat ....1+664	Uganda 256
Albania.................... 355	French Guiana 594	Morocco 212	UAE 971
Algeria 213	French Polynesia 689	Mozambique............258	UK.............................44
Andorra.................... 33	Gabon..................... 241	Myanmar 95	Uruguay 598
Angola 244	Gambia................... 220	Namibia 264	USA 1
Anguilla .... 1+809?	Germany (ex-DDR)... 37	Naulu Is. 674	USSR 7
Antigua .... 1+268	Germany (ex-FDR) ... 49	Nepal......................977	Vanuatu...................678
Argentina 54	Ghana..................... 233	Netherlands..............31	Vatican City..............39
Aruba 297	Gibraltar.................. 350	Netherlands Antilles 599	Venezuela 58
Ascension Is. 247	Greece..................... 30	New Caledonia 687	Vietnam.....................84
Australia................... 61	Greenland............... 299	New Zealand 64	Virgin Islands (British) ...
Azores 351	Grenada .... 1+784?	Nicaragua...............505	..........................1+284
Bahamas............ 1+242	Guam..................... 671	Niger 227	Virgin Islands (US) ....
Bahrain 973	Guatemala.............. 502	Nigeria....................234	..........................1+340
Bangladesh............. 880	Guinea................... 224	Niue Is. 683	Yemen AR...............967
Barbados .... 1+246	Guinea Bissau 245	Norfolk Is. 672	Yemen PDR 969
Belgium.................... 32	Guyana................... 592	Norway 47	Yugoslavia 38
Belize..................... 501	Haiti 509	Oman 968	Zaire........................243
Benin 229	Honduras................ 405	Pakistan 92	Zambia....................260
Bermuda .... 1+441	Hong Kong.............. 852	Panama...................507	Zimbabwe 263
Bolivia 591	Hungary................... 36	Papua New Guinea .675	
Botswana............... 267	Iceland.................... 354	Rwanda 250	
Burkina Faso........... 226	India......................... 91	St. Helena 290	
Brazil......................... 55	Indonesia................. 62	St. Kitts-Nevis......1+869	
Brunei 673	Iran 98	St. Lucia ....1+758	
Bulgaria 359	Iraq 964	St. Pierre/Miquelon ..508	
Burma...................... 95	Ireland 353	St. Vincent/Grenadines..	
Burundi 257	Israel 972	..........................1+784	
Cameroon 237	Italy.......................... 39	Samoa (US) 684	
Canada 1	Ivory Coast 225	Samoa (Western)....685	
Canary Is. 34	Jamaica .... 1+876	San Marino 39 (295)	
Cape Verde Is......... 238	Japan........................ 81	Sao Tome/Principe ..239	
Cayman Is........... 1+345	Jordan 962	Saudi Arabia............966	
Central African Rep. 236	Kenya 254	Senegal 221	
Chad 235	Kiribati 686	Seychelles...............248	
Chile 56	Korea PDR 850	Sierra Leone............232	
China 86	Korea Rep 82	Singapore 65	
Christmas Is............ 682	Kuwait..................... 965	Solomon Is. 677	
Cocos Keeling Is..... 682	Lebanon.................. 961	Somalia DR 252	
Colombia................... 57	Lesotho................... 266	South Africa..............27	
Congo PR 242	Liberia..................... 231	Spain 34	
Cook Is. 682	Liechtenstein 41	Sri Lanka 94	
Costa Rica 506	Luxembourg............ 352	Surinam...................597	
Cuba 53	Macao..................... 853	Swaziland...............268	
Cyprus 357	Madagascar............ 261	Sweden 46	
Czechoslovakia......... 42	Madeira 351	Switzerland...............41	
Denmark 45	Malawi 265	Syria........................693	
Djibouti.................... 253	Malaysia 60	Taiwan.....................886	
Dominican Rep. 1+809?	Maldive Is. 960	Tanzania 255	
Ecuador 593	Mali......................... 223	Thailand 66	
Egypt AR.................. 20	Malta....................... 356	Togo 228	
El Salvador 503	Marshall Is. 692	Tonga 676	
Equatorial Guinea ... 240	Martinique............... 596	Trinidad & Tobago	
Ethiopia................... 251	Mauritania............... 222	..........................1+868	
Falkland Is. 500	Mauritius................. 230	Tunisia....................216	
Faeroe Is. 298	Mexico 52	Turkey 90	
Fiji........................... 679	Micronesia 691	Turks & Caicos Is.	
Finland.................... 358	Monaco.................... 33	..........................1+649	

Abbreviations and Service Codes

ABS	Absent subscriber
ACB	Access barred
ADR	Addressee refuses
ANUL	Delete
ATD	Attempting to deliver the message
BK	Message aborted
BMC	No end of message or end of transmission received
BUS	Busy
CCD	Call cut or disconnected
CFM	Please confirm, I confirm
CIE	The CES ran out of processing/communications capacity
CNS	Call not started
COL	Collation please/I collate
CRV	Do you receive well?/I receive well
DER	Out of order
DF	You are in communication with the called subscriber
DTE	Remote DTE clearing
EOS	Element of service not described (X.400)
FAU	Faulty
FMT	Format error
FSA	Fast select acceptance not subscribed
GA	You may transmit/May I transmit?
IAB	Invalid answerback
IAM	Unable to process the address information
IDS	Invalid data from ship
IDT	Input data timeout
IFR	Invalid facility request
IMS	Message size is invalid, 7932 characters max
INC	Inconsistent request (X.400)
IND	Incompatible destination
INF	Call the network information center
INH	Was unable to establish the type of message from the following header:
INV	Invalid call
ISR	Invalid ship request
ITD	Awaiting delivery
ITL	I transmit later
JFE	Office closed because of holiday
LDE	Maximum message length exceeded
LEF	Local equipment failure
LPE	Local procedure error
MBB	Message broken by higher priority
MCC	Message channel congestion
MCF	Message channel failure
MKO	Message killed by operator
MNS	Minutes
MOM	Wait/waiting
NA	Access barred
NAL	No address line is present
NDA	There was no delivery attempted
NC	Network congestion
NCH	Subscriber's number changed
NFA	No final answerback
NI	No line identification available
NIA	No initial answerback
NOB	Not obtainable
NOC	No connection
NP	No party/not obtainable
NR	Indicate your call number/my call number is…
NRC	Reverse charging acceptance not subscribed
NTC	Network congestion
OAB	Operator aborted
OCC	Telex occupied/number busy
OK	Agreed/do you agree?
OOO	Out of order
P	Stop your transmission
PPR	Paper
PRC	Premature clearing
PRF	Protocol failure
R	Received
RAP	In shall call you back
RCA	Reverse charging acceptance not subscribed
RDI	Redirected call
REF	There was a failure in the remote equipment
RIS	Recipient improperly specified (X.400)
RLE	Resource limit exceeded
RPE	Remote procedure error
RPO	RPOA out of order
RPT	Repeat/I repeat
RSB (RSBA)	Retransmission still being attempted
SCC	Call completed successfully
SHE	SES hardware error
SNF	The satellite network has failed
SPE	SES protocol error
SSSS	Change of alphabet
SUC	Test results being delivered
SVP	Please
TAX	What is the charge/the charge is…
TBY	Trunks busy
TEST MSG	Please send a test message
TGR	TDM group reset
THRU	You are in communication with a telex position
TIM	Timeout
TMD	Maximum number of addresses exceeded
TPR	Teleprinter
UNK	Unknown status (when logical channel number is zero)
W	Words
WFA	Wrong final answerback
WIA	Wrong initial answerback
WRU	Who is there?
XXXXX	Error

Inmarsat-C 2-digit Service Codes

The following service codes are used in the Inmarsat-C system. Not all LES's have implemented 2-digit codes, and not all codes are supported by those LES's that have implemented them. When used, the 2-digit service codes appear in the Prefix portion of an address as a special access code. Consult the LES for details.

00	Automatic telex calls using international telex country codes
31	Maritime enquiries
32	Request for medical advice
33	Request for technical assistance
37	Time and charges requested
38	Request for medical assistance
39	Request for maritime assistance
41	Sending weather reports to meteorological centers
42	Sending navigational and weather dangers to shore authorities
43	Ship position reports (e.g. AMVER)
6(x)	Administration specialized use (e.g. leased lines)
68	Information service
91	Automatic line test

Glossary

AOR/E   Atlantic Ocean Region East, roughly 60°E to 90°W at the equator

AOR/W   Atlantic Ocean Region West, roughly 20°E to 130°W at the equator

CES: Coast Earth Station, same as LES. These are the stations with the big dishes that provide the link to the terrestrial communications systems.

Comsat   The US provider of Inmarsat satellite communication services. Provides telex, outgoing fax and email service, as well as transcription service for incoming fax and telephone messages. Service to three Ocean Regions.

Email   Electronic Mail. The term "email" usually refers to messages sent via the internet, although other systems (such as X.400) are also used.

EGC   Enhanced Group Call, the signaling method used to transmit weather messages and notices on a selective basis to all Inmarsat-C terminals.

Inmarsat   INternational MARitime SATellite Organization, the organization that oversees international maritime satellite services.

Inmarsat-C   The least expensive of the various Inmarsat satellite communications units. A small antenna, reasonable power consumption and a modest price (compared to the larger Inmarsat systems) make this a practical choice for smaller vessels. Data only (telex or email).

IOR   Indian Ocean Region, roughly 140°E to 10°W at the equator

LES: Land Earth Station, same as CES

MES: Mobile Earth Station, i.e. the Trimble Galaxy Inmarsat-C/GPS Marine Transceiver

O.R.   Ocean Region, the geographic areas served by the four Inmarsat satellites, POR, AOR/W, AOR/E, IOR.

POR   Pacific Ocean Region, roughly 100°W to 100°E at the equator

Practice   The opposite of "Theory".

Satcom-C   Same as Inmarsat-C, used by folks that can't spell "Imnarsat".

Station-12   The group of LES's operated by PTT Telecom Netherlands. Besides Comsat, the only other known email service provider. Also provides telex and outgoing fax service to all four Ocean Regions.

Theory   A small town in Indiana where every printer works with every computer, and email always gets through. See "Practice".

TLA   Three Letter Acronym