

Qfax Reference Guide

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Chapter 1 - Introduction

Purpose/How to use this manual

This manual describes the installation and use of Quorum Qfax software for reception of weather fax images. A brief introduction to weather satellites and fax images can be found in the section titled “Introduction to Weather Satellite Reception.”

This manual assumes that the user is proficient with the use of the personal computer and of basic MS-DOS operating system commands. Little effort is intended or made to explain the operating system commands and their usage. If you require assistance in this area, refer to your computer manuals, on-line help, or other reputable sources of assistance.

Qfax software is divided into four broad functions, and each has its own chapter devoted to its purpose and uses:

FUNCTION NAME	PURPOSE OF FUNCTION
CAPTURE	Used to set satellite configurations and to manually capture images
PREDICT	Automatic tracking and image capture of polar orbiting weather satellites
VIEW	Image viewing and manipulation routines
ANIMATE	Automatically creates and displays an animated image loop of geostationary satellite images.

Table 1 Qfax Major Program Functions

Conventions Used In This Manual

Qfax uses a “Windows like” GUI (Graphical User Interface) for most user input. A general list of terms and conventions used in this manual follows:

- A “button” is a small, usually gray rectangular display element that has a 3D look. Buttons are “pressed” or “clicked” to produce an action.
- “Point” means to position the mouse cursor over whatever you want to point to on the screen.
- “click” means to quickly press and release the mouse button without moving the mouse.

- “double-click” means to quickly click the specified mouse button twice without moving the mouse.
- “Drag” means to point, then hold down the mouse button as you move the mouse. Releasing the mouse button completes the action.
- Qfax uses both buttons of a 2 button mouse and the left and right buttons of a 3 button mouse. The left button is usually the action button while the right button is usually the “backup” or “escape” button.
- Some commands or procedures require you to press more than one key either together or in succession. Alt+U means to hold down the Alt key while pressing U. Alt, U means to press the Alt key then release it before pressing U.
- Information that you should type on your keyboard is shown in a typewriter style font. Special labeled keys are enclosed in angle brackets. For example:

qfax<Enter>

means to press the keys q,f,a,x then the Enter key.

- Single alphabetical character references may appear between single quotes. In the text “Signal Line ‘A’,” the single quotes serve to emphasize the unique importance of the ‘A’ versus ‘B’ Signal Lines. In this context, it is important to not confuse the ‘A’ and ‘B’ Signal Lines.

Qfax Description

Qfax software provides the most comprehensive and sophisticated functionality found in any product at its price range, while providing an easy to learn and use intuitive interface. Even novices can be up and running in minutes with just a few mouse clicks.

Qfax incorporates the Quorum Qtrack satellite tracking program as a fully integrated function which allows you to effortlessly predict, track, and capture data from up to 8 polar orbiting satellites. Qfax is the only product to simultaneously display the satellite position in both tabular and graphical form along side the incoming image. Images captured in this way are automatically tagged with satellite time and ephemeris data for direct use by advanced navigation and mapping functions. The user can capture images manually or automatically through the use of the built-in seven day programmable scheduler.

Once an image is captured, Qfax provides extensive image processing functions such as zoom, pan, rotate, mirror, flip, contrast, sharpen, smooth, noise filter, histograms, 3D, enhancement curves, and more. Images can be viewed in video resolutions up to 1280 x 1024 x 256 colors. Supported video file formats include TIFF, GIF, PCX, BMP, and JPEG. Qfax also supports printing to HP PCL compatible laser printers and Epson 24-pin printers.

Qfax provides ephemeris-based true vector overlays of geopolitical boundaries, latitude / longitude grids, and sea surface temperatures on NOAA APT images. Distance and bearing measurements can also be displayed on NOAA polar orbiter images.

Computer Host System Requirements

Qfax software provides advanced features that require a moderate amount of computing power. In general, more computing power (use of a system with an 80486 rather than 80386 processor), more RAM, a larger hard disk, and higher resolution video system hardware will enhance the operation of the system. The following list represents the minimum recommended configuration:

- An IBM PC compatible computer with an 80386SX processor
- A math coprocessor
- 4 MB of RAM
- 100 MB hard disk drive
- 1 3.5 inch 1.44 MB floppy disk drive
- A VESA 1.2 (or later) compatible video system capable of operation in 640 x 480 x 256 color mode (VESA mode 101)
- MS DOS version 3.1 or later
- A Microsoft compatible mouse
- 1 open 8 or 16 bit ISA (Industry Standard Architecture) card slot

We recommend the following as the minimum system configuration for a new computer purchased for use with Qfax:

- An IBM PC compatible with an 80486DX processor
- 8 MB of RAM
- 540 MB or larger hard disk drive
- 1 3.5 inch 1.44 MB floppy disk drive
- A VESA 1.2 (or higher) compatible video system capable of operation in 1024 x 768 x 256 color mode
- A Microsoft compatible mouse
- MS DOS version 6.0 or later
- 1 open 8 or 16 bit ISA or EISA slot

In addition to the computer and Qfax Software, you will need a Wefax and APT capture board and at least one of the following equipment configurations for the reception of weather fax signals:

- A 137 MHz APT antenna, such as the Quorum TS-137 turnstile or QF-137 quadrifilar for reception of signals from polar orbiting satellites
- A dish antenna with feed and downconverter, such as the Quorum SDC-1691CWP, Feed-1691L, and 6 foot dish antenna for reception of signals from geostationary satellites
- An HF receiver and antenna for reception of NAFAX

Introduction To Weather Satellite Image Reception

Weather Satellites

There are two basic sources of weather images: geostationary and polar orbiting satellites. Polar orbiting satellites orbit at an altitude of approximately 850 kilometers (528 miles) above the surface of the earth and pass over any given earth location twice every twenty-four hours. Polar orbiting satellites require less equipment to receive images (compared to Geostationary receiving systems) and therefore provide a good starting point for most weather satellite users. Geostationary satellites are in an equatorial orbit that is high enough above the earth that their speed matches the rotation of the earth. Because their speed matches the rotation of the earth, they appear to always be in the same sky position relative to a ground station. Geostationary reception capabilities can be added to any quality satellite receiving system, either when it is first set up or at a later date.

Polar orbiting Satellites are unique from geostationary satellites because polar orbiters are constantly in motion and must be tracked by the computer to calculate when they will be in range of your receiving station.

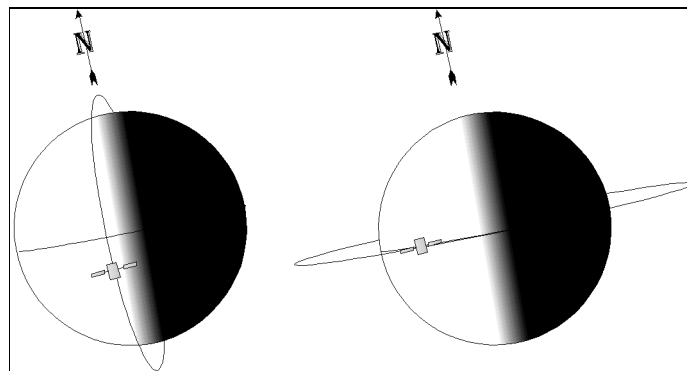


Figure 1 Polar (left) and Equatorial (right) orbits

Figure 2 illustrates the different components used in a typical weather satellite receiving station:

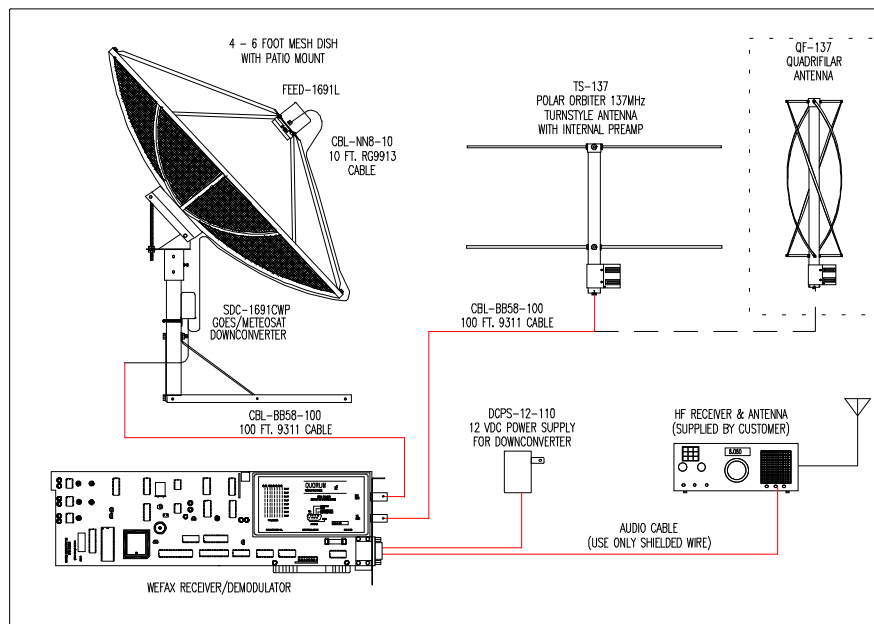


Figure 2 Typical Weather Satellite Receiving Station

Polar Orbits (APT)

There are two primary sources of polar orbiter satellite weather imagery: the US NOAA and the Russian Meteor series satellites. Both types of satellites are launched into polar orbits. In a polar orbit the satellite travels in a circular motion that carries it approximately through the poles of the earth (see Figure 1). As the satellites orbit, the earth also rotates under them. The satellite looking downward with its sensors will paint, in strips, the entire surface of the earth twice each twenty four hour period.

The mode of transmission for low earth orbiting satellites is 120 line per minute (LPM) facsimile, transmitted using an FM carrier in the 137 MHz band. The FM deviation of these satellites is about ± 18 KHz, with an RF power output of five watts using right hand circular polarization. All polar orbiters transmit in APT (Automatic Picture Transmission) format. It can be assumed that NOAA and Meteor satellite transmissions are similar in most respects, however the image formats are different in appearance and technical details.

NOAA Satellites

NOAA satellites are launched into sun synchronous orbits. In a sun synchronous orbit, each satellite passes over a given area at approximately the same time each day and will pass over a particular area twice every twenty-four hours. Each orbit of the spacecraft results in a transmitted image swath that is 2736 kilometers (1,700 miles) wide.

The NOAA satellites transmit two channels of image data placed side by side. Depending on whether they are scanning in sunlight or dark, there will be a combination of either visible and infrared or two infrared images available. Current frequencies used by the NOAA satellites are 137.500 MHz and 137.620 MHz. Normally the NOAA satellite APT transmitter is always on except for periods of transmission conflict between satellites transmitting on the same frequency.

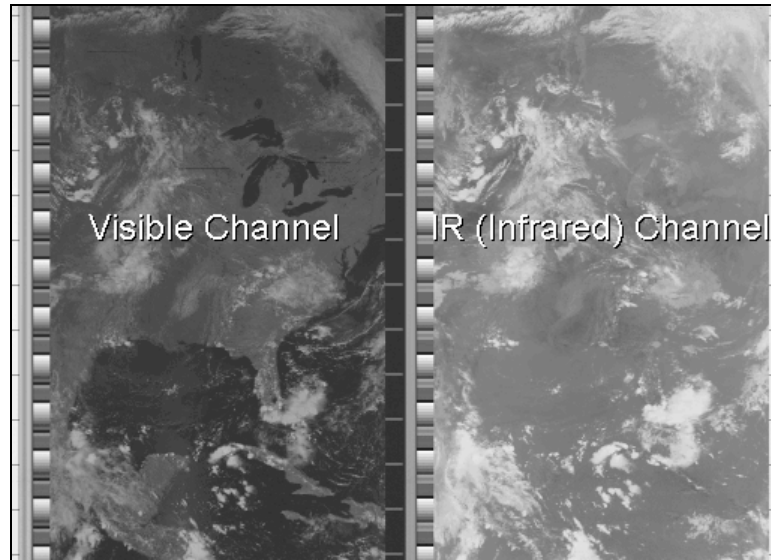


Figure 3 NOAA Polar Orbiter APT Image Format

Terminator Crossing Effects

Occasionally, one of the NOAA satellites follows the terminator (the dividing line between the lighted and unlighted face of the earth) in its evening ascending pass. As the satellite progresses in its south to north ascending pass, it also moves from east to west, due to the orbital inclination and the rotation of the earth. During certain periods, the satellite actually crosses the terminator while within range of a receiving station. One often unexpected result from the terminator crossing for beginning observers occurs when the left frame switches from an infrared to visible sensor. *The satellite senses the change in illumination as it moves to the west and automatically switches from an infrared to visible sensor in the left frame when there is adequate light available.*

Since the illumination level is low when the shift to visible sensor is made, the frame appears to change from a normal infrared view to a black image. The natural conclusion can be that either there is a problem in the receiving stations hardware or software, or that the satellite has developed a problem. In this case, neither is true! Increasing the image's brightness in the Qfax VIEW function will reveal that the supposedly "black" frame contains valid visible cloud information.

Meteor Satellites

The Meteor weather satellites consist of two major types: the Meteor 2 and Meteor 3 series. The Meteor satellites generally transmit visible imagery only. When they cross the terminator (the dividing line between night and day), they automatically switch off or to another mode. Some of these satellites have IR (infrared) capability. There are no published specifications or schedule for the Meteor satellites. The Meteor orbiters are not placed in sun synchronous orbits. As a result, the time of day when they move over a given area will gradually change, usually getting a little later each day. The commonly used Meteor frequencies are 137.300 MHz, 137.400 MHz, and 137.850 MHz.

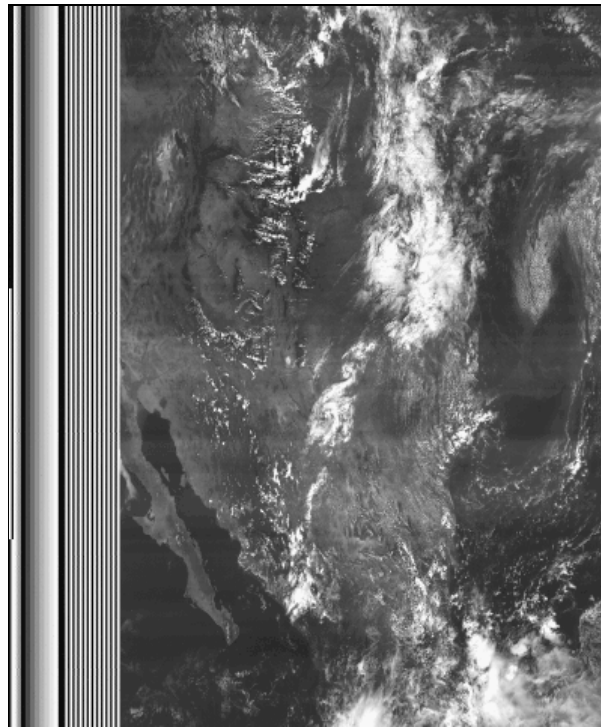


Figure 4 Meteor Polar Orbiter Image Format

Polar Orbiter VHF Antennas

APT antennas must be of the proper type to efficiently receive the desired signal. The downlink frequency used for the polar orbiting weather satellites is in the 137 MHz band. The signal is relatively weak and is transmitted with circular polarization.

Circular polarized radio waves rotate around a central axis as they radiate from the transmitting antenna. Picture a length of wide ribbon stretched from your receiving antenna to the satellite antenna. Now twist this ribbon until it looks like a corkscrew. This is what the signal looks like as it radiates to earth.

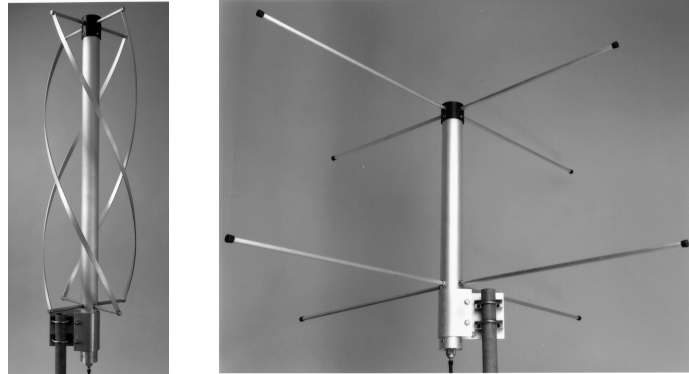
Signals transmitted either horizontally or vertically are said to be linearly polarized. Most people are familiar with the TV antenna on their roof, which is a linear antenna.

Television signals are transmitted horizontally, thus the antenna should lie in the horizontal plane. If the antenna is rotated to vertical polarization, there is a tremendous decrease in the signal, to the extent that some stations can no longer be received. Cross polarization can cause up to 20 dB signal loss (every 3 dB is one-half the amount of signal). Because of these factors, cross polarization is very undesirable. It is imperative to avoid cross polarization at the receiving station, since cross polarization means signal loss, and any loss means noisy images.

Because of the motion of the satellite and the effect of the earth's magnetic field, linear polarization is very inefficient for signal downlinks on polar orbiting satellites. To overcome the problem of cross polarization, NOAA and Meteor weather satellites transmit APT signals using a circularly polarized antenna. The receiving station needs a proper circularly polarized antenna to achieve fade-free reception. In circularly polarized antennas, the polarization direction is either left hand (CCW) or right hand (CW) as observed from the rear of the antenna toward the incoming or outgoing signal.

For polar orbiter reception, an antenna with right hand circular polarization (RHCP) is used in order to match the signal sent from the satellite. The circular omnidirectional antenna is the most commonly used for APT. Omnidirectional antennas exhibit nearly identical sensitivity in all directions, and unlike directional antennas, they do not have to be moved in order to track satellites. Quadrifilar and turnstile type omnidirectional antennas are both excellent choices for APT use.

The Quorum QF-137 Quadrifilar antenna is recognized as the best possible antenna for



reception of circularly polarized weather satellite signals because it is the same basic design as the satellite's antennas. The gain pattern provides a good match to the signal strength as the satellite moves overhead. The quadrifilar does not require the existence of a large ground structure, and as a result, it provides excellent performance for marine use.

Figure 5 Quadrifilar (left) and Turnstile (right) Antennas

The Quorum TS-137 is a high quality turnstile antenna that uses a self-phased design resulting in superior performance when compared to designs which use phasing harnesses. The TS-137 is a good choice for all but the most demanding users.

Pricing differences and performance at low reception elevations are the factors which separate the QF-137 Quadrifiler and the TS-137 Turnstile antennas. The Quadrifiler will provide virtually noise free reception once a satellite reaches an elevation of 5 to 10 degrees above the horizon. The Turnstile will provide virtually noise free reception once the satellite has reached 10 to 15 degrees elevation. Even with this limitation, a view many hundreds of miles North and South of the station's location can be received without noise on an overhead pass.

Antenna Mounting Guidelines

It is a good idea to keep the antenna a good distance away from and above the computer. Computers are notorious sources of radiated electrical noise, especially those with modems which generate signals on the 137.620 MHz NOAA frequency. A good rule of thumb is to keep the antenna not less than twenty feet from the computer and mounted at a height equal to or greater than the tallest part of the roof. This will allow a coax run of fifty to one-hundred feet, which is a reasonable length for good performance.

Caution!

Observe all safety precautions included in the antenna's documentation. Failure to observe proper safety precautions when mounting antennas can result in injury or death!

Polar Orbiter VHF Preamps

Due to the low signal strength transmitted from the Polar orbiter satellites, receiving stations all require a high quality preamp. The preamp should have a reasonable amount of gain and a relatively low noise figure. Gain specifies how much the signal is amplified, and noise figure is a measurement that specifies the amount of noise the amplifier adds to the signal. A noise figure of 1 dB and a gain of 15 to 20 dB is more than adequate for APT reception.

Inter-modulation (normally referred to as intermod) is a common problem for receiving stations located in cities. Intermod is created in the receiver due to excessive preamp gain. If you hear aircraft radios coming through the satellite receiver, then intermod is usually the problem.

The general rule on preamplifier gain is to use only enough gain to set the system noise figure and to overcome the loss in the coaxial cable that connects the preamp to the receiver. Any excess gain contributes to receiver inter-modulation problems.

The preamp must be mounted close to the antenna. The reason for this is that coaxial cable, no matter how good, introduces some amount of loss. By mounting the preamp at the antenna, full advantage is taken of the signal available from the antenna. Quorum antennas feature preamps that are built into the antenna for this reason.

Placing the preamp at the antenna poses another problem. Preamplifiers typically require +12VDC to operate. This voltage is sent through the coax in order to avoid running a separate power line for the preamp. An advantage of running power through the coax is that it helps prevent interference from entering the preamp power line. Both

the Quorum QF-137 and TS-137 omnidirectional antennas have matched preamps which are powered through the coaxial line.

Geosynchronous Satellites (Wefax)

Geosynchronous (also referred to as geostationary) satellites are placed into an equatorial orbit at a distance of 35,792 kilometers (22,240 miles) above the earth. One characteristic of this orbit is that the satellite's velocity maintains its position above a fixed point on the earth. In essence, the satellite appears stationary or always located at the same position in the sky to an observer on earth. Thus, it is possible for the satellite to continuously transmit images of the same area of the surface of the earth all of the time.

US GOES and European METEOSAT geosynchronous satellites transmit Wefax images on 1691 MHz. In addition, METEOSAT satellites contain a second Wefax channel at 1694.5 MHz. Japanese GMS satellites also transmit Wefax images on 1691 MHz, but the signal bandwidth used by GMS requires the use of a receiver with a much wider bandwidth than used for GOES or METEOSAT reception. The Quorum Wefax Professional Adapter card supplies the dual bandwidth receiver required to receive Japanese GMS Wefax.

The GOES and METEOSAT satellites are geosynchronous satellites that transmit weather images after processing by ground controllers. The mode of transmission is 240 line per minute facsimile. The signal downlink is an FM carrier on 1691 MHz (European METEOSAT uses 1691 and 1694.5 MHz) with a deviation of ± 9 KHz. To receive the WEFAX broadcast requires a small parabolic dish style antenna, suitable feed horn, and an S-band downconverter. The purpose of a downconverter is to convert a higher frequency to a lower frequency, in this case converting the 1691 MHz signal to the lower frequency of 137.500 MHz. By downconverting the signal to 137.500 MHz, the receiver used for polar orbiter APT reception can also be used to receive Wefax.

Image formats and timing vary between GOES, METEOSAT, and GMS satellites. In order to properly receive and display images from geosynchronous satellites, the correct settings of these parameters must be known by the Qfax software.

Wefax Antennas

Since the WEFAX downlink is in the high UHF band, a parabolic dish makes an excellent receiving antenna. By using the Quorum IFD-1691L integrated feed and downconverter, or a combination of the Quorum FEED-1691L feed horn and SDC-1691C or SDC-1691CWP downconverter, a four to six foot dish will provide noise free reception of WEFAX signals. Quorum recommends using a four to six foot diameter dish in conjunction with a low noise WEFAX downconverter. The integrated feed and downconverter mount at the focal point of the dish antenna. For the separate feed horn and downconverter option, the downconverter should be mounted in a weatherproof case behind the dish. The cable connecting the Feed to the Downconverter should be low-loss microwave cable (CBL-NN8-6 or CBL-NN8-10).

Unlike the signals transmitted by the polar orbiting weather satellites, the 1691MHz downlink used by geostationary satellites is transmitted using linear polarization.

You will need to know the satellite azimuth and elevation angle for your location when installing the antenna. Refer to the Quorum Installation/Operation Manual that comes with the antenna system for detailed instructions on installing and aiming the antenna.

Wefax Downconverter

A downconverter converts the 1691 MHz UHF Wefax signal to a lower frequency for reception by the VHF receiver. In the Quorum SDC-1691C downconverter, the 1691 MHz signal is mixed with a LO (local oscillator) frequency of 1553.5 MHz to yield an IF frequency of 137.500 MHz. This downconverted IF signal is then fed to the receiver's UHF input. Since the FM downlink from the Wefax satellite is only deviating ± 9 KHz, the local oscillator frequency tolerance must be held very close to nominal or the signal will move out of the receiver passband. The installation requires that the downconverter be mounted outside with the Wefax receiving antenna, so the downconverter is exposed to temperature extremes. Quorum downconverters contain an oven stabilized LO crystal to insure frequency stability at all times.

Downconverter noise figure and gain are two important specifications that greatly effect received image quality. The lower the noise figure (which is a measure of noise generated within the circuitry of the downconverter) the better. Since the received signal is from space, which contains very little background noise at these frequencies, the downconverter noise is the limiting factor in system sensitivity. The amount of internally generated noise also effects the size of the antenna that is required to receive a noise free image. Using a downconverter with a 5 dB noise figure requires a much larger receiving antenna than a system with a 1 dB noise figure.

The gain of the downconverter refers to conversion gain from the RF input connector to the IF output connector. A conversion gain of 40 to 45 dB will allow cable lengths of up to a few hundred feet from the downconverter IF output to the receiver input. Normally a small type coaxial cable such as Belden 9311 is used to connect the IF output from the downconverter to the receiver.

The Quorum SDC-1691C downconverter typically has a noise figure of 0.8 dB, a conversion gain of 48 dB, frequency stability of ± 2 KHz, and image rejection of 60 dB.

Receivers

The receiver used for Wefax must be of the proper design to deliver the encoded image information to the digitizer. The satellite transmits a carrier that is FM modulated with a 2400Hz subcarrier. This FM subcarrier has the actual video AM modulated on it. In simple terms, the 2400 Hz audio tone carries the image data. A small amount of the tone is black, and a large amount of tone is white. Anything between is derived as a shade of gray.

The most important aspect of the receiver is the bandwidth of the IF. Most scanners used to pick up police and amateur radio calls have very narrow bandwidths, while

commercial FM receivers have a very wide bandwidth. Wefax transmissions are between the two extremes. If one attempts to use a scanner to receive the Wefax signals provided by the downconverter, part of the signal will be lost due to the insufficient amount of bandwidth available in the scanner. Conversely, the commercial receiver has so much bandwidth that the signal gets lost in the noise and is unusable. There is no substitute for a good receiver specifically designed for Wefax and APT. Quorum receivers use a 50 KHz IF bandwidth which provides an optimal match for both Wefax and APT reception.

Digitizer

The digitizer takes the receiver audio and performs the proper filtering, demodulation, and digitizing of the incoming video signal. The digital information passed to the computer is then processed by software and is displayed, saved to disk, or routed to a printer.

The digitizer must take the raw data from the receiver and process it so the software can properly display and store the images.

Software

Software is used to display, save, and enhance the received images.

The Quorum Qfax software provides a very user friendly Weather Satellite receiving station. Its receiving and processing options make a powerful and easy to use weather satellite ground station.

Computer And Monitor

To display the received images and manipulate the data requires a PC and monitor. Some minimum computer specifications must be met by the equipment. Refer to the "Computer Host System Requirements" section in this chapter for specifications.

Weather Image Filename Convention

Qfax CAPTURE, PREDICT, AND ANIMATE functions save image files to the hard drive automatically. The file names are generated by the program and adhere to the following specification:

filename format: "*moddhhmm.ext*":

where:

mo is the month

dd is the day of the month

hh is the hour

mm is the minute that reception of the image began.

ext is the graphics file type extension.

Allowable file types include:

GIF
TIFF
JPEG
BMP
PCX
ANI

So, the file “09061538.ANI” was captured on September 6, at 15 UTC hours, 38 minutes past the hour. “ANI” is the extension used for files generated for animation sequences.

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Chapter 2 - Install

The Qfax program disk supplied with your purchase is configured to run with the Quorum product(s) you have purchased. The software installation procedures consists of copying the necessary files to your hard drive and initializing variables unique to your location and computer. In most cases, following the simple installation procedures listed in this chapter will assure that you will quickly and easily be receiving weather images.

NOTE: We must assume that the user understands how to use the computer, change directories, and use basic DOS commands. If you need assistance in basic computer use, please consult your manuals, knowledgeable individuals, or utilize one or more of the many good books on these topics. Quorum can not offer support on basic computer use! Some computer stores in your area may offer services to install hardware and software in the computer at a reasonable rate. Many stores and community colleges offer excellent basic computer skills courses at reasonable prices.

Operating System Environments

Qfax is designed to operate in the MS-DOS operating system environment. While it may run under Windows, OS/2, or other systems, operation is intended only under MS-DOS. Should you experience any difficulties running Qfax under other systems, return operation of Qfax to the MS-DOS environment.

Before attempting to run Qfax in Windows NT or OS/2 operating systems, the system settings for DOS program parameters must be properly modified. Refer to your operating system manual for details on setting DOS program parameters for the system you are using.

Windows®95: When Qfax is run from the Windows MS DOS facilities, data loss may be observed. While Qfax is running in the foreground, other programs that are running in the background may also be using processor time. If the background processes take enough processor time, Qfax no longer has sufficient processor time available, and image lines are dropped. To correct the problem, use one of the following procedures:

1. Modify the DOS program parameters in the operating system so that Qfax receives the necessary system resources.
2. Set up the system so that Qfax runs in native DOS mode.

Software Installation

To prepare for software installation, boot your computer to MS-DOS. If you are running Windows[®]95, OS/2, or Windows NT, change to the MS-DOS prompt.

To install the software on a hard disk, first make a new directory using the MS-DOS Make Directory command (MD). A good choice for a directory name is QFAX. To create this directory, place the Qfax program Disk in the computers floppy drive (assumed to be drive A in this example), and type the following:

```
cd \<Enter>      to get to the root directory
md qfax<Enter>   create a new directory named QFAX
cd \qfax<Enter>  to move to QFAX as the current directory
```

Now copy the Wefax Program disk from floppy drive (assumed to be drive A in this example) to the QFAX directory:

```
copy a:*. *<Enter>
```

Installing Sample Images

Sample Images are provided for your use on the Qfax Sample Image Disk. For best performance in loading, viewing, and manipulating these images, copy the files on the Qfax Sample Image Disk to your hard drive before viewing them. While still located in the Qfax directory, do the following to install the sample images:

Install the Sample Image Disk in your floppy drive (assumed as drive A in this example).

```
copy a:*. *<ENTER>
```

The images are now in the Qfax directory and are available for viewing using the View function of the Qfax software.

Starting the Qfax Program

To start the Qfax program, change to the directory where the Qfax program is located by typing:

```
cd \qfax <ENTER>
```

To run the Qfax software type:

```
qfax<ENTER>
```

The program will display “Please wait for a short initialization”. In a few moments the software should proceed to the Capture Screen (Figure 6).

When starting Qfax from the DOS prompt the following optional switches are available:

qfax /v<Enter> Starts Qfax in View Mode
qfax /p<Enter> Starts Qfax in Predict Mode
qfax /n<Enter> Starts Qfax in Animate Mode

If the Qfax software detects a problem with a Quorum Adapter card setup, the Setup Screen will appear instead of the Capture Screen (see Figure 7 through Figure 11).

Qfax, version 3.49J or later, has the ability to run the full software package without a Quorum scan card in the computer. To run the program in demo mode, Select "DEMO" for the Wefax PC Adapter Type.



Figure 6 Capture Screen

When a Quorum Wefax adapter card is installed in the computer, then the first time the Qfax program is run, the appropriate setup options will need to be selected. Figure 7 through Figure 11 show the setup screens for the following Quorum products:

Wefax PC Adapter 1	Wefax Explorer
Wefax PC Adapter 2	Wefax Voyager
Wefax Professional	

Table 2 shows the appropriate responses to the setup screen options. To use the table, locate the product name in the top row for the Quorum adapter card you are using. Allowable responses are listed in the columns below the product name.

Quorum adapter cards and receivers can be mapped to a wide range of addresses within the computer. The address specified in the setup screen must match the actual address to which the card or receiver is mapped. The addressing of the card or receiver is established by the address jumpers on the card, not by the settings in the setup screen.

The settings in the setup screen simply inform the Qfax program of the address where the hardware resides.

Figure 7 Wefax PC Adapter I
Setup

Figure 9 Wefax Professional
Setup

Figure 8 Wefax PC Adapter II
Setup

Figure 10 Wefax Explorer
Setup

Various Quorum Adapter Cards

Figure 11 Wefax Voyager
Setup

More detailed instructions for setting the address for your product can be found in the appropriate hardware manual.

Table 2 Hardware Setup Options Table

	Wefax PC Adapter I	Wefax PC Adapter II	Wefax Professional	Wefax Voyager	Wefax Explorer
Address	100 3FF	100 3FF	100 3FF	Com 1 to Com 4**	100 3FF
Wefax PC Adapter Interrupt	2 7	n/a	n/a	3 4**	n/a
Wefax / APT Receiver Type	PC-137 SL-137	PC-137 SL-137	On Board Receiver Only	On Board Receiver Only	On Board Receiver Only
Receiver Address	100 3FF	100 3FF	n/a	n/a	n/a
GMS Wefax Receiver Type	PC-GMS	PC-GMS	On Board Receiver Only	n/a	n/a
GMS Receiver Address	100 3FF	100 3FF	n/a	n/a	n/a

****Table 3 Voyager Com Port Addresses & Interrupts**

	Address	Interrupt Used
Com 1	3f8 3ff	4
Com 2	2f8 2ff	3
Com 3	3e8 3ef	4
Com 4	2e8 2ef	3

When all options in the setup screen are set, press the TEST button to confirm they are correct. When the TEST function verifies the information, Qfax will print:

TEST PASSED -

To escape from the SETUP screen, select the Save button with the mouse.

If one of the parameters in the setup screen does not match, Qfax will print:

TEST FAILED -

This message indicates that there is a setup or hardware conflict preventing communication with the adapter card or receiver(s) in the computer. Possible causes for this message include:

1. Entering incorrect information in the SETUP screen.
2. Adapter or receiver card hardware addresses that conflict with each other.
3. Adapter or receiver cards that conflict with other cards installed in the computer.

Check the following items to identify and eliminate any problems:

1. Verify that the setup options were entered in the SETUP screen as intended.
2. Verify that the addressing selected by the hardware jumpers on any cards match the address specified in the setup screen.
3. Check to see if another option card in the computer uses the address specified by the address jumpers on any Quorum cards. If so, change the address of one of the conflicting cards, and reconfigure the software for the card whose address was changed.

The following messages appear when two devices are specified in SETUP as occupying the same address:

If a receiver address conflicts with the Wefax PC Adapter I or II:

PC-137 Receiver address conflicts with PC Adapter address!

PC-GMS Receiver address conflicts with PC Adapter address!

If multiple receivers reside at the same address:

PC-GMS Receiver address conflicts with PC-137 address!

Change the address on one of the cards and the corresponding entry on the SETUP screen to match any changes made.

NOTE: If multiple problems exist, it is possible to get other error messages. Keep correcting any problems until the "TEST PASSED -" message appears.

Press the "SAVE" button to proceed to the CAPTURE screen.

Initializing Local Station Information

Qfax Software uses variables unique to your geographic location to track satellites and calculate local time information. These variables are stored in the file "LOCATION.DAT". The Qfax Program Disk is supplied with a default LOCATION.DAT file with variables initialized for Irving, Texas. Prior to using the "Predict" function, which uses the location data to track satellites, the information should be updated for your location. The following information is required to inform the Qfax program of the geographic location where it is being operated:

- Latitude
- Longitude
- Height above sea level
- Time offset from UTC (Greenwich) time

The latitude, longitude, and height above sea level can be obtained from a good quality atlas, local pilots, airports, or municipal government offices. The latitude and longitude values entered should be accurate to at least one arc minute or 0.0167 decimal degrees. Height should be accurate to the nearest 305 meters (1000 feet). Latitude and longitude should be entered in decimal degrees or degree minute formats, and not in the degrees minutes seconds format.

Update your location information by using the following steps:

Run the Qfax program. From the MS DOS prompt and the Qfax directory, type:

qfax<ENTER>

An initialization screen will appear. After the initialization screen is cleared, the main "Capture" screen is displayed. Type 'P' to move to the PREDICT screen.

Type 'S' to edit the Setup information. Type 'L' to select Location information.

Refer to Figure 12 for the following discussion:

Once the 'L' selection has been made, the current location settings will appear in the upper left hand window. To edit a value, select the appropriate black capitalized letter from the command buttons located on the bottom line of the screen.

Press 'A' to set the latitude for the Qfax station location. The prompt "Enter new Latitude" appears at the bottom of the screen. Type the station's latitude in decimal degrees or degree minutes formats (see example). Latitude north of the equator is positive, while latitude south of the equator is negative. If you are in the southern hemisphere, type a minus sign before the latitude.

Example:

32.7600 (decimal degrees)
- or -

32 46.60 (degree minutes)

Figure 12 Predict Screen & Local Option Commands Menu

Press 'O' to set the Longitude for the Qfax station location. The message "Enter new Longitude" appears at the bottom of the screen. Type the station's longitude in decimal degrees or degree minutes format. East longitude is positive, while west longitude is negative. If you are in the western hemisphere (from 0° to 180), type a minus sign before the longitude.

Example:

-97.3300 (decimal degrees)

- or -

-97 19.80 (degree minutes)

Press 'H' to set the height above sea level for the Qfax station location. The message "Enter new Height" appears at the bottom of the screen. Type in the height in feet or meters of the station's location above sea level. The default unit of measure is in feet. Append the letter 'm' to the height to enter the measurement in meters.

Example:

600 (for 600 feet)

- or -

183m (for 183 meters)

Press 'U' to set the UTC time offset. The message "Enter new Offset" appears at the bottom of the screen. Type the difference in hours that the Qfax station's location differs from UTC time. The world standard for time is "Universal Coordinated Time" or "UTC" time. The reference location for UTC is 0 degrees longitude, the original sight of the Royal Observatory in Greenwich, England. Locations west of 0 degrees longitude and up to the international date line must enter a positive number. Locations east of 0 degrees and up to the international date line must enter a negative number.

The following table shows the offsets for time zones in the United States. To determine your UTC offset, determine which time zone you are in, and use the offset listed below the zone:

ZONE:	AST/EDT	EST/CDT	CST/MDT	MST/PDT	PST
UTC OFFSET:	4	5	6	7	8

ZONE CODES:

AST	Atlantic Standard Time
EDT	Eastern Daylight Time
EST	Eastern Standard Time
CDT	Central Daylight Time
CST	Central Standard Time
MDT	Mountain Daylight Time
MST	Mountain Standard Time
PDT	Pacific Daylight Time
PST	Pacific Savings Time

Figure 13 UTC Offset Table for U.S. Zones

IMPORTANT NOTE: If the UTC time offset is not set correctly, satellite tracking will not be correct! The Predict function uses the offset to determine when satellites will be within range of the receiving station. To assure that that orbital predictions are correct, be certain this offset is correct!

To save all the values that have been entered or changed, choose the Done option by typing 'D'. This will save the new values to the LOCATION.DAT file. PREDICT creates a map of the world with the Qfax station's location at the center and a local area zoom map with the station's location placed in the center. These maps are saved as the files WORLD.MAP and ZOOM.MAP and are used by PREDICT to refresh the screen. If the file MAP.DAT is not present, PREDICT cannot draw land mass outlines but will still create maps with latitude and longitude grids. If you wish to escape without saving any new values, choose the No change option by typing 'N'.

Once your location data is entered, PREDICT is fully operational for your location with the exception of entering specific satellites from which you wish to track and capture images.

This completes software installation of the Qfax program.

Store the original Qfax program disk in a safe place! It may be needed in the future to reinstall Qfax or other support files.

NOTE: If satellites are not received when expected, you should be aware of the following possible causes:

- The computer's date and/or time are not set correctly. Refer to MS DOS user manual for details on how to set the time and date.
- The UTC offset is incorrect. In locations that use Daylight Saving Time, the offset must be changed when moving to or from Daylight Savings Time in the

spring and fall. Correcting the offset will resolve the problem (refer to Figure 13).

- Satellites are routinely switched off and on for maintenance purposes and to avoid transmitting conflicts when satellites are in close proximity of another.
- A current set of orbital information must reside in the Qfax directory. This file must be a two-line Norad orbital data file named “ELEMENTS.DAT.” See the “UPDATING EPHEMERIS INFORMATION” section in the PREDICT chapter of this manual for details on obtaining this file. Quorum recommends that this data set be updated every two to four weeks.
- A hardware problem exists. Refer to Troubleshooting section “Polar Orbiter Predict Errors” in the Appendix of this manual.
- If all satellites cannot be heard during predicted times, it is most likely that the time, date, or UTC offset is incorrect. If only a few are not heard when are expected, it is probably due to the fact that the ones not heard are not transmitting.

Chapter 3 - Satellite Configurations

Why Use Configurations?

Configuration concepts are vital to understanding how to use Qfax software! Please take the time to examine this information!

The concept of satellite configurations is essential to the operation of Qfax software. In order to master all of the software features available, it is important to have a good understanding of why configurations are used and how to properly set up satellite configurations.

Simply put, a configuration file for each satellite to be received must be available so Qfax knows how to set up the receiver hardware, as well as to provide the information required to properly display the image type provided by the satellite.

By means of directory information stored in satellite's configuration file, Qfax can store similar images in a specific directory. This is an important tool in organizing the storage of images. In the course of a day, a large number of polar orbiter and geosynchronous images can be received and stored by Qfax. It is much easier to access specific images when they have been stored in different directories by image type. An appropriate analogy would be like one business that throws all of its sales information into a large box, versus another business that files all sales information in alphabetical files in a filing cabinet system. Needless to say, the latter business will spend significantly less time finding specific customer information.

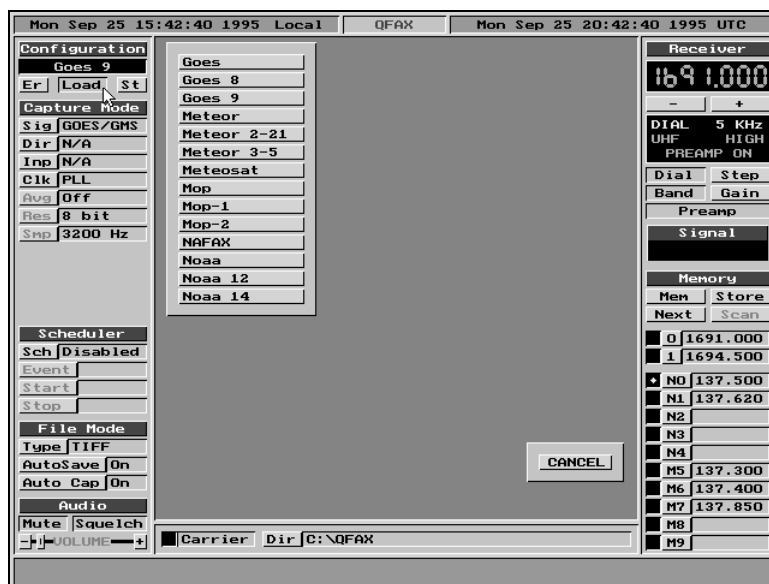


Figure 14 Configurations List Box

The Qfax Program Disk is supplied with configurations for the basic satellite types, as well as for many weather satellites that are known to be active at the time the disk was duplicated.

To become familiar with the configurations on the Program Disk:

1. Run the Qfax program.
2. Press the Load button, which is located in the upper left Configuration window of the screen.
3. A list box will appear to the right of the “Configuration” window (refer to Figure 21). The list box contains the names of the configurations available for use by Qfax. Loading a configuration sets the Configuration window, Directory List Box, and the receiver control windows settings (see Figure 16). Try loading different configurations and observe which settings change. The significance of all settings is explained In the next section.
4. To close the window, select the satellite configuration you wish to load, or press the “CANCEL” button to return to the CAPTURE screen without making any changes.

NOTE: The “Er” and “St” buttons are explained later in this chapter. Do not press these buttons until you understand their purpose.

The following standard configurations are supplied with the program disk:

GOES	U.S. Geostationary Operational Environmental Satellites.
NOAA	U.S. polar-orbiting satellites.
METEOSAT	European geostationary METEOrological SATellite.
METEOR	Russian polar-orbiting satellites.
NAFAX	Wefax images and maps sent over HF radio frequencies.

Table 4 Basic Satellite Configurations

Qfax can animate images of the same type. In order to animate the images, the images must be stored by type in individual directories. The ability to create a configuration by image type allows the user to animate a virtually unlimited number of image types. For example, the user could save visible images of North America in a \QFAX\GOESVS directory and infrared images in a \QFAX\GOESUS directory. From within the Qfax ANIMATE function, the user could animate either the visible or infrared images by choosing the appropriate directory and enabling the animate function (refer to the ANIMATE section of this manual for specific details on animating images).

Qfax stores the parameters required for proper reception and display of satellite images in a separate configuration file for each satellite. The configuration files are saved in the format of QFAXnnnn.CFG, where nnnn is the configuration number. Satellite configurations are set up within the CAPTURE screen.

CAUTION! The PREDICT function automatically loads a satellite configuration each time a new satellite is visible. ANIMATE loads new configurations according to the ANIMATE schedule. If you have made changes to the current configuration which have not been saved as an updated or new configuration, **THE CURRENT CHANGES MADE WILL BE LOST** as soon as:

1. A new configuration is loaded by PREDICT
2. Another configuration is loaded from the CAPTURE screen
3. Another configuration is loaded by ANIMATE

If you wish to keep any changes made to the current configuration, they must be saved to the current or a new configuration using the Store button.

The remainder of this section provides specific information on why configurations are required and how configurations work.

The “SETTING SATELLITE CONFIGURATIONS” section provides specific instructions on how to set up configurations.

Polar Orbiter Characteristics Effecting Configurations

Weather satellites differ in their characteristics. Polar orbiters use several different VHF frequencies (137 MHz range) to transmit image information: 137.3 MHz, 137.4 MHz, 137.5 MHz, 137.62 MHz, and 137.85 MHz. The image formats used by US and Russian satellites are radically different: US satellites send two side-by-side images simultaneously, while Russian satellites send one visible or infrared image only. US satellite image information is synchronized (phase-locked) to the radio signal frequency while most Russian satellites are not synchronized. When utilized, phase-locking allows image registration control during reception, which assures that the image is precisely aligned vertically, without any sideways skew or bowing of the image (see *Figure 18* and *Figure 19*). Finally, orbiters alternate between ascending passes (south to north movement) and descending passes (north to south movement).

In order to properly receive and display orbiter images, the software must know which of the parameters listed above to use. For example, if the desired satellite is transmitting an image on 137.5 MHz, the receiver will not receive the signal if it is tuned to 137.62 MHz. Furthermore, once the receiver is set to the correct frequency, the image will not be displayed if the satellite type is set to METEOR when attempting to receive a NOAA satellite. Since the configuration is set to METEOR, the adapter card will listen for a 256 Hertz tone burst that defines the image edge of a METEOR satellite, but the NOAA satellite sends an 832 Hertz tone burst instead. Since the expected tone burst will not be received, the image will not start.

Geosynchronous Characteristics Effecting Configurations

US GOES and European METEOSAT geosynchronous satellites transmit Wefax images on 1691 MHz. In addition, METEOSAT satellites contain a second Wefax channel at 1694.5 MHz. Japanese GMS satellites also transmit Wefax images on 1691 MHz, but the signal bandwidth used by GMS requires the use of a receiver with a much wider bandwidth than used for GOES or METEOSAT reception. Only the Quorum Wefax Professional Adapter card supplies the dual bandwidth receiver required to copy Japanese GMS Wefax.

Image formats and timing vary between GOES, METEOSAT, and GMS satellites. In order to properly receive and display images from geosynchronous satellites, the correct settings of these parameters must be known by the Qfax software.

Configuration Strategy For Using Predict

With Qfax software, the user can specify where images should be stored on the hard drive based upon satellite configurations. The user might decide to have PREDICT save all US NOAA satellite images in a directory called \QFAX\NOAA, and save all Russian METEOR images to another directory called \QFAX\METEOR. This type of strategy provides the user with an ordered storage system which can drastically reduce the time required to locate images. In effect, the user creates the equivalent of a filing system on the hard drive. If the user is specifically interested in NOAA orbiter images, it might be advantageous to create separate directories for each satellite, such as a \QFAX\NOAA12 directory and a \QFAX\NOAA14 directory.

Configuration Strategy For Using Animate

Qfax ANIMATE allows the user to save a specific image type to a unique directory on the hard drive. These saved images can be repetitively displayed in rapid sequence, providing the illusion of movement of clouds. In order to do the animation, the software must have access to sequential frames of the same image type stored in a unique directory. For example, to view an animation of the cloud patterns over the United States and the Atlantic Ocean, the GOES US IR04 images can be saved and looped. To accomplish this task, the user should make a directory called \QFAX\GOESUS to store GOESUS images. In addition, a GOES satellite configuration called GOESUS must be created to contain this directory information. When the ANIMATE Scheduler receives an image specified as GOESUS, it then knows to store the resulting animation image in the \QFAX\GOESUS directory, since the directory information is stored in the GOESUS configuration.

Setting Satellite Configurations

To create or change a satellite configuration, move to the CAPTURE screen. To change a parameter, move the mouse pointer over the function button to be changed, and click the left mouse button. This will depress the function button and actuate it.



Figure 15 Satellite Configuration Is Done Within The CAPTURE Screen

Configuration Controls

Configuration parameters are set by the controls indicated in Figure 16 which are located within the CAPTURE screen. The other window areas in this illustration have been removed for clarity. The screen will still look like the normal capture screen as shown in Figure 15.



Figure 16 Configuration Control Areas Within The CAPTURE Screen

Satellite configuration parameters are created, stored, loaded, and erased using the Configuration Window in the CAPTURE function. The following discussion refers to the controls shown in Figure 17.

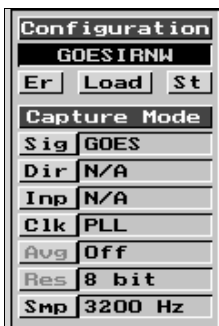


Figure 17 Configuration Window

CONFIGURATION The name of the currently loaded configuration is always located below the “Configuration” title at the very top of the window. In this example, the currently loaded configuration is GOESIRNW which saves the infrared GOES northwest image to a directory by the same name (see the “SELECTING A NEW DIRECTORY” heading below for instructions on setting the directory).

Configuration Window Settings

The configuration parameters listed below are set with the controls in the Configuration Window as shown in Figure 17.

Sig - Selects the desired satellite Signal type. This information informs the Qfax software of the expected image type, size, and what control tones and timing should be used to receive and display the image. Failure to select the proper type of signal will result in no display, or incorrect display of the desired satellite (see discussion under the “WHY USE CONFIGURATIONS” section for details). Select the appropriate SIGNAL type from the allowable signal types listed below:

GOES - GOES Geostationary Satellite WEFAX images.

GOESTAP - GOES images supplied through GOESTAP.

GMS - Geostationary Meteorological Satellite, Japan. The GMS satellites utilize a much wider deviation than all other weather satellites. Consequently, a special receiver must be used to receive this satellite (PC-GMS receiver and adapter card or Wefax Professional receiver and adapter card).

Meteor - Russian Polar Low Earth Orbiters APT images.

Meteosat - European Space Agency Geostationary Satellite format.

Nafax - Images received on HF radio transmissions.

NOAA - NOAA Polar Low Earth Orbiters APT Images.

Dir - Direction is required for polar orbiter weather satellites received in CAPTURE mode only (PREDICT automatically calculates the pass direction). A particular orbiter can be either Ascending or Descending, depending upon the time of the pass. This attribute can be determined from the PREDICT function by observing the motion along the predicted ground track. If a satellite is moving from south to north in reference to the receiving station, then the pass is Ascending. If a satellite is moving from north to south, then this is a Descending path. Correctly setting the Dir attribute assures that the received image will not be upside-down.

NOAA satellites are placed in sun-synchronous orbits. A detailed discussion of the characteristics of sun-synchronous orbits is beyond the scope of this manual, however, the following attributes are noteworthy:

1. NOAA weather satellites are launched so they make a descending pass in the morning and an ascending pass in the late afternoon or early evening. Because they are in a sun-synchronous orbit, each satellite moves over a given location in the morning and afternoon/early evening at approximately the same times. Currently, NOAA 12 provides early morning images, and NOAA 14 provides early afternoon images. In practice, as satellites reach the end of their service life, other satellites are launched to replace their approximate time slots.
2. The satellite passes the equator and each latitude at the same time each day, resulting in overhead passes that are essentially the same through all the seasons of the year. This means that long-term comparisons of data will be consistent.
3. The goal is for at least two NOAA polar orbiting satellites to be in orbit at all times. The time of day for orbital injection is based upon several factors:
 - A. The time of day that data is needed for synoptic map analysis.
 - B. Subpoint solar angles for visible channel instruments, i.e., lighting conditions at the surface.
 - C. Orbital plane separation from other satellites in orbit (To maximize the value of the data, the orbits preclude the possibility that two satellites will pass over the same area at the same time).
 - D. Time of year the launch will occur.
4. Occasionally, one of the NOAA satellites follows the terminator (the dividing line between the lighted and unlighted face of the earth) in its evening ascending pass. As the satellite progresses in its south to north ascending pass, it also moves from east to west, due to the orbital inclination and the rotation of the earth. During certain periods, the satellite actually crosses the terminator while within range of a receiving station. One often unexpected result from the terminator crossing for beginning observers occurs when the left frame switches from an infrared to visible sensor. The satellite senses the change in illumination as it moves to the west and automatically switches from an infrared to visible sensor in the left frame when there is adequate light available.

Since the illumination level is low when the shift to visible sensor is made, the

frame appears to change from a normal infrared view to a black image. The natural conclusion can be that either there is a problem in the receiving stations hardware or software, or that the satellite has developed a problem. In this case, neither is true! Increasing the image's brightness in the Qfax VIEW function will reveal that the supposedly "black" frame contains valid visible cloud information.

Meteor satellites are not sun-synchronous, so their orbital time over a given location constantly shifts. The only way to determine if a pass will be ascending or descending is to examine orbital prediction information (see PREDICT section of the manual). Occasionally, Meteor satellites track across the terminator and either switch from infrared to visible sensors (in satellites that have both infrared and visible sensors) or simply quit transmitting (satellites with visible sensor only).

Inp Selects the source for satellite audio.

Inp must be set for these products:

Product	Choices
Wefax I Adapter Card	Aux Pin 1, HF Pin 2, Aux Xclk, RX pin 14
Wefax II Adapter Card	Pin 1, Pin 2, Pin 3 (also J5), Pin 4
Wefax Professional Card	NB Recvr, WB Recvr, Pin 3 (of J3, 9 pin D-connector)

Refer to the adapter card manual for information on configuring or identifying the audio sources for these products.

No setting of Inp is required or possible for the Wefax Explorer or Wefax Voyager.

Clk The clock can be set to either PLL or OSC:

PLL (phase-locked loop) mode Image data is synchronized to the 2400 Hertz subcarrier frequency.

Use: NOAA polar orbiters and geosynchronous satellites.

Since polar orbiters spend virtually all of their time moving from or toward the receiver, this frequency as seen by the stationary receiver is shifted (the Doppler effect). If the receiver does not track and correct for the amount of shift, the image will bow as shown in Figure 18. This is due to the fact that Doppler shift slightly adds or subtracts to the 2400 Hertz subcarrier, and the receiver does not track and compensate for this change. So, by using a fixed reference oscillator, the Doppler changes shift the start and stop reference of each line. By setting the CLK to PLL, the hardware tracks the amount of Doppler shift and compensates for it. The use of the PLL forces true vertically aligned images in spite of the Doppler shift present on the satellite signal.

NOTE: The use of PLL is required to assure the correct operation of temperature calibration and the generation of map overlays on NOAA polar orbiters!

Osc mode uses a free-running 2400 Hertz oscillator that does not track changes in the 2400 Hertz subcarrier. On Russian satellites that do not phase lock the image with the subcarrier, the user will be forced to accept some bowing of the image edges.

Use: Russian polar orbiters, except for METEOR 3-5 and subsequent satellites which phase lock the image to the subcarrier. Also used for HF NAFAX,

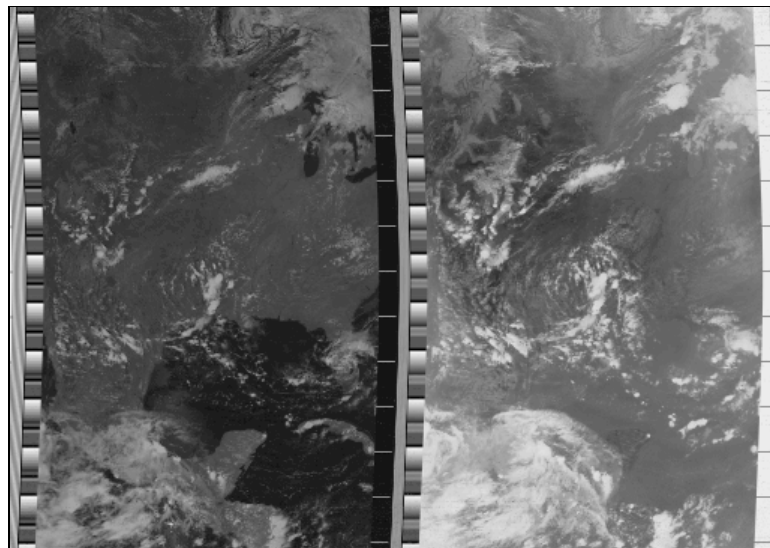


Figure 18 Doppler Shift Image Bowing, PLL Off.

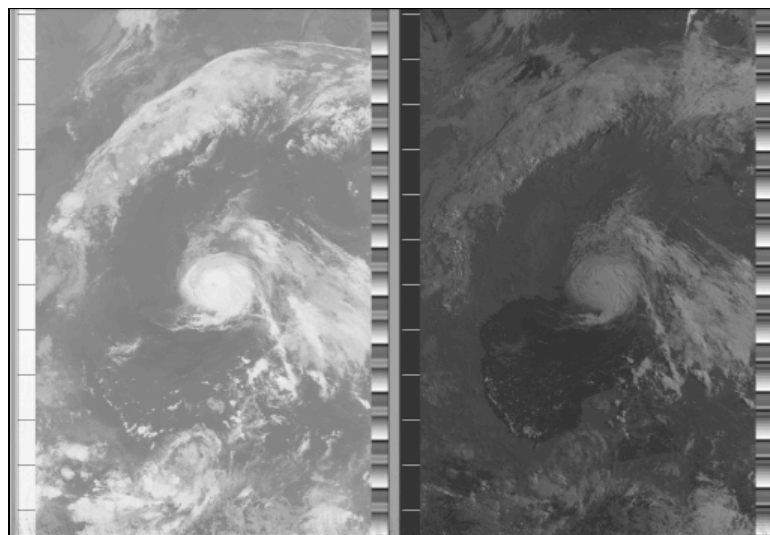


Figure 19 Vertical Registration with Clock Set to PLL.

Note: For polar orbiting weather satellites All NOAA satellite images are phase-locked to the signal carrier. Therefore, the clock for NOAA satellites should be set to PLL. All METEOR satellites do not have phase-locking, except METEOR 3-5. Only METEOR 3-5 and future METEOR satellites with phase-locking should have the clock set to PLL. Other Meteor satellites should be set to OSC.

Avg Off (not adjustable by the user fixed in this version)

Res 8-Bit (not adjustable by the user fixed in this version)

Smp Set image sampling rate (defines image resolution). Wefax and APT images are sent as individual lines. Quorum Adapter Cards have the ability to vary the number of samples that are taken and stored from each line of image information. When the sample rate matches the resolution of the image being transmitted, then maximum image resolution is captured, and no increase in image quality will be gained by setting the sample rate to a higher value. The cost for the increased resolution is that the file size increases with higher resolutions. An image captured at a 4800 Hz sample rate will be 33 percent larger than one captured at 3200 Hz. So, file size is a trade-off for increased resolution.

The sampling rate also effects image symmetry. For example, GOES and Meteosat Wefax images are transmitted in 800 by 800 pixel format. Increasing the sample rate will increase the resolution on a line, but since the number of lines is fixed by its transmission format, the image will no longer maintain its original symmetry, and maps will appear elongated. In like manner, optimally square pixels are obtained in NOAA APT image transmissions by using the 4096 Hz sample rate. Increasing or decreasing the sample rate will change the resolution at the expense of symmetry.

The user must determine what is of primary importance in choosing the sampling rate symmetry or resolution/file size. Choices for sample rate are:

Sample Rate	Sample Application Notes
3200 Hz	For minimum file size. Receives GOES & Meteosat the way they are sent in their 800 x 800 native format.
3600 Hz	Provides a good compromise smaller file size than 4096 or 4800 sample rates, yet maintains pleasing aesthetics.
4096 Hz	Optimal square pixels for NOAA satellites
4800 Hz	For maximum resolution, and largest file size. You receive all there is to receive at this setting

Setting The Receiver

The Qfax software provides a fully functional scanning receiver on all Quorum products except for the PC-GMS receiver (PC-GMS frequency is set to one frequency by a crystal and is not adjustable). Features include digital frequency readout, signal strength, Hi/Lo gain, adjustable tuning step size, preamp On/Off, UHF/VHF input select:



Figure 20 Receiver Window

NOTE: When using the fixed frequency PC-GMS receiver, only the title PC-GMS, the frequency of 1691.000, and the signal strength meter will be displayed.

The Receiver functions are located in the Receiver window on the right side of the CAPTURE screen, as illustrated in Figure 20.

Receiver Window Title Bar

For the Wefax Explorer, Wefax Voyager, and Wefax Professional Adaptors, the title in the blue area will read Receiver.

Wefax Adapter I and Wefax Adapter II cards can support one or two receivers. The blue area located at the top of the Receiver window will display the receiver that is currently enabled. *Only one receiver can be used at any given time.* The following receiver titles can be displayed if they are present with the Wefax Adapter I or II:

PC-137
PC-GMS
SL-137

Changing Receivers

The Receiver status title bar in Figure 20 displays the currently enabled receiver type in the top blue area of the receiver window. The information displayed in this window is dependent on the receiver. If two receivers have been setup in the CAPTURE screen setup, you can change to the alternate receiver by clicking the left mouse button of the blue title bar where the receiver type is displayed.

Frequency Readout And Controls

Frequency Readout Box Displays the receiver frequency. The receiver can be manually set by using the mouse, or it is automatically set to the receiver frequency specified in a satellite configuration file when the configuration file is loaded. The following color convention is used in displaying the receiver's frequency:

Green UHF frequency displayed

Yellow VHF frequency displayed

The following controls in the window are used to adjust the receiver attributes:

'+' move receiver frequency Up by the frequency increment specified by Step (see Step)

'-' move receiver frequency Down (see Step)

Dial When selected, the receiver is controlled by the settings in the Receiver window. Dial must be selected to tune the receiver with +/- . Dial is selected by pressing the Dial button in the Receiver window and is deselected by pressing the MEM button in the Rcvr Memory Window located below the Receiver window. When Dial is not selected, the receiver is controlled by the scanner functions (see the "Receiver Memory Window" section in the CAPTURE chapter for details on using the scanner).

Step Establishes the increment that the frequency will change when the receiver frequency is adjusted using the '+' and '-' controls. Select Step frequency increment used by '+' and '-' controls. 5 KHz, 25 KHz, 50 KHz, 100 KHz, and 1 MHz increments can be selected.

Band Selects the UHF or VHF input of the receiver. Typically, an APT satellite antenna cable is connected to the VHF input, and the Geostationary downconverter output is connected to the UHF input.

Gain Selects receiver Gain. The Low setting reduces receiver gain by approximately 6-10 dB. An alternate way to think of this is that setting it to High will boost the signal voltage approximately 2 times. Setting the receiver to Low may be of use in locations that are having problems with receiver overload. The presence of a strong local radio signal can cause a variety of symptoms that interfere with image reception. Lowering the receiver gain can help reduce the problem in some instances. If the problem persists, the problem may be eliminated through the addition of a helical in-line filter (available from Quorum).

Preamp This control switches Preamp 12 volt DC voltage on. This voltage is fed to the VHF antenna connector on the adapter card and supplies voltage through the coaxial cable for the APT preamp (located at the APT antenna). All Quorum antennas have preamplifiers. For proper APT operation with Quorum antennas, this control must be set to Preamp On

Rcvr Signal -The signal level meter indicates the relative received signal strength measured at the receiver. For those who are technically inclined, the signal strength is based on the amount of limiting in the receiver IF amplifiers. The

logarithmic receiver response is converted to a linear current used for display purposes. Typically, the display has an overall dynamic range of 30 to 40 dB.

Erase, Load, Store buttons

The Erase, Load, and Store buttons perform their action upon satellite configurations, each of which is store as a file on the hard drive. Pressing the Erase and Load buttons brings up the following screen containing the configurations list box:

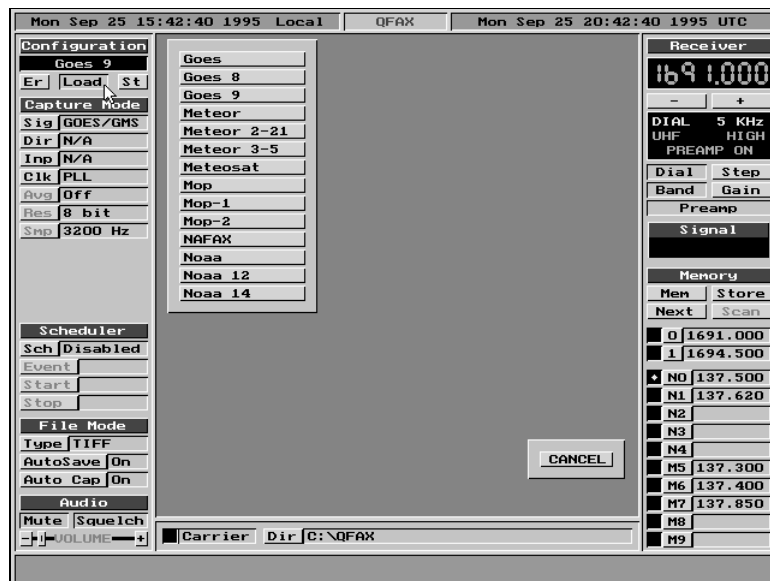


Figure 21 Configurations List Box

ER button The ER (ERase) button is provided to allow stored configurations to be erased. To erase a configuration, select the ER button. A list of currently stored configuration names appears in the image window. Select the name of the configuration you wish to delete by moving the mouse cursor over the configuration name and then pressing the left mouse button.

LOAD button The LOAD button is used to select and load a configuration previously stored on the hard drive. When the load button is selected with the mouse, a list of configurations available for loading is displayed in the image window. Use the mouse to click on the desired configuration. The file will be loaded, and all configuration, directory, and receiver parameters will be set according the information stored in the configuration file.

ST button The ST (STore) button is used to store configuration, directory, and receiver parameters to the hard drive. The configuration file[s] are stored in the same directory as the Qfax software. Each satellite configuration file is saved with a filename format of QFAXnnnn.CFG, where nnnn represents a decimal number.

To use the ST button, first select the proper parameters for the satellite to be received in the Configuration and Receiver windows. Once the parameters have been set, use

the mouse to select the ST button in the Configuration window. The following prompt will appear in the prompt window at the bottom of the screen:

A screenshot of a command-line prompt window. The text inside the window reads: "Enter Configuration Name (12 chars max) <Enter> for current: _". The text is in a monospaced font, and there is a cursor at the end of the line.

Figure 22 STore Configuration Name Prompt

If you have modified an existing configuration's parameter[s] and wish to save the configuration with the same name it was loaded as, press <Enter>.

If you created an original configuration (not previously stored) or modified an existing configuration, and wish to save it with changes as a new configuration name, type the new name (maximum of 12 characters) and press <Enter>.

CAUTION!

When saving configurations for polar orbiting weather satellites, be sure that the name used for the configuration name matches the satellite name used in the "elements.dat" file. If a satellite is stored in the "elements.dat" file under the name NOAA 14, this is how it must be typed for this prompt. A common error is to include a dash in the name when it is not listed that way in "elements.dat". The listing for NOAA 14 in the elements.dat file does not include a dash! If the configuration is entered with a dash (NOAA-14), PREDICT will not be able to find a satellite by that name in the "elements.dat" file, and will not be able to find the information required to navigate the image in the image file.

The next dialogue box appears if <Enter> was used in response to the "Enter Configuration Name..." prompt:

A screenshot of a command-line prompt window. The text inside the window reads: "Do you want to update this configuration? (y or n) _". The text is in a monospaced font, and there is a cursor at the end of the line.

Figure 23 Save Configuration Update Option Prompt

Type 'y' <Enter> to save the changes you have made in the configuration's settings.

Type 'n' <Enter> to abort without saving the changes made to the configuration.

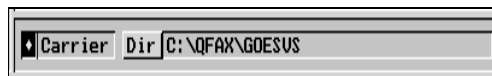
The next prompt allows you to choose in which directory images captured with this configuration will be saved.

The use of this feature provides a powerful tool for organizing images on the hard drive and avoiding hard drive chaos! It is usually advantageous to store each type of configuration in its own directory!

A screenshot of a command-line prompt window. The text inside the window reads: "Do you want to save directory information? (y or n) _". The text is in a monospaced font, and there is a cursor at the end of the line.

Figure 24 Save Directory Information Prompt

Type 'n' <Enter> to save all files captured with this configuration's name in the directory shown below the image window and to the right of "Dir" (Figure 25). In this example, all images would be saved to the "c:\qfax\goesvs" directory shown to the right of "Dir". Since you have chosen to use this directory, no further input is required, and you can skip the "Using The Directories Box" section below.

*Figure 25 Directory For Image File Saves*

Type 'y' <Enter> to specify a new directory where images captured with this configuration name will be stored. This directory information is stored in the configuration file and is used whenever an image is captured using the specified configuration name. The Directories window (Figure 26) will appear in the image window of the screen.

If you are choosing to store the selected configuration in a directory that does not yet exist, refer to the "Making A New Directory" section.

If you are choosing to store the selected configuration in an existing directory, refer to the "Selecting A New Directory" section below.

Using The Directories Box

Selecting A New Directory

The Directories window displays directories available from the current path specified in the "Path:" line. The Directories box displays the parent directory and sub-directories which are available choices from the current directory. The '.' is the notation for the current directory, and '..' is the notation for the next higher (parent) directory to the current directory (See the MS-DOS User's Manual for details). Sub-directories are shown if they are available in this window.

To move to the next higher directory from the current directory, double-click on '..'.

To move to a sub-directory from the current directory, double-click on the name of the desired sub-directory. In Figure 26, to move to the GOESUS subdirectory, double-click on the GOESUS label in the Directories box, or click once on the GOESUS label. Click once on the OK button when you are ready to exit the Directories window.

The Files box shows the files located in the current directory, and the Drives box shows available drives in the system with the currently selected drive high-lighted. The "Disk Free:" line displays the free space in bytes for the currently selected drive.

File Selection By File Extension Type

The format box allows the user to choose which file types are displayed in the Files window. When a box has been selected (the interior is black), files with the chosen file extension will be displayed. If a box has not been selected by a given file extension type, any files ending with that extension will not be displayed. The following graphics file types can be chosen to be displayed: TIFF, GIF, PCX, QFX, BMP, JPEG, BIN, and ANI.

Making A New Directory

If you have created a new configuration type, you probably want to store the images in a directory reserved for that image type only. After answering 'y' to the "Do you want to save directory information (y or n) _" prompt, the Directories window appeared in the image window (see Figure 26).

Next, select the Make Dir button to create a new directory for the new image type to be saved. A new directory can only be made below the current location shown in the path. The cursor will move to the "Path:" line in the Directories window. Type in the new path name, and press the OK button to save the new directory information. The new configuration is now saved to the hard drive, including all configuration, receiver, and directory information.

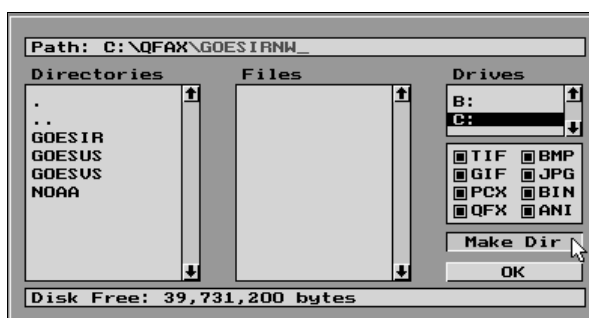


Figure 26 The Directory Window: Making A New Directory

As an example, assume that the existing GOES configuration has been used as a template to save GOES infrared northwest images. as shown in Figure 26. A new directory named GOESIRNW is created to hold any GOES IR northwest images by clicking the Make Dir button and typing the new directory name after the parent QFAX directory. Next, click on the OK button. The new directory is created and will be used to save any image captured using the GOESIRNW configuration in the path C:\QFAX\GOESIRNW. As long as no other image types are captured using this configuration, only infrared GOES northwest images will be stored in this directory.

Chapter 4 - Capture Operation

General Description

The Qfax CAPTURE function is used to set up parameters necessary for the proper configuration and operation of the many Qfax features. For example, in order to receive a satellite, the receiver must be tuned to the proper band and frequency. For polar orbiters, the preamplifier must be turned on. The signal type must be set so the software knows what format to use to display an image from a GOES geostationary satellite or NOAA polar orbiter. The user may desire to set a particular image sample rate for a given type of satellite. All these settings are done within CAPTURE.

From the Scheduler Window, CAPTURE also allows the user to establish a "Scheduler" to record selected images that are transmitted in specific time slots. From within the File Mode window of CAPTURE, the image data file type can be selected from the choices of TIFF, PCX, GIF, and BMP graphics formats. Finally, audio control functions are also set within the Audio Window in CAPTURE.

Capture Screen Menu Bar

When using the CAPTURE function, the following menu bar appears at the bottom of the screen:



Figure 27 Capture Screen Menu Bar

Across the bottom of the screen there are seven buttons. Each is accessible with the mouse or by direct entry of the upper case black letter in the button description from the keyboard. These function as follows:

Capture	Place the software into the mode to capture an image.
Predict	Advance to the PREDICT screen.
View	Advance to the VIEW screen.
Animate	Advance to the ANIMATE screen.
Setup	Recall the hardware SETUP screen.
Scheduler	Display the SCHEDULER screen.
Exit	Exit the Qfax program.

The Capture Screen

The CAPTURE function is used to set up and control satellite configuration files, receiver configuration, program configuration and image capture:

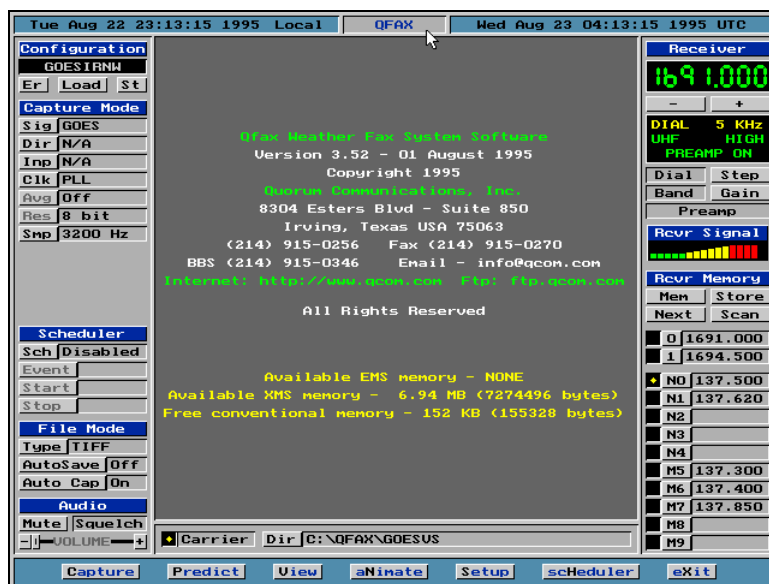


Figure 28 Capture Screen with Information Display

To change a parameter, move the mouse pointer over the function button to be changed and click the left mouse button. This will depress the function button and actuate it.

Some controls are available from the keyboard and the mouse from within the CAPTURE FUNCTION:

KEYS	FUNCTION
Alt+C	Toggle AutoCapture on/off
Alt+D	Volume Down Decrease speaker volume
Alt+M	Mute Toggles audio on/off
Alt+Q	Turns audio on when satellite subcarrier is detected
Alt+S	Toggle AutoSave on/off
Alt+U	Volume Up Increase speaker volume

Table 5 Alt Key Function Summary

MUTE, SQUELCH, VOLUME UP/DOWN, AUTOSAVE, and AUTO CAPTURE can all be adjusted while capturing an image.

Adding/changing Satellite Configurations

Important Note!

An in-depth discussion of using and setting configurations is provided in the “Overview Satellite Configurations” chapter of this manual.. This section is provided as a quick reference only!

Satellite configuration parameters are created, stored, loaded, and erased using the Configuration Window in the CAPTURE function:



Figure 29 Configuration Window

Erase, Load, And Store Buttons

The top three buttons, Er, Load, and St are used to erase, load, and store configuration files and operate as follows:

BUTTON	PURPOSE
Er	Erase configuration from list
Load	Load configuration from list
St	Store new configuration to list

Capture Mode Controls

Sig The Signal type informs the software of what type of signal is being received. Qfax requires this information so it can properly receive, save, and display images. Press the Sig button to cycle through the signal types.

Sig	SIGNAL TYPE
NOAA	NOAA Polar Low Earth Orbiters
Meteor	Russian Polar Low Earth Orbiters
GMS	Japanese Geostationary Meteorological Satellite
GOES	U.S.A. GOES Geostationary Satellite
GOESTAP	GOES images supplied through GOESTAP
Meteosat	European Space Agency Geostationary Satellite
Nafax	Images sent on HF radio signals

Table 6 Signal Types

- Dir** Direction (NOAA & Meteor polar orbiters Ascending or Descending, else N/A for Not Applicable)
- Inp** Wefax Professional, Wefax Adapter I and II cards *only* selects appropriate audio signal input for adapter use.
- Clk** PLL phase lock to satellite subcarrier.
Use: To lock to NOAA images, forces true vertical image sides. Also used for geostationary satellites.
- OSC internal clock reference for Russian Meteor orbiters.
Use: Russian polar orbiters (except Meteor 3-5 or later equipped with phase-locking) and HF Nafax.
- Avg** Off (not user adjustable fixed in this version)
- Res** 8-Bit (not user adjustable fixed in this version)
- Smp** Set image sampling rate (defines image resolution)

Sample Rate	Sample Application Notes
3200 Hz	For minimum file size. Receives GOES & Meteosat the way they are sent in their 800 x 800 native format.
3600 Hz	Provides a good compromise smaller file size than 4096 or 4800 sample rates, yet maintains pleasing aesthetics.
4096 Hz	Optimal square pixels for NOAA satellites
4800 Hz	For maximum resolution, and largest file size.

Table 7 Sample Application Notes

The parameters under CAPTURE Mode are individually selected for each type of satellite signal to be captured. The St command is used to store the capture mode settings to disk for later recall.

NOTE: The configurations stored here are used by CAPTURE, ANIMATE, and PREDICT. When these functions locate a satellite, they will look here for the proper configurations. The distribution disk contains standard configurations for most of the current satellites. If you delete or rename these configurations, some portions of the program may not function properly.

Scheduler Window

The scheduler window controls whether or not the CAPTURE scheduler is enabled or disabled. While a scheduled event is active, the window displays the event number and the event's start and stop times.

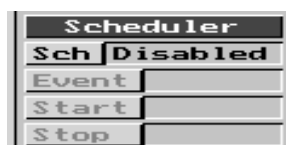


Figure 30 Scheduler Window

BUTTON	FUNCTION
Sch	Enabled/Disabled (turn Scheduler On/Off)
Event	Currently active Event number (0 to 199)
Start	Time of event start
Stop	Time of event stop

Table 8 Scheduler Button Functions

NOTE: Also see “Setting Up The Scheduler” for operational information.

File Mode Window

The File Mode Window displays the type of graphics file format that is in use and allows the user to change to a different graphics file format. All image files will be saved in the currently specified graphics format.



Figure 31 File Mode Window

Type Sets the graphics file format used to save images. The user can choose between TIFF, PCX, GIF, and BMP graphics format.

NOTE: The GIF file format is a compressed format. This means the files are smaller than TIFF or PCX, but the time it takes to read and write a GIF is much longer. If you

choose the GIF file type, you may miss the start of the next image, because the computer is still saving the file. This should only be a problem on slower computers with slow disk drives. If you have a problem with missing images because of the long file save time, choose TIFF or PCX. You can resave these images to GIF format later.

AutoSave Toggles auto file save feature Off/On. When enabled, all images are saved to disk at the end of the image transmission. Use the mouse or ALT+S from keyboard to toggle the AutoSave option.

NOTE: If AutoSave is off when an image ends, the image will NOT be saved to a file. In this case, the image is displayed on the screen, but is also cleared from the memory buffer. If you are in the process of capturing an image and you want to save it, but forgot to enable AutoSave before the image began, use the ALT+S command from the keyboard to toggle AutoSave On before the transmission ends. As long as AutoSave is On before the stop tone or the image ends, the file is saved.

Auto Cap Toggles the auto file capture feature On/Off (If On, captures images consecutively. If Off, captures one image and stops). Use the mouse or ALT+C from the keyboard.

Audio Window

The audio window allows the user to adjust audio volume, mute, and squelch parameters.



Figure 32 Audio Control Window

Mute Toggles Mute audio to speaker On/Off (Alt+M). This action turns the speaker off until Mute is toggled back on.

Squelch Toggles Squelch On/Off. When enabled, audio turns on with the reception of a valid subcarrier tone from the selected satellite frequency) Alt+Q.

<-----> Adjust VOLUME (Up/Down) Alt+U and Alt+D.

NOTE: The mute, squelch, and volume can be changed while capturing images by pressing the appropriate key sequences on the keyboard (this will not work on some keyboards).

The Receiver

The Qfax software provides a fully functional scanning receiver on all Quorum products except for the PC-GMS receiver (PC-GMS frequency is set to one frequency by a crystal and is not adjustable). Features include digital frequency readout, signal strength, Hi/Lo gain, adjustable tuning step size, preamp On/Off, and VHF/UHF input select.

NOTE: When using the fixed frequency PC-GMS receiver, only the title PC-GMS, the frequency “1691.000”, and the signal strength meter will be displayed.

The RECEIVER functions are located in the Receiver window on the right side of the CAPTURE screen, as illustrated in Figure 28.



Figure 33 Receiver Window

Receiver Window Title Bar

For the Wefax Explorer, Wefax Voyager, and the Wefax Professional adapter cards, the title in the blue area will display the word “Receiver”.

Wefax Adapter I and Wefax Adapter II cards can support one or two receivers. The blue area located at the top of the Receiver window will display the receiver that is currently enabled. ONLY ONE RECEIVER CAN BE USED AT ANY GIVEN TIME. The following receiver titles can be displayed if they are present with the Wefax Adapter I or II:

PC-137
PC-GMS
SL-137

Changing Receivers

This operation applies to the Wefax Adapter 1 and Wefax Adapter 2 cards only!

The Receiver status title bar in Figure 33 displays the currently enabled receiver type in the top blue area of the receiver window. The information displayed in this window is dependent on the receiver. If two receivers are set up in the CAPTURE screen setup, you can change to the alternate receiver by clicking the left mouse button of the blue title bar where the receiver type is displayed.

Frequency Readout And Controls

The Frequency Readout Box displays the current receiver frequency. The receiver's frequency can be manually set by using the mouse, or it is automatically set to the receiver frequency specified in a satellite configuration file when the configuration file is loaded. The following color convention is used in displaying the receiver's frequency:

Green: UHF frequency displayed

Yellow: VHF frequency displayed

The following controls in the window are used to set the receiver attributes:

'+' move receiver frequency Up by the frequency increment specified by STEP (see STEP)

'-' move receiver frequency Down (see STEP)

Dial - When selected, the receiver is controlled by the settings in the Receiver window. Dial must be selected to tune the receiver with the '+/-' buttons. Dial is selected by pressing the Dial button in the Receiver window and is deselected by pressing the Mem button in the Rcvr Memory Window located below the Receiver window. When Dial is not selected, the receiver is controlled by the scanner functions (see the "Receiver Memory Window" section below for details on using the scanner).

STEP - Establishes the increment that the frequency will change when the receiver frequency is adjusted using the '+' and '-' controls. 5 KHz, 25 KHz, 50 KHz, 100 KHz, and 1 MHz increments can be selected.

BAND - Selects the UHF or VHF input of the receiver. The APT satellite antenna cable should be connected to the VHF input, and the Geostationary downconverter output connected to the UHF input.

GAIN - Sets the receiver's internal GAIN adjustment. The Low setting reduces receiver gain by approximately 6-10 dB. An alternate way to think of this is that setting it to HIGH will boost the signal voltage approximately 2 times. Setting the receiver to LOW may be of use in locations that are having problems with receiver overload. The presence of a strong local radio signal can cause a variety of symptoms that interfere with image reception. Lowering the receiver gain can help reduce the problem in some instances. If the problem persists, the problem may be eliminated through the addition of a helical in-line filter (available from Quorum).

PREAMP - This control switches PREAMP 12 volt DC voltage on. This voltage is fed to the adapter card's VHF antenna connector that supplies the voltage to the coaxial cable for the APT preamp located at the APT antenna. All Quorum antennas have preamplifiers. *For proper APT operation with Quorum antennas, this control must be set to PREAMP ON.*

Rcvr Signal - The signal level meter indicates the relative received signal strength measured at the receiver. For those who are technically inclined, the signal strength is based on the amount of limiting in the receiver IF amplifiers. The logarithmic receiver

response is converted to a linear current used for display purposes. Typically, the display has an overall dynamic range of 30 to 40 dB.

Receiver Memory Window

Qfax software includes a scanning receiver function containing 2 UHF and 10 VHF memories (Figure 34). The scanning receiver can be used to determine which satellites are turned on, and which frequencies are in use.

NOTE: The PC-GMS receiver is permanently set by a receiving crystal to one receive frequency. Since its frequency is not controllable, The scanning function is not available to the PC-GMS, and the Receiver Memory Window is not displayed.

To Store a new frequency in a Memory:

1. Press the Dial button in the Receiver window.
2. Adjust the dial to the new frequency using the '+' and '-' controls.
3. Move the mouse cursor over the memory (N0-N4, M5-M9) where the frequency is to be stored, and click the left mouse button.
4. Press the Store button with the mouse.

Figure 34 Memory Window

Rcvr Memory	
Mem	Store
Next	Scan
0	1691.000
1	1694.500
N0	137.500
N1	137.620
N2	
N3	
N4	
M5	137.300
M6	137.400
M7	137.850
M8	
M9	

The new frequency will be displayed in the window to the right of the memory button.

To Erase a memory channel:

1. Press the Mem button. The Store button text will change to Erase.
2. Select the memory button you wish to erase (N0-N4, M5-M9).
3. Press the Erase button.

NOTE: The Store/Erase button function toggles with the Mem and Dial buttons. If the Dial button is pressed, the Store button is displayed and active, allowing the current dial frequency to be stored to the selected memory location. If the Mem button is selected, the Erase button is displayed and active, allowing the selected memory location to be erased.

Button	Function
Mem	Select Memory mode (Mem must be on to recall Memory Frequencies and Scan).
Store or Erase	Store/Erase button is used to store and erase memory channels. Only “Store” or “Erase” is displayed at any given time.
Scan	Scan NOAA & Meteor memory locations N0-N4 and M5-M9. The Mem button above the memories section must be selected for Scan to function. <i>The scanner does not scan the 0 and 1 memories!</i>
Next	Selects the next active memory location.

Table 9 Receiver Memory Window Button Functions

NOTE: The Next button functions in conjunction with the Mem and Dial buttons. If the Mem button is pressed, the Next button will move to the next memory location containing a frequency and tune the receiver to the frequency stored there. If the Dial button is pressed, the Next button will advance to the next memory location containing a frequency. If the Store button is then pushed, the Dial frequency will overwrite the frequency displayed in this memory location.

Memory Locations

0-1: Stores UHF frequencies for GOES and Meteosat (1691.000 MHz and 1694.500 MHz).

N0-N4: Store NOAA frequencies in these locations (137.5 MHz and 137.62 MHz).

M5-M9: Store Meteor frequencies in these locations (137.3MHz, 137.4MHz, and 137.85MHz).

NOTE: The memory locations numbered N0-N4 are for NOAA frequencies. While in Scan mode, if a valid signal is found in one of these locations, the program will look through the Configuration file for a generic configuration called NOAA. This configuration is then loaded and the satellite pass is captured and saved to disk. Likewise, memory locations numbered M5-M9 are for Meteor frequencies. A valid signal on one of these locations will load a configuration called Meteor.

The generic NOAA and Meteor configurations MUST be stored as Configuration files in the \QFAX directory for the scanning function to work properly. If these configurations are accidentally lost, they can be restored by copying the “.CFG” files from Qfax Program Diskette to the \QFAX directory.

Capture Using The Memory Scanner

Qfax contains a full featured memory scanner. The scanner can be used to scan NOAA and Meteor APT satellite frequencies. When the scanner picks up a valid

signal, it automatically receives and saves the image and then resumes scanning once the file has been saved.

To capture images using the memory scanner:

1. If the desired frequencies have not been loaded into memory locations, add them now.
2. Push the Mem button.
3. Push the Scan button to begin scanning.
4. Push the Scan button again when you are ready to quit scanning.

The scanner will scan the active NOAA and Meteor memory channels (It does not scan memories 0 and 1). When scan detects a carrier for 30 seconds, it will begin to capture the image. When the image transmission is completed, scan will save the file to disk and begin scanning the channels again. The scanner will continue to capture and save images as long as it is enabled.

Since no schedules are available for Russian satellites, the scan feature can be useful in determining which of the Russian Meteor satellites are active at any time.

Carrier And Dir



Figure 35 Carrier and Directory Window

Underneath the image viewing area is the Carrier detect light and the Current file Directory list box (Figure 35).

Carrier The '*' is displayed when a valid satellite signal is detected. Specifically, the Carrier light is On when the subcarrier of a satellite is detected or when the receiver is phase locked to a Nafax signal.

Dir This box displays the current path from which images are being loaded and stored.

The Directories Box Making Or Changing Directories

Selecting A New Directory

The Directories window (Figure 36) displays the current directory. The Directories box displays the parent directory and sub-directories which are available choices from the current directory in the Directories window. In the Directories window, the '.' is the notation for the current directory, and '..' is the notation for the next higher (parent)

directory to the current directory (See the MS-DOS User's Manual for details). Sub-directories are shown if they are available in this window.

To move to the next higher directory from the current directory, double-click on '..'.

To move to a subdirectory from the current directory, double-click on the name of the desired subdirectory. In Figure 36, to move to the GOESUS subdirectory from the current C:\QFAX directory, double-click on the GOESUS label in the Directories box.

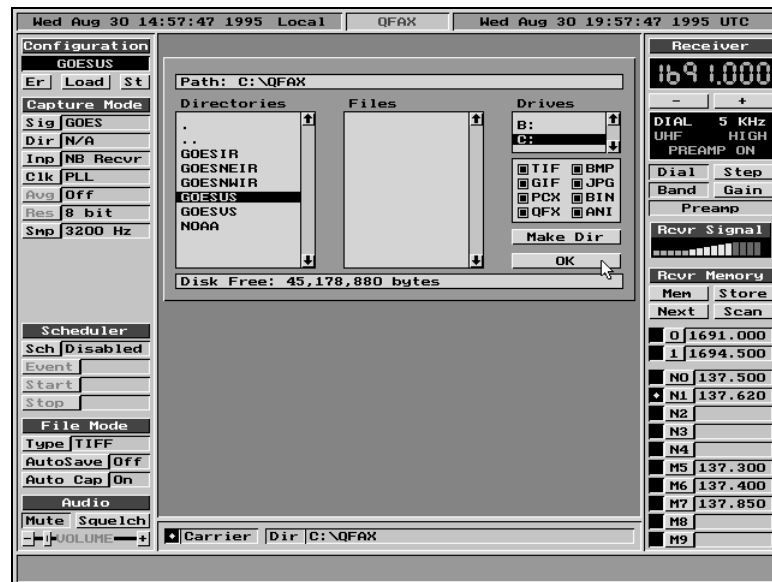


Figure 36 The Directory Window: Making A New Directory for image storage

File Selection By File Extension Type

The Files box (Figure 36) shows the files located in the current directory, and the Drives box shows available drives in the system with the currently selected drive highlighted. The "Disk Free:" box displays the free space in bytes for the currently selected drive.

The format box allows the user to choose which file types are displayed in the Files window. When a box has been selected (the interior is black), files with the chosen file extension will be displayed. If a box has not been selected by a given file extension type, any files ending with that extension will not be displayed. The following graphics file types can be chosen to be displayed: TIFF, GIF, PCX, QFX, BMP, JPEG, BIN, and ANI.

Making A New Directory

The Directories window displays the current directory and can be used to add a new directory where files will be saved to in CAPTURE (see Figure 37).

IMPORTANT NOTE: This operation creates a temporary change which lasts until a new configuration is loaded. When a new configuration is loaded that contains directory information, the directory information stored in the configuration file erases any changes that have been made manually with the Directories window. To make a directory change permanent, it must be saved as part of a configuration. Refer to the “Overview” chapter of this manual for detailed information and instructions on setting the directory information of a configuration.

To initiate a change in the directory currently selected, use the mouse to press the Dir button in the Carrier and Directory Window (Figure 35). After the button is selected, the Directories window (Figure 36) is displayed in the image window.

Next, select the Make Dir button to create a new directory for the new image type to be saved. The cursor will move to the “Path:” box in the Directories window. Type in the new path name, and press the OK button to save the new directory information.

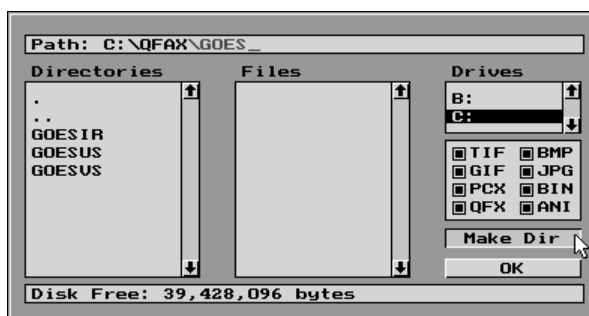


Figure 37 Making A New Directory

In Figure 37, a new C:\Qfax\GOES directory is created by pressing the Make Dir button and adding the text GOES to the displayed C:\QFAX\ path. Once GOES is added to the path, click the OK button to remove the Directories box. All images captured will now be stored in the C:\QFAX\GOES path. *This change will last until a configuration file is loaded that specifies a new directory setting or the Directories window is used to add a new directory or change to a different directory.*

Receiving An Image In Capture

Once the required receiver and Capture Mode parameters have been established for the desired satellite, CAPTURE can be used to receive and save an image. CAPTURE can receive images when controlled manually, or when the scheduler is set up, CAPTURE can receive and save images in an unattended mode. If an animation of images is required, the ANIMATION function should be used instead of CAPTURE. Refer to the ANIMATION function of this manual for details. If you desire to use the scheduler to capture images in the unattended mode, see the next section regarding Scheduler setup and use.

To manually receive an image in CAPTURE, prior to the start of the desired image's transmission time:

1. Load the desired satellite's configuration or manually set the configuration and receive parameters.
2. Set AutoSave to On to save the image to disk.
3. Set Auto Cap to On to receive images continuously as they are transmitted, or to Off to receive just one image manually.
4. Select CAPTURE from the Menu Bar using the mouse or keyboard.

Once image transmission is begun, CAPTURE will automatically detect the start of the image, determine the position of the image edges, display the image, and save the image to disk if AutoSave has been set to On:

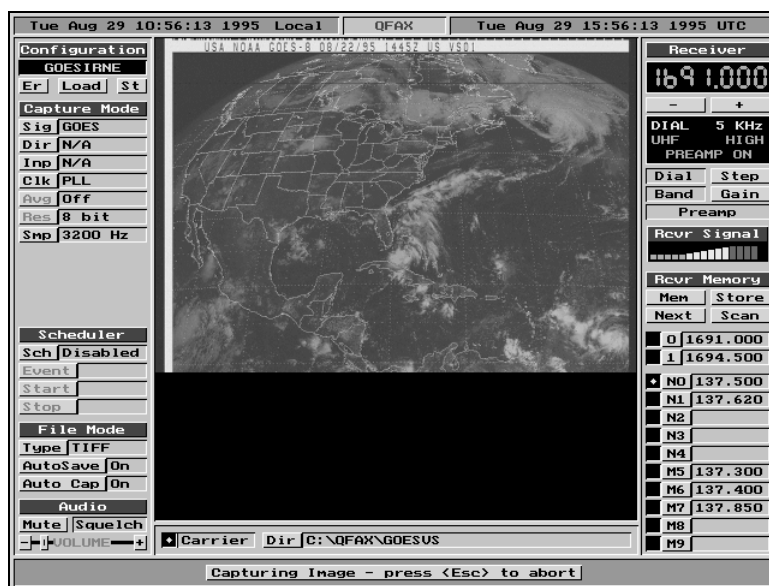


Figure 38 CAPTURE Image Reception

NOTE: If AUTOSAVE is off when an image ends, the image will NOT be saved to a file. The image will be displayed on the screen, but is cleared from memory. If you are in the process of capturing an image and you want to save it, use the ALT+S command, from the keyboard, to toggle AUTOSAVE on before the transmission ends. As long as AUTOSAVE is ON before the stop tone occurs or the image ends, the file will be saved.

For images of the start/stop format (geostationary images) there are five sequences the software goes through before capturing an image:

1. Waiting For Start Tone
2. Start Tone Detected
3. Locking To Image Edge
4. Waiting For Image Start

5. Capturing Image

When CAPTURE is selected, the message Waiting For Start Tone appears at the bottom of the screen. The software waits here until a valid image start is detected. When a valid image start is detected, the message Start Tone Detected will be displayed. Next, synchronization to the edge of the image will occur and the display will read Locking To Image Edge. After the software has locked to the image edge, it displays Waiting For Image Start as it waits for the top of the image. Once the top of the image is reached, Capturing Image will be displayed and the image will be written to the screen one line at a time. A similar sequence is used for polar orbiter APT images.

This process is automatic and requires no intervention from the operator. Any of the operations may be canceled by the operator at any time. Press <Esc> and follow the instructions. A forced start can be initiated at any time by hitting <Enter>. Each time <Enter> is pressed, the software will advance to the next level until capture begins.

Capture Scheduler

The CAPTURE Scheduler allows the user to establish time slots when images will automatically be received and stored to the hard drive. This allows unattended reception of images for later use or analysis at a more convenient time.

The scheduler automatically enables file save

Scheduler Concepts

The CAPTURE Scheduler allows the system to continuously monitor a user generated schedule for the next image event time. In order for the Scheduler to work, CAPTURE must not be manually placed in Capture mode. When the scheduler determines it is time for a new image to be saved, it captures the image, and returns to what it was previously doing. In this fashion, it is possible for CAPTURE to receive and save images in an unattended mode.

It is helpful to understand how the CAPTURE Scheduler works and the differences between the ANIMATE and CAPTURE schedulers. The ANIMATE and CAPTURE schedulers are separate and succinct entities. The key features of the ANIMATE and CAPTURE schedulers in Qfax are:

- Both CAPTURE and ANIMATE capture images according to their respective schedule, as input by the user.
- Both CAPTURE and ANIMATE save images as a GIF, TIFF, JPEG, BMP, or PCX formatted files (in ANIMATE, AutoSave must be enabled).
- Only the ANIMATE scheduler saves sector images in the “.ANI” format required by ANIMATE in order to loop images. “.ANI” files can only be

made from configurations where the Sig type is GOES, Meteosat, Goestap, HF, or GMS.

- “.ANI” Images can only be looped within ANIMATE.
- Both Geostationary Wefax and polar orbiter APT can be scheduled, captured, and saved by the ANIMATE and CAPTURE schedulers.

Use ANIMATE to schedule, capture, save, and loop geostationary satellite Wefax images.

Use CAPTURE to schedule, capture, and save both geostationary Wefax and polar orbiter APT images for later viewing with the VIEW function.

Setting Up The Scheduler

To set up the scheduler, click the mouse on the Scheduler button located in the menu bar at the bottom of the screen, or enter 'H' from the keyboard. The Scheduler window will open (Figure 39).

Functions within the Scheduler window include:

Event A unique number ranging from 0 to 199 that refers to each scheduled event. Depressing an event number allows the event parameters to be modified. More than one event can be selected for modification at one time. This can be used to save time when setting parameters that are common to several events.

NOTE: Click the mouse on the Event number to select that line. No changes can be made to the scheduler unless one or more Event lines are selected.

Day Determines which day or days this event will be active. This can be set to any day of the week. If All is selected in this field, the event will occur every day at the designated Start and Stop time.

Start The start time that the scheduler begins to look for image to be transmitted.

Stop - The time after which no new images will be captured. Any current image being captured will be completed if it spans beyond this time.

Repeat Determines whether or not to capture a scheduled event the first time it is scheduled, or every day it is encountered.

NOTE: If Repeat is set to Yes, the Event will occur every week at the Day selected. If set to No the Event is captured only once, on the first occurrence of the Day selected, and the Event line is cleared.

Config Specifies which satellite is received and the directory where the image file is saved. See the “Overview” chapter for instructions on setting configurations.

Clear Clears all selected Event lines in the Scheduler. Use this to erase a line when it is no longer needed.

Next Displays the Next page of the scheduler.

Prev Displays the Previous page of the scheduler.

Done Saves the scheduler information and closes the scheduler window.

Example Scheduler

In the following example, the scheduler is set to automatically capture the GOES-8 Operations Schedule and the four full disk infrared transmitted each day. Figure 39 illustrates the setup in this example. *All times are specified in UTC!*

Important Note! The scheduler must be set using UTC times, not your local time!

The Operations Schedule is sent in two images sent at 10:54 UTC and 10:58 UTC. Since these times are consecutive, we can tell the scheduler to capture all images in this time range. In this case, setting the Start time to 10:53 and the Stop time to 10:59 will capture both of the desired Operations Schedule images.

Normally, you should set each event in the scheduler to start one minute before the image is transmitted and the stop time to one minute after transmission has begun. Once Qfax has begun receiving an image, it will complete receiving the entire image.

The second grouping in the scheduler (Events 2-5) sets up the schedule to capture the four full disk infrared images. Transmission times for these images are:

01:50 UTC

07:22 UTC

13:46 UTC

19:22 UTC

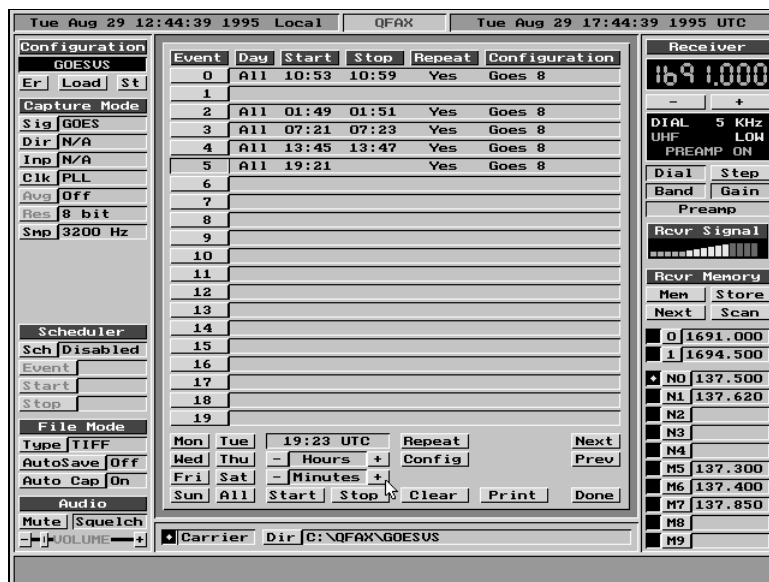


Figure 39 Configuring the Scheduler

Notice that for each transmission time entered into the scheduler, the Start is set one minute prior to transmission time, and the Stop time is set to one minute after transmission time. This provides a window that compensates for errors in the computer's clock or slight variations in transmission time starts. Since we wish to receive these images each day for each Event, Day is set to All, and Repeat is set to Yes. Also, since the source for all images is the GOES-8 satellite, the configuration for each time slot is set to GOES-8.

Shortcut: You can press more than one event button at one time. This allows you to set the same parameter for multiple events in one operation. In example Figure 39 above, Event buttons 0, 2, 3, 4, and 5 were all pressed On. Then using the mouse, the All button was pressed at the bottom of the screen, followed by the Repeat button. Finally, the Configuration button was pressed and GOES-8 was chosen. In this way, for all of the events 0, 2, 3, 4, and 5, the day was set to All, Repeat was set to Yes, and the configuration was set to GOES-8 in one operation. The Start and Stop times were set individually.

Once all parameters are entered, select the Done button to close the scheduler window.

Note: These scheduled events were in effect at the time this section was written. Wefax schedules do change relatively often. Do not assume that the times for these events are accurate now! Refer to the current Operations Schedule transmitted from the satellite or a Bulletin Board for the current schedule.

Scheduler Activation

Once a schedule has been established, the CAPTURE Scheduler can be used to capture the scheduled images in an unattended mode:

1. Set the DOS clock to the correct time (if needed).
2. Run Qfax.
3. In the Scheduler window, toggle the Sch button until Enabled is displayed to the right of the button.

Images will now automatically be captured and saved to disk according to the Schedule.

Do not manually initiate CAPTURE mode if you wish to use the scheduler. The scheduler only works if it can initiate capture mode.

Audible Beep Warning Insufficient Disk Space

Note: If there is insufficient disk space to save an image, CAPTURE will generate an audible Beep when it attempts to save the file. The scheduler will continue to capture

images, but will not be able to save them to disk until adequate space has been made available on the drive. This is the only condition that generates the audible beep.

Chapter 5 - Predict Operation

General Description

The Qfax PREDICT function provides satellite prediction, tracking, and APT data capture in an easy to operate, fully integrated format. PREDICT is a full implementation of the SGP4 model and is intended to be used to track and acquire data from polar orbiting satellites. The SGP4 prediction model is accurate for all low altitude satellites such as the NOAA series. Although the program allows satellites to be entered which are not strictly covered by this model, such as geosynchronous satellites, the accuracy of the predicted position is decreased since deep space perturbations are not accounted for.

As shown in Figure 40, PREDICT simultaneously predicts the location and acquisition times of up to eight satellites in the Tracking Windows. It also provides both a graphical and tabular view of the satellite Nadir (sub-point) on both a world scale map and a local area "zoom" map centered around the user's location. During data acquisition, a "quick look" of the incoming image is provided on screen, as shown in Figure 46.

PREDICT can be run from the MS-DOS prompt by typing:

```
qfax /p<Enter>
```

Creating A Map Overlay For NOAA Orbiters

Polar orbiting weather satellites do not transmit images with map overlays (such as seen on GOES geostationary Wefax images). The lack of map overlays can create quite a problem on days when land features are obscured by clouds, since no reference point can be found in the image. Qfax overcomes this limitation with its ability to create map overlays for NOAA polar orbiting weather satellites.

PREDICT captures the satellite images and automatically stores them on the hard drive. The saved file contains the image, satellite identification, and the time stamp for the pass. This information is required to create a map overlay.

Once a NOAA image has been received and stored, a map overlay for the image can be created from the VIEW function. Refer to the "VIEW" chapter for complete details of generating a map overlay.

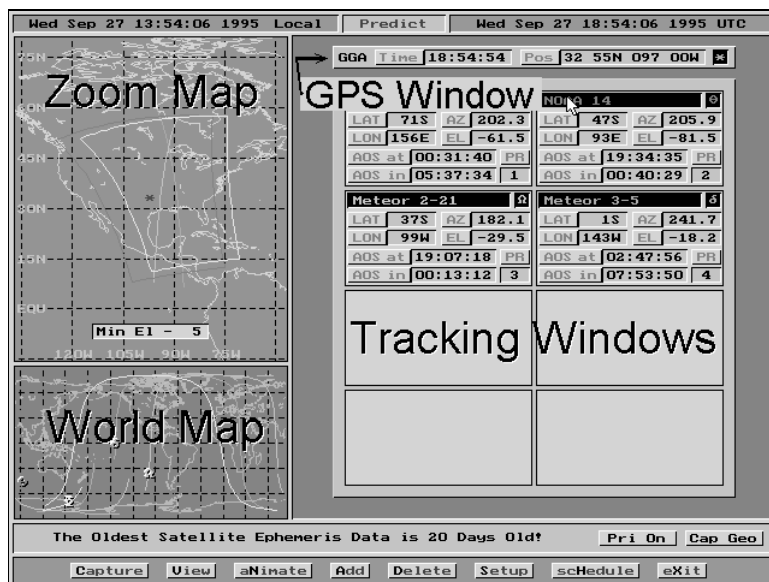


Figure 40 Initial PREDICT Tracking Screen

Predict Files

The following files must be located in the directory in which the Qfax program is installed:

MAP.DAT	World map database
ELEMENTS.DAT	Satellite Ephemeris data file

You also have other files present, but the two above are required for PREDICT to function properly. During operation, PREDICT creates several other files it requires:

SATS.DAT	List of satellites being tracked
WORLD.MAP	World map showing specified satellite locations
ZOOM.MAP	Zoom of area around location specified in location.dat
LOCATION.DAT	Variables describing location of the Qfax station.

Predict Menu Bar

PREDICT prints the currently valid commands in a menu window at the bottom of the screen. To select a command with the mouse, place the mouse cursor over the desired button, and push the left mouse button. From the keyboard, each command is activated by pressing the letter in the command button that is both capitalized and black. Upper or lower case letters can be entered for commands.



Figure 41 PREDICT Menu Bar

From within PREDICT, the user can move to the other function screens of CAPTURE, VIEW, and ANIMATE, as well as exit the program to MS DOS. The user can also add or delete satellites from the tracking/capture list, change station location information, and obtain future satellite scheduling information.

Setting Station Location And UTC Offset Information

Whenever PREDICT is started, it looks for the file "location.dat". This file holds information unique to the location where the Wefax APT receiving station is located, including longitude, latitude, height above sea-level, and the time offset in hours from Greenwich, England. If "location.dat" is not in the same directory as the Qfax program, the first time you enter the PREDICT function, you are forced into the Edit Location process. Until you edit the variable, the variables are automatically set to zero.

You can manually update your location information at any time from the main PREDICT menu by pressing 'S' for Setup. An additional menu is printed.

To change the settings of the "location.dat" file, refer to "Initializing Local Station Information" in the Installation chapter of this manual for detailed instructions on setting location variables.

If the system has a Global Positioning System (GPS) receiver connected and properly configured, Qfax will automatically acquire the longitude and latitude, and update the "location.dat" file (see the "GPS TO RS232 INTERFACE" section later in this chapter for GPS installation and setup instructions). The system clock will also be set to the time indicated by the GPS receiver, with the exception of the period +\20 minutes from local midnight. This constraint is added to prevent the computer system from failing to advance the calendar at midnight. Also, note that the date is not updated by the Qfax software.

Setting Minimum Elevation

PREDICT allows the user to set a minimum elevation for receiving satellites. This elevation ranges from 0 to 25 degrees. When a satellite reaches the preset minimum elevation, the receiver is activated and data is captured. This minimum elevation effects both AOS (Acquisition Of Signal) and LOS (Loss Of Signal) of the satellite pass. This feature can be used to eliminate noise caused by fading at the horizon and to save disk space.

To set the minimum elevation from the PREDICT menu, select 'S' for Setup, then press 'M' for Minimum Elevation. The prompt "Enter Minimum Elevation" will be displayed in the lower command window. Enter the desired elevation in the range of 0 to 25 degrees. Once the Minimum Elevation is selected, the Zoom Map will be redrawn with the satellite tracks reflecting the new AOS and LOS. A display box in the bottom of the Zoom Map displays the Minimum Elevation.

Entering Satellites

Add Satellite Command

The right side of the PREDICT screen contains eight windows which display information for each of the satellites PREDICT is tracking (see Figure 40). The Qfax Program disk is provided with some active satellites already setup in the Tracking Windows. Additional satellites can be entered from within the PREDICT function by using the "Add" command.

Press 'A' to add a satellite to the active tracking list. If at least one of the eight satellite windows is empty, the "Add Satellite" dialogue box (Figure 42) will appear in the upper left hand window. This box displays the names of the satellites present in the "elements.dat" ephemeris data file. If none of the windows are empty, PREDICT displays the following message:

No Space Available! Delete a Satellite First!
Press a key

When this message is displayed, you must delete one satellite from the list before you can add a new one (see the "Delete Satellite Command" section, below).

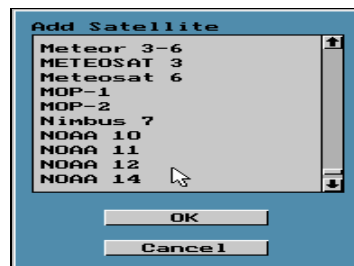


Figure 42 Add Satellite
Selection Window

To Add a satellite:

1. Check to be certain that a configuration exists for the satellite to be added (PREDICT cannot receive images from a satellite without a configuration). If a configuration does not exist, go to the CAPTURE function and create a configuration for the satellite (see "ADDING/CHANGING SATELLITE CONFIGURATIONS" in the CAPTURE chapter for instructions). If you Add a satellite that does not have a configuration saved, the Satellite's name window will be gray instead of the color, and no images can be received or saved.
2. Press the left mouse button on the up and down arrows, until the satellite you wish to add is displayed in the window.
3. Place the mouse cursor over the selection as shown in Figure 42, and press the left mouse button to highlight the new satellite.
4. Double-click the selected satellite with the mouse, or select the OK button to complete the selection. The new satellite tracking information will appear in the first empty window.

The eight satellite windows are prioritized from 1 to 8, with the upper left window having the highest priority and the lower right window having the lowest priority. The priority number is displayed in the lower right-hand corner of each Tracking Window (see Figure 43). The satellite priority is used to determine which satellite is received if

more than one is visible at the same time. When adding satellites, place the satellite with the highest priority in window 1, the next highest position in window 2, and so on.

If any errors are found in the ephemeris data for a satellite, an error message is printed. Replacing the ELEMENTS.DAT file with a valid up-to-date copy will correct most problems.

Delete Satellite Command

To delete a satellite from the satellite tracking window:

1. Position the mouse cursor over the Delete button on the menu bar.
2. Press the left mouse button (from the keyboard, hit the 'D' key).
3. The following message will be printed in the dialogue window located above the menu bar:

Press LEFT mouse button over satellite to delete

4. Place the mouse cursor in the tracking window of the satellite you wish to delete and press the left mouse button.

The satellite will be deleted, and normal PREDICT operation will resume.

Moving A Satellite To A Different Window

To move a satellite's tracking information to a different window:

1. Place the mouse cursor over the satellite you wish to move.
2. Press the left mouse button and hold it down. A hand shaped mouse cursor will appear while the button is pressed.
3. Move the mouse until the hand is located where you want the satellite to be positioned.
4. Release the mouse button.

If you move a satellite to a position occupied by another satellite, the satellites will be swapped in their window locations.

Qfax automatically saves changes you make to the tracking windows when you exit the PREDICT function.

The Satellite Tabular Display Window

PREDICT displays the satellite tabular display window (see Figure 43) when none of the satellites specified in the table are within reception range of the station (If a satellite is within range, and data is being received, then this window is used to show a sample of the received image). At the top of each satellite window within the tabular display is

the satellite name, and to its right is a symbol which is used to display the satellite location on the World and Zoom maps. Each satellite is displayed in a different color and with a different symbol. The color of the satellite's name indicates whether or not a configuration exists for the satellite:

Color satellite name: a configuration file exists for this satellite.

Gray satellite name: no configuration file exists for this satellite.

As shown in Figure 43, the next two lines below the satellite's name show the current satellite position in nadir latitude (LAT) and longitude (LON), and direction relative to the station's location as indicated by Azimuth (AZ) and Elevation (EL). The Azimuth and Elevation point toward the satellite from your location. When the satellite is not visible (elevation < 0 degrees) the Elevation is shown as a negative number.

Below the latitude/longitude and Azimuth/Elevation data box pairs are two additional lines that display either the next time of satellite signal acquisition or loss of signal time. If the satellite is not currently visible, these lines display the next AOS (Acquisition Of Signal) time in UTC ("AOS at" legend on the screen) and the length of time until this occurs ("AOS in" legend). If a satellite image is being captured, these lines display the next LOS (Loss Of Signal) time in UTC ("LOS at" legend) and the length of time until LOS occurs ("LOS in" legend) as shown in Figure 44.

The information in this display updates as often as the speed of the CPU allows.

Satellite	LAT	LON	AZ	EL	AOS at	AOS in	LOS at	LOS in
NOAA 14	69N	116W	348.6	-8.1	21:23:10	01:27:19		
NOAA 12	64N	31W	31.3	-17.9	00:44:48	04:48:57		
Meteosat 2-5	2N	53E	44.6	-65.5	04:44:49	08:48:58		
Meteosat 2-21	50S	85W	172.0	-37.6	20:14:54	00:19:03		

Figure 43 PREDICT Tabular Display Window.

The Priority Number (PR)

To the right of the AOS / LOS is the priority (PR) for the satellite that is being tracked. This priority number indicates which satellite takes precedence when more than one satellite is visible. Priority 1 takes precedence over 2, 2 over 3, and so forth. When a satellite with a higher priority appears while a satellite image with a lower priority is being received, the lower priority satellite's image data file is closed, the receiver switches to the configuration of the higher priority satellite, and the image from the higher priority satellite is captured, displayed, and saved.

Satellite	LAT	LON	AZ	EL	LOS at	LOS in	PR
NOAA 14	53N	106W	345.7	8.0	20:00:30	00:00:55	1

Rcvr Signal: [Green Bar Graph]
Frequency: 137.620

Figure 44 PREDICT LOS Information During Capture.

To move a satellite to a different priority, move it to the window with the desired priority number (the window in which a satellite is located determines what priority it

has). Move satellites using the instructions found in “*Moving A Satellite To A Different Window*” in this chapter.

The Priority Button

The Priority Button is used to enable or disable the Priority feature in PREDICT. When enabled, higher priority satellites interrupt lower priority satellite image captures when two or more satellites are simultaneously visible. The Priority button is used to prevent a lower priority satellite image from being interrupted by an upcoming higher priority satellite. The Priority feature can be toggled off or on.

To toggle the priority function on or off, click the left mouse button on the PRI On / PRI Off button or ALT+P from the keyboard. Turning Priority off forces Qfax to complete the current satellite pass.

The CAP GEO Button

Geostationary satellites can be captured using the PREDICT function. To capture a Geostationary satellite from PREDICT:

1. A configuration must exist for the geostationary satellite. If one does not exist, add a configuration using the CONFIGURATION function (see the “ADDING/CHANGING SATELLITE CONFIGURATIONS” in the CAPTURE chapter for instructions).
2. ADD a geostationary satellite in the lower right hand box.
3. Select the CAP GEO button by placing the mouse cursor over the button, and press the left mouse button.

Geostationary images are captured when no higher priority satellites are visible. When

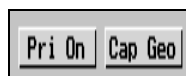


Figure 45 Priority and Capture Geostationary Buttons

another satellite of higher priority becomes visible, the configuration for the higher priority satellite is loaded, and the image is captured. When the higher priority satellite is no longer visible the geostationary satellite configuration is loaded and geostationary imagery will again be captured.

All image files are saved to the hard disk since PREDICT automatically enables Auto File Save.

Because there is only one receiver in the hardware, Qfax can only capture one satellite at a time. Serious users can alleviate this situation by installing a second system. In a

two system configuration, one system is typically dedicated to Polar Orbiters and the second to Geostationary satellite image animation.

Satellite Configurations for PREDICT

PREDICT uses satellite configuration information in order to set up the parameters required for satellite reception. PREDICT must find a configuration file for the satellite being tracked. For example, if PREDICT is tracking a satellite named NOAA 14, there must be a configuration file saved for NOAA 14 in order for the program to receive and save images. The configuration files exist in the Qfax directory in the format of QFAXnnnn.CFG (nnnn is a sequential number). If Qfax cannot find a matching configuration, PREDICT does not know how to tune the receiver, what capture mode to use, and no data can be saved.

Detailed instructions for establishing or changing satellites can be found in the “CAPTURE” chapter of this manual. The following notes should be kept in mind when setting satellite configurations for PREDICT use:

- The receiver frequency must match the transmission frequency of the named satellite.
- The preamplifier must be set to On.
- Gain should be set to HIGH.
- Band must be set to VHF.
- All orbiters must be configured to the appropriate Signal Type (NOAA for U.S. satellites and Meteor for Russian satellites).
- The direction (ascending or descending) need not be set because PREDICT automatically determines direction.
- Clock should be set to PLL (Phase-Locked Loop) for NOAA satellites to prevent the images from tilting to the side and OSC (oscillator) for Russian satellites (except Meteor 3-5 and later satellites where the image is phase-locked to the carrier frequency).
- The name of the satellite in the ephemeris data file “elements.dat” must match the name given the satellite in the configuration file. A common error is to use dashes improperly, i.e., NOAA-12 instead of NOAA 12. The names must match exactly!
- Smp (Image Sampling Rate) can be set according to preference:

Sample Rate	Sample Application Notes
3200 Hz	For minimum file size. This is the native 800 x 800 format for GOES & Meteosat.
3600 Hz	Provides a good compromise of smaller file size than 4096 or 4800 sample rates, yet maintains pleasing

	aesthetic appearance.
4096 Hz	Optimal square pixels for NOAA satellites.
4800 Hz	For maximum resolution and largest file size.

Table 10 Sample Rate Application Notes

Updating Ephemeris Information

Up-to-date satellite ephemeris information is necessary for accurate prediction and operation of PREDICT. To update the ephemeris information, obtain a new ephemeris data file. Replace the existing elements.dat file with the new data file. It is not necessary to remove any mail headers or other extraneous information from the file. PREDICT will locate the valid data and skip over any other data.

PREDICT uses 2 line element sets in standard NORAD format. This data is intended for use with SGP4 prediction models. Ephemeris data can be obtained from the following sources:

Quorum BBS: (214) 915-0346
 Quorum on Internet: ftp.qcom.com directory: pub/elements
 Ephemeris filename: *elements.dat*

Celestial Bulletin Board

BBS phone number: (334) 409-9280
 Internet address: archive.afit.af.mil directory: pub/space
 ephemeris filenames:
 tle.new (updated daily, contains weather & other satellites)
 weather.tle (updated weekly, weather satellites only)

These files must be renamed to "*elements.dat*" for use by Qfax!

AMSAT formatted ephemeris data file usage: Some program features will not work properly with AMSAT formatted ephemeris data files. Since NORAD formatted files are readily available, NORAD formatted files should be used exclusively!

Quorum can not assist with information about how to access bulletin boards and how to download files. Many fine sources of information can be consulted for help in this area. Refer to your modem manual, your telecommunications software manual, or other related books for more information.

The DOS Clock

PREDICT uses the DOS clock to compute AOS, LOS, and current satellite position. The DOS time is also included in the data files written during a satellite pass. This time data along with the ephemeris data of the satellite is used by Qfax NAVIGATE function to generate map overlays. The accuracy of the time stored in the file directly effects the accuracy of the overlay. You should check your DOS clock *daily* using

WWV or other accurate time sources. There are shareware programs that use a modem to call the NBS (National Bureau of Standards) to correctly set the computer clock. For automatic time correction, use a GPS receiver (see "GPS TO RS232 INTERFACE" section in this chapter for details).

Capturing APT Data

Once a satellite becomes visible in the PREDICT function, Qfax tunes the Receiver to the correct frequency, and a "quick look" image display window is opened on the right side of the screen (Figure 46).

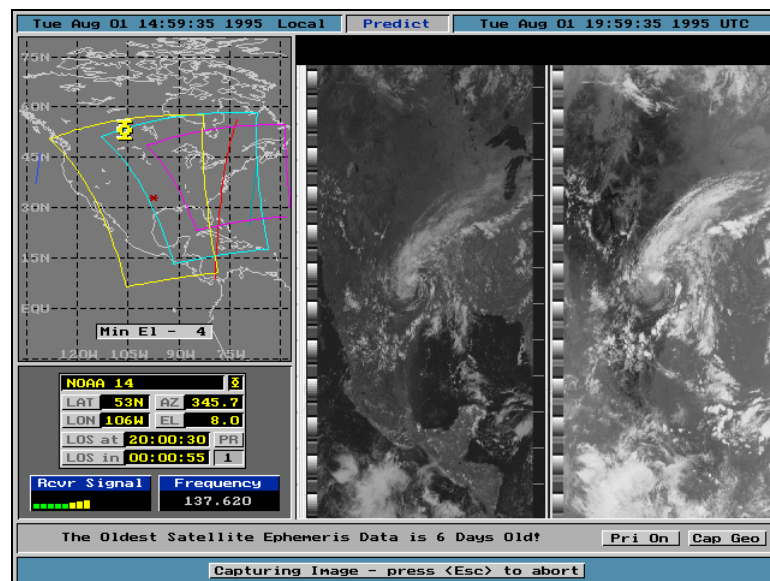


Figure 46 PREDICT NOAA Capture in Progress

At the bottom left side of the screen, under the Zoom Map, the current satellite location data is displayed in a format identical to that displayed in the tabular display window.

If at any time during data capture, a higher priority satellite becomes visible or is about to become visible, PREDICT saves and closes the current data file, aborts the current capture and awaits the higher priority satellite before re-entering Capture mode, unless the Priority button is pressed.

The World Map

At the lower left of the display screen is a map of the world which is generated using the longitude and latitude location specified in the "location.dat" file. The world map has longitude and latitude grids located at 30 degree increments. On the map, the predicted track for the next 110 minutes and the current location for each of the active

satellites is plotted. The current location of satellites updates continuously. The predicted orbital path line is updated every 10 minutes.

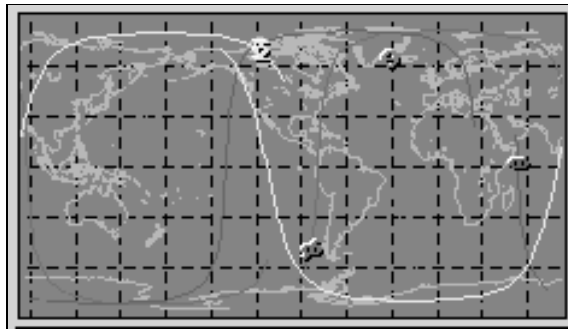


Figure 47 PREDICT World Map

The world map is useful in determining if the satellite will pass over your location within the next orbit. NOAA satellites have an orbital period (the time it takes to go around the earth one time) of approximately 102 minutes.

PREDICT also updates the world map any time a satellite is added or deleted. If PREDICT is plotting new tracks on the world map, it can be interrupted by pressing any key. PREDICT will resume plotting the tracks after a period of no keyboard activity.

The Zoom Map

A map centered on the receiving station's location is drawn on the left upper side of the display screen. The center of the map is located at the longitude and latitude specified within the current "location.dat" file, unless you latitude would cause the top or bottom of the map to exceed 90°. A red "*" indicates the location of the Wefax station of the zoom map. If you have not entered information for your location, detailed instructions for changing the variables are located in the "Initializing Local Station Information" of the Installation section of this manual.

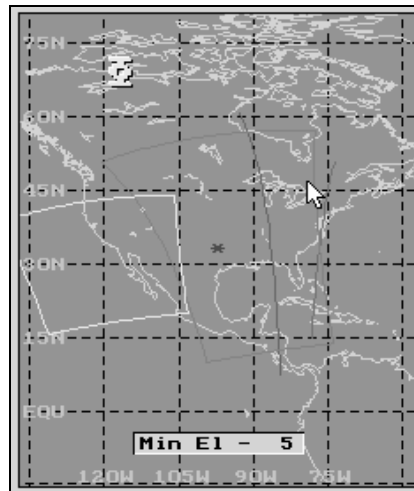


Figure 48 PREDICT Zoom Map

The area covered by the zoom map is generally the area in which NOAA satellites are visible to your receiving station location. At higher latitudes, a NOAA satellite may be visible but not be within the area in the map.

On the zoom map, the track of each of the active satellites for the next pass is plotted. These tracks correspond to the AOS to the LOS times in the satellite tabular windows. The ground track of each of the active satellites for their next pass within the area of the map is shown using two methods: A box showing the ground coverage of the satellite's scanners is plotted for NOAA satellites, and for all non-NOAA satellites, a line describing the nadir path (the point on the surface of the earth directly below the satellite) is plotted. These tracks are updated any time a satellite is added or deleted, or when a satellite transitions from being visible to not visible.

If a satellite nadir is located within the area of the zoom map, the corresponding satellite symbol is plotted on the zoom map and updated in real time. While capturing data, the predicted satellite track and current position is continuously displayed in real time while data is saved.

Generating A Schedule For Orbiters

A schedule of satellite acquisition times can be generated by the PREDICT function. Output from this feature can be directed to the system printer or routed to the CAPTURE "schedule.dat" file for use by the CAPTURE scheduler. Acquisition times sent to the scheduler file do not write over existing schedule events.

Adding orbiter information to the CAPTURE scheduler allows both orbiters and geostationary satellites to be received and stored by the CAPTURE scheduler. Since the new schedule sends information on all satellites for the specified time period, it is usually desirable to manually edit the CAPTURE Scheduler in order to delete passes of satellites that are not of interest.

Tracking Accuracy

During data capture, PREDICT writes information to the satellite's image data file that allows NAVIGATE to accurately calculate and place the latitude, longitude and Geopolitical boundaries on the image as a map overlay. The method used generates the most accurate overlay possible, but is very sensitive to errors in time, station location specifications, and ephemeris data. Accurate navigation requires that the following items are accurate:

Accurate time Probably more critical than any other item, *your PC clock should be accurate to the nearest second or better*. Several tools are available to aid in setting the PC clock accurately. There are several shareware programs available from on-line services that utilize a modem connected to the computer. The program dials the National Bureau of Standards and uses the data provided to set the PC clock. Receivers are also available that receive the National Bureau of Standards WWV radio station broadcasts. Finally, GPS receivers obtain accurate time information and which can be interfaced to the computer for automatic time updates, as well as providing accurate station location information. Refer to the "GPS to RS232 INTERFACE" section in this chapter for details on the GPS interface.

Accurate ephemeris The satellite ephemeris data file "elements.dat" should be updated at least one a month. Refer to "UPDATING EPHEMERIS DATA" in the next section for instructions in obtaining and installing this data.

Accurate location information Latitude and longitude entered in the Setup option of the PREDICT screen should be accurate to 1 arc minute, and station altitude (above sea-level) should be accurate to within 300 meters (984 feet). Refer to "Initializing Local Station Information" located in the "Install" chapter of this manual for detailed station setup instructions.

GPS and the GPS Status Bar

GPS (Global Positioning System) consists of a number of satellites in earth orbit that transmit information to GPS receivers. From the GPS information, the receiver determines its position, altitude, and other navigational parameters. When a GPS receiver is properly connected to a computer running Qfax, the GPS Status Bar (Figure 49) is displayed above the Tabular Display Window. This bar displays time and location data as determined by the GPS receiver. This is useful for mobile installations and for those who desire automatic time acquisition. The GPS status bar does not function unless a GPS receiver has been connected to the system's RS232 communications port. Under setup NMEA0183 in the PREDICT screen you can choose Com1 Com4 as the communications port.



Figure 49 GPS Status Bar

In PREDICT, GPS status is indicated by the presence of an asterisk in the GPS Status:

green '*':	GPS reception is functional.
red '*':	Signal reception is OK, but the required data is not present or recognizable.
If no '*':	Press the '\$' key. This will cause the dialog bar at the bottom of the screen to print the data stream in the List Box below the image window (see Figure 50). This feature ONLY displays the sentence type chosen in "setup Nmea0183." If no data appears, then either the no data is being received by Qfax, or the specified sentence type is not being sent. Review the "GPS TO RS232 INTERFACE" section and correct any errors.

Table 11 GPS Status Indicator

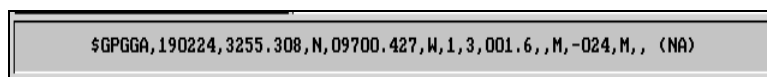


Figure 50 Qfax Selected GPS Sentence Data Display

WHAT IS NMEA0183?

NMEA stands for National Marine Electronics Association and 0183 is the number of a particular standard for transmitting information. NMEA0183 is a communications

standard used between information servers and users. Certain GPS devices utilize this standard to transmit time and location information. This particular information is of use to some Qfax users, especially those using Qfax to receive polar orbiting weather satellites in a mobile marine environment or those who desire automatic time information.

If you would like more information about the NMEA0183 standard, please request specifications from:

Robert Sassaman
NMEA Executive Director
P.O. Box 50040
Mobile, AL 36605
U.S.A.

FAX: (205) 473-1669

GPS to RS232 Interface

GPS Interface and Cable Assembly

Nmea0183 devices utilize the RS422 serial interface standard. IBM PC compatible computers utilize RS232 standard interface connections. Ideally, RS422 signals are interfaced to the computer's RS232 serial port through appropriate RS422 receivers and accompanying electronics. However, most GPS receivers can be connected directly to RS232 serial ports as shown in the following diagram:

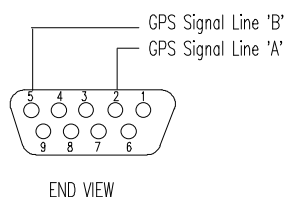


Figure 51 GPS to RS232 Interface

**SAFETY
WARNING!**

Connecting the GPS signal wires to the RS232 connector requires the use of a HOT soldering iron! If you are not comfortable with soldering operations, please refer this task to a knowledgeable technician. Observe proper handling and safety procedures during soldering procedures.

PC serial interfaces generally use DB-9 connectors. A female DB-9 connector (Radio Shack part #276-1538) and protective hood with strain relief (Radio Shack #276-1508) is required to interface to the computer's male DB-9 serial port connector.

Using the GPS receiver manual supplied with the receiver, carefully identify the signal line 'A' wire and the signal line 'B' wire. Carefully solder these two signal lines to the DB-9 female connector:

1. Solder Signal Line 'A' to pin 2 of the DB-9 female connector.
2. Solder Signal Line 'B' to pin 5 of the DB-9 female connector.
3. Place the protective hood over the connector.

The GPS shield wire should only be grounded at the GPS receiver end and not connected to the RS232 connector.

Testing GPS Serial Communications

Once the GPS to computer serial port cable has been fabricated, use the following procedure to verify that the computer is properly receiving the GPS serial data stream. This procedure requires the use of a PC serial communications program such as Procomm or Windows Terminal program.

Plug the DB-9 GPS serial cable into an open PC serial port.

Start the serial communications program.

Configure the port to 4800 baud, 8 bits, no parity, and 1 stop bit.

Data should start to appear on the screen as shown in Table 1. If data does not appear immediately, allow a few minutes for the receiver to determine its location. There may be times, especially in city locations, where there is an insufficient number of satellites visible for the receiver to determine its position. If data fails to show up after a brief delay:

1. Check to see that the GPS receiver is on and receiving.
2. If the receiver is functioning, but no data appears in the communications program, check the communications program settings to be certain the correct com port and the correct data format is selected.
3. Verify all cable wiring connections to the computer and receiver.
4. If everything is correct, try reversing the Signal Line 'A' and Signal Line 'B' wires on the serial port connector.

Once data begins to appear, it is necessary to determine what type of sentence the GPS receiver is sending to the computer. Qfax uses this information to determine which sentence to use and how to read the data in the sentence. Qfax derives the data it needs from GGA, GLL, OR RMC type sentences.


```

$GPGLL,3255.38,N,09700.44,W,185020,A
$GPGGA,185020,3255.380,N,09700.439,W,1,3,001.9,,M,-024,M,,
$GPVTG,000,T,354,M,00.0,N,00.0,K
$GPZDA,185020.31,28,09,1995,,
$GPGLL,3255.38,N,09700.44,W,185022,A
$GPGGA,185022,3255.380,N,09700.439,W,1,3,001.9,,M,-024,M,,
$GPVTG,000,T,354,M,00.0,N,00.0,K
$GPZDA,185022.34,28,09,1995,,

```

Table 12 GPS Raw Data Sample and Sentence Formatter Identification

Observe the data appearing on the screen. Hit the <PAUSE> key to freeze the screen if needed for viewing the information. Sentences begin with the '\$' character. The next two characters identify the type of TALKER, and can be ignored for our purpose. The next three characters identify the Sentence Formatter mnemonic code. Additional data follows the sentence formatter characters until a new line and carriage return end the sentence. In the data stream shown in Table 1, GLL, GGA, VTG, and ZDA sentences are being sent to the computer by the receiver. Since Qfax uses the GLL, GGA, and RMC sentence types only, record the GLL and GGA sentence types (shown double-underlined) as available for use in PREDICT GPS setup.

PREDICT Setup For GPS Use

Before the GPS information can be read and used by Qfax, the Qfax program must be setup so it knows which serial channel is connected to the receiver and the GPS sentence type being sent by the receiver. To initialize this information:

1. Run Qfax and go to PREDICT.
2. Select the Setup button on the bottom menu bar.
3. Select the "setup Nmea0183" button.
4. Enter a number 1-4 corresponding to which serial port the GPS serial cable is plugged into, and press the <ENTER> key.
5. Select the appropriate sentence type being sent by the GPS receiver:
 - 0 for GGA
 - 1 for GLL
 - 2 for RMC

Qfax is now set up for GPS use.

Qfax uses only the time, latitude, and longitude information supplied by the GPS receiver. Other GPS information is ignored.

On occasion there may be a field missing or bad data in the data stream. This may be due to the fact that the receiver is:

- Not receiving data from enough satellites
- Not getting good time information
- Not getting good position data.

It is not uncommon to have an insufficient number of satellites for position determination visible on occasion, although this is not very likely to occur in the ocean, since there are no terrain features to physically block satellite signals.

Audible Beep Warning Insufficient Disk Space

Note: If there is insufficient disk space to save an image, PREDICT will generate an audible BEEP when it attempts to save the file. PREDICT will continue to capture images, but will not be able to save them to disk until adequate space has been made available on the drive. *A lack of sufficient disk space is the only condition that generates the audible beep.*

Chapter 6 - View Operation

General Description

VIEW provides extensive image processing functions such as zoom, rotate, contrast, brightness, sharpen, smooth, noise filter, equalize, NOAA enhancement curves and more described in this section. You can view an image at up to 1280 x 1024 x 256 colors, and can choose to use TIFF, GIF, BMP, or PCX as the standard image file format. The proprietary “.QFX” file format allows the navigation map overlay containing latitude, longitude, coast lines, and geopolitical boundaries to be saved along with the image data. Qfax supports HP PCL and Epson 24 pin compatible printers.

This section describes each menu within VIEW, starting with the main menu. The VIEW menus are located at the top of the screen. Some functions open other menus with extended options. Every effort has been made to make the menu structure as user friendly as possible. This description gives an overview of each option and how it works. Use the following function descriptions as a reference while you use and become familiar with VIEW.

Starting View

From the MS-DOS prompt, type:

```
qfax /v<Enter>
```

to go directly to the Qfax VIEW function from DOS.

From the CAPTURE screen or any other Qfax screen, choose the VIEW option from the main menu. The opening screen of VIEW contains the main VIEW menu:



Figure 52 VIEW Menu Bar

Navigating through Menu Screens Using the Mouse

While in the VIEW function, you can select menu items with the mouse.

The left mouse button is used to select a menu option. Place the mouse cursor over the menu item you wish to select and press the left mouse button.

The right mouse button allows you to back out through any series of menus. From the main menu the right mouse button will turn the menu off for full screen viewing.

File

The file menu (Figure 53) contains commands that allow the user to load and save files, manipulate images, print image files, and delete image files. Select the desired function by locating the mouse cursor over the desired function and clicking the left mouse button.

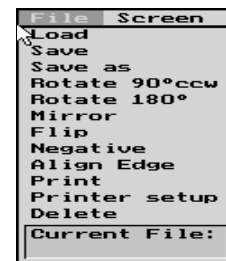


Figure 53 File Submenu

Load/Save/Save as Dialogue Box

Selecting the Load or Save As options from the File menu opens the following submenu:

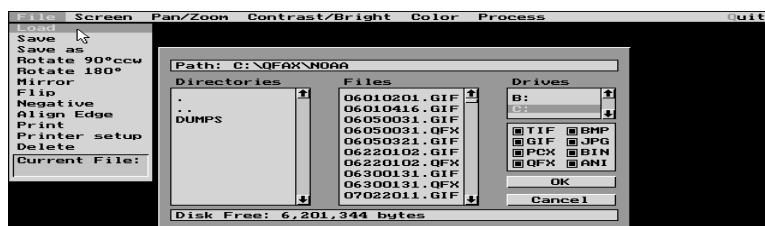


Figure 54 Load/Save/Save As Dialogue Box

The user can change directories from within the Directories Box. Double-click the right mouse button to select the desired option:

- ‘..’ changes to the parent directory of the current directory
- Select a displayed subdirectory to change to that subdirectory

To Load an image file:

1. Select the drive where the file is located.
2. Select one or more filename extension masks for displaying files.
3. highlight the desired filename and select the OK button
or
double-click on the desired filename.

If a file extension type box is selected (black interior), then the corresponding type of file will be displayed. In the Figure 54, files with extensions of TIFF, GIF, PCX, QFX, BMP, JPG, BIN, and ANI are selected and displayed.

NOTE: The “.QFX” format is a proprietary file format used by VIEW to store a NOAA polar orbiter image with the map overlay generated by the NAVIGATE

operation. Once a NOAA image has been navigated, the overlay can be saved with the image using the “.QFX” file format. This way you do not have to navigate an image each time you wish to view it. A “.QFX” image may be reloaded, zoomed, and processed.

This sub-menu also displays the available number of free bytes available on the selected drive.

Save

Stores the image to disk using the currently specified filename. Any time an image has been modified by any of the VIEW features (rotate, NOAA edit, etc.) Save must be used to store the changes. This will over-write the unmodified image! Use “Save as” to retain the old image and save the changes to a new file.

To save map overlays generated by NOAA NAVIGATE on NOAA images, the file must be saved with the “.qfx” file extension!

Save as

Saves the displayed image file to disk using the filename specified by the user in the filename line. The user can choose to save the file with any file extension shown in the extension box: GIF, TIFF, PCX, QFX, BMP, JPG, BIN, or ANI. Backspace over unwanted parts of the original file name, type in the desired filename with extension, and select the OK button with the mouse.

To save map overlays generated by NOAA NAVIGATE on NOAA images, the file must be saved with the “.qfx” file extension!

Rotate

Rotates the image 90° counter clockwise. Use the “Save” or “Save as” option to save changes made with Rotate.

Rotate 180

Rotates the image 180 degrees. Rotate 180 is used to correct images that are upside-down. This situation occurs when the direction is incorrectly set on a NOAA orbiter pass acquired by CAPTURE. Weather maps and Meteosat images sent on GOES satellites are also captured upside-down, since this is how they are sent on the Wefax transponder. Use the “Save” or “Save as” option to save changes made with Rotate 180.

Mirror

Mirrors the Image Moves left side to right, right to left. Use the Save or Save As option to save changes made with Mirror.

Flip

Move top to bottom, bottom to top. Use the “Save” or “Save as” option to save changes made with Flip.

Negative

Invert pixel intensities. Black becomes white, white becomes black, etc. Use the “Save” or “Save as” option to save changes made with Negative.

Align Edge

Resets the positioning of the edge of an image. When activated, a vertical line is drawn on the image. As the mouse is moved, the line moves left and right. Position the line with the mouse to the point for the new left image edge. Click the left mouse button. A new image will be drawn reflecting the new left edge position. When finished, use the “Save” or “Save as” option to save changes made with Align Edge.

Print

Prints the entire image file (the SCREEN Print menu option can be used to print only the image as it is displayed on the screen).

NOTE: FILE Print prints the entire file from the hard drive. SCREEN Print prints the image on the screen as it appears on the monitor.

- Use FILE Print to print the entire file.
- Use SCREEN Print to print the image as displayed on the monitor (see SCREEN menu).

Printer Setup

Opens the following dialogue box:



Figure 55 Printer Setup Dialogue Window

Select the options that match the printer's specifications by using the left mouse button. The following print attributes can be specified:

- Image rendering method scatter, halftone, or color (color printers only).
- Plotted image resolution in dots per inch (up to the printer's maximum resolution).
- When printing from the "File" menu, one of two palettes is available for use:

When the "Use the screen palette to print image files" box is *enabled*, the printer driver uses the existing screen palette settings, and the image presented on the screen is what will be printed. If the image is too light or dark, adjust BRIGHTNESS accordingly and print again.

When the "Use the screen palette to print image files" box is *disabled*, the original palette stored with the image file is used.

Screen Print *always* uses the current screen's palette.

Delete

Deletes the current file.

Current File

Displays the name of the currently load file.

Screen

The SCREEN menu is used to control the resolution used to display images, save and print the image as it is displayed on the monitor, and control pixel averaging and x-y coordinate readout box.

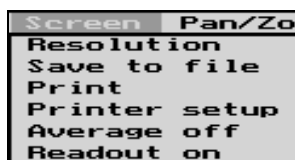


Figure 56 SCREEN Menu

NOTE: Screen Print prints the image on the screen as it appears on the monitor. This allows any image enhancements and overlays to be printed with the image. (FILE Print prints the entire file from the hard drive).

- Use FILE Print to print the entire file (see FILE menu).
- Use Screen Print to print the image as displayed on the monitor.
- Use Screen Print to print NOAA APT images with overlays generated by NOAA Navigate.

Screen Print is the only way to print a NOAA APT image with a map overlay generated by the NOAA Navigate option.

Resolution

This option allows the user to choose the desired screen resolution to be used by Qfax when displaying images. Allowable options are 640 x 480, 800 x 600, 1024 x 768, 1280 x 1024. The options are controlled by the type of video card and amount of video ram present in the system. If a video mode is selected that is not compatible with the system hardware, the monitor can become unreadable or scrambled. If this occurs, hold the left and right mouse buttons down together for 3 seconds to restore the hardware to the standard VGA 640 x 480 mode.

Save to file (Alt+S)

Holding down the <ALT> key while pressing 'S' key saves the current screen image as it is shown on the monitor to a disk file. This option saves any image enhancements and the current zoom view as shown on the monitor.

Use “Save to file” under the “Screen” menu *to save the image with enhancements* as it is displayed on the monitor:

To hide the View menu prior to choosing “File save as”, click the right mouse button, and press Alt+S on the keyboard. This hides the menu and then opens the Directories window.

To display NOAA temperature values for a given latitude and longitude,

1. Open the desired NOAA file.
2. Zoom to achieve the desired view.
3. From the NOAA Tools submenu, select “Lat/Lon On” to display the latitude and longitude windows (including the temperature display).
4. Position the cursor on the desired latitude/longitude on the infrared image frame. The temperature at this location is displayed in the “Tem:” windows.
5. Press Alt+S on the keyboard to open the Directories window.

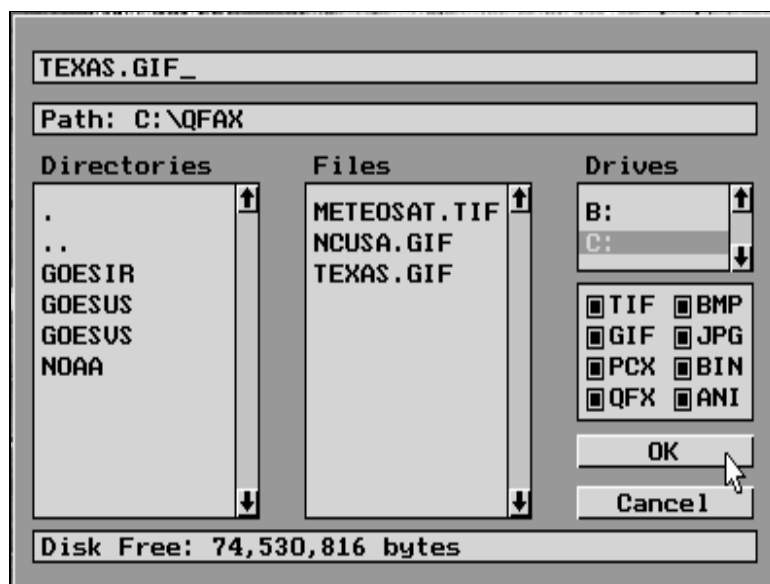


Figure 57 Directories Window With File Name Line

The directories box shown in Figure 57 opens when “File Save As” is selected. The file name line at the top of the directories window automatically proposes the current parent name of the image as the file name used to save the image displayed on the screen. In the example shown, the file “TEXAS.GIF” was previously loaded and enhanced, and “File save as” was chosen using Alt+S. Qfax proposes that we use the “TEXAS.GIF” file name to save the new enhanced image. This would overwrite the

original image file, however. In order to preserve the original image file, type in a new name as shown in Figure 58:

1. Backspace to erase the proposed name.
2. Type in a new drive or path (optional), and the new file name. The file format the file is saved as is determined by the file extension. Allowable choices include TIF, GIF, PCX, QFX, BMP, JPG (256 grayscale only, not 24 bit true color), EPS (Encapsulated PostScript) and BIN. ANI is not available from this function. Note that the EPS option does not appear in format type list in the Directories window.

JPG Note: Qfax only handles 256 grayscale images. Color enhancements will not be saved in this format since the image is converted to grayscale before saving. To save color enhancements, select any other supported file format.

3. In this case, the new drive and path is “c:\qfax\ncaa” and the new file name is “Texas3d.pcx”.
4. Click on the “OK” button when finished. The new file is written, and the Directories window closes.

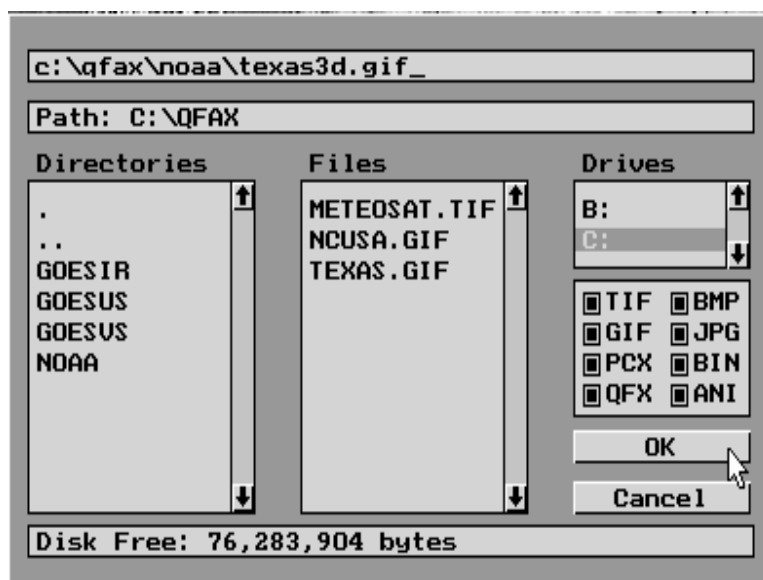


Figure 58 Ready To Enter A New File Name

Helpful hints for this option:

- This option does not save all of the data of the original image file, only the part which is displayed.
- It is generally best to use a new file name when using this option in order to avoid overwriting the original image data.

- A new drive, path, or file name can be entered, or the proposed default path (displayed in the “Path” window) can be chosen.
- To remove the menu so it is not saved in the file, click the right mouse button prior to using Alt+S.

Use “Save to file” under the “File” *menu to save the entire image file without enhancements*. This option saves the entire image in the format it is received and without any enhancements.

When “Save to file” is used under the “File” or “Screen” menu, the file name, type, path, and directory may be specified as desired.

Print (Alt+P)

Prints the current image as it is displayed on the monitor. Holding down the <ALT> key while pressing ‘P’ will print the current screen. This allows the cursor to be placed on the image and printed for reference, or allows the top menu banner to be turned off and excluded from printing.

To hide the View menu, prior to choosing “Print”, click the right mouse button, and press Alt+P on the keyboard. This hides the menu and then prints the image as shown on the monitor.

To display NOAA temperature values for a given latitude and longitude,

1. Open the desired NOAA file.
2. Zoom to achieve the desired view.
3. From the NOAA Tools submenu, select “Lat/Lon On” to display the latitude and longitude windows (including the temperature display).
4. Position the cursor on the desired latitude/longitude on the infrared image frame. The temperature at this location is displayed in the “Tem:” window.
5. Press Alt+P on the keyboard to print the image as shown on the monitor.

The graphics file format the file is saved as is determined by the file extension. As an example, a file named 10101344.pcx will be saved as a PCX format image file. A file named 10101242.gif will be saved as a GIF format image file.

Printer setup

Used to set up the printer for the SCREEN print function. See “FILE Printer” Setup for instructions on Printer Setup use.

Average on/off

Toggles screen pixel averaging off or on. Averaging pixels is useful when viewing images at less than a 1:1 zoom.

Readout on/off

Toggles the cursor x-y coordinates and pixel value readout off or on. The values are displayed at the bottom of the screen.

Pan/Zoom

Pan repositions the image on the screen without resizing it, and Zoom allows the user to resize the displayed image from zoom factors of 1 to 99.

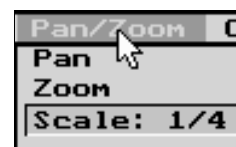


Figure 59 Pan/Zoom Menu

Pan

Pan repositions the image on the screen without resizing it. To Pan an image, select the Pan submenu with the mouse. An outline box with a '+' cursor in its middle will appear over the image. Position the cursor over the new center point, and click the left mouse button.

Zoom

Zoom allows the user to resize the image from zoom factors of 1 to 99. The result of each menu option is summarized in Table 13:

Menu Option	Zoom Function
IN	zoom IN x1
OUT	zoom OUT x1
ALL	zoom to image limits. Displays all of the image.
X1	jump to zoom x1
X2	jump to zoom x2
X4	jump to zoom x4
Box	See the "Using The Box Option In Zoom" section below.
SCALE: n/n	Display of the current zoom factor ratio (n/n)

Table 13 Zoom Menu Option Functions

NOTE: Each time you select ZOOM IN, 1X, 2X, 3X, or 4X, an outline box appears. As illustrated in Figure 60, the boundaries of the zoom box show the area to be included in the subsequent zoom of the image. To complete the zoom, position the box until it outlines the area you wish to enlarge, and click the left button. Each time you use ZOOM IN, the magnification of the image will increase by x1 until x99 is reached. ZOOM OUT will decrease the magnification by x1 each time it is selected. The 1X, 2X, 3X, or 4X settings zoom directly to the specified zoom factor.

The zoom process is illustrated in Figure 60, and the resulting image is shown in Figure 61.

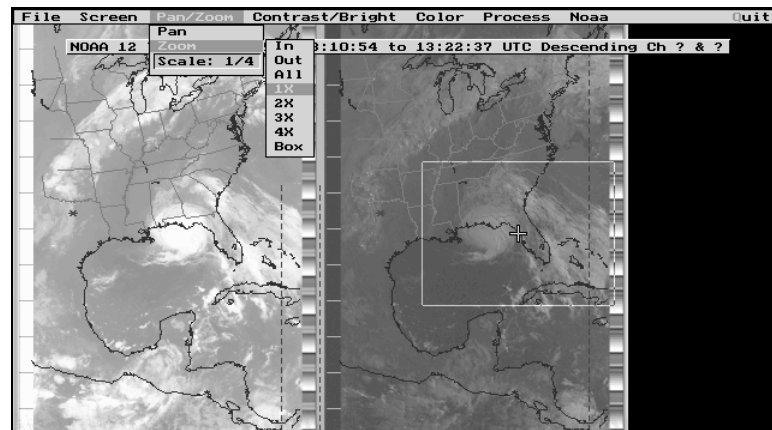


Figure 60 Zoom Outline Box Around Hurricane Erin.

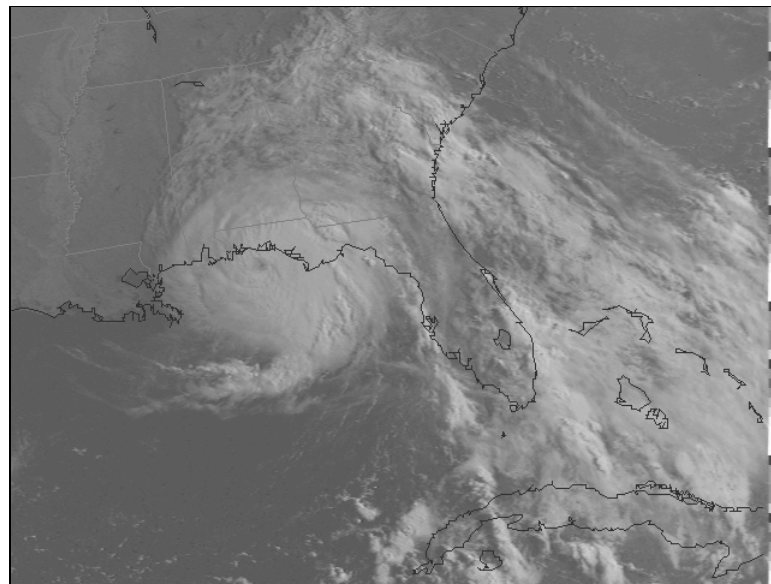


Figure 61 Resulting Zoom Image

Using The Box Option In Zoom

The Box option allows the user to draw a free-hand box on the displayed image. Zoom will select the proper zoom ratio and enlarge the image to show all of the area the user selected.

To create a zoom box:

1. Press the Box button on the Zoom Submenu.
2. Position and click the mouse on the beginning corner of the box. Now, as the mouse is moved, a box will be displayed.
3. Move the mouse until the box covers the area of the image to zoom.
4. Click the left mouse button. The stop-watch cursor appears and then the zoomed in image area is drawn.

In most cases, the Zoom Box displays more of the image than is originally selected because Zoom uses whole number integer ratios only. Therefore, zoom selects the ratio which includes all of the image selected, plus whatever amount of the image that is required to fill the remainder of the integer ratio zoom box area.

The next three figures illustrate the Zoom Box process and results. In Figure 62, the area of the image to zoom is selected:

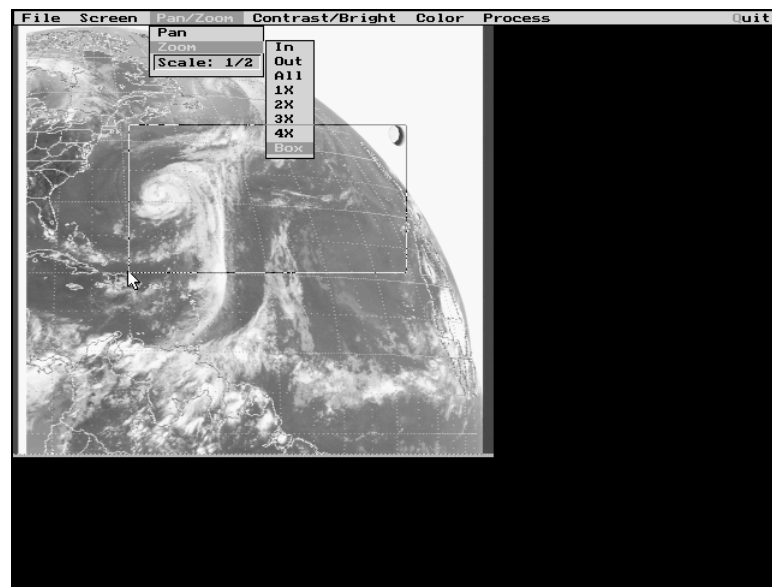


Figure 62 User Generated Zoom Box

Figure 63 shows the screen after the image has been zoomed. The resulting image includes all the area in the user zoom box, plus additional image areas not included in the user generated zoom box:

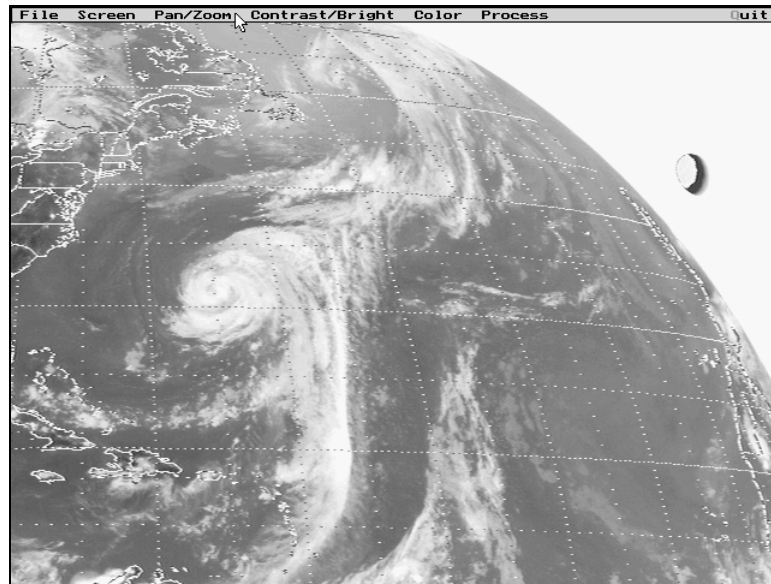


Figure 63 The Screen After Zooming

The reason additional area has been added is due to the fact that pixels are integer numbers. Since it is not possible to display a fraction of a pixel value, zooms must be done in integer steps, i.e., 1, 2, 3, etc. So the end effect of the user generated zoom is that the program selects the closest integer zoom factor, and enlarges the image by that increment. In this case, the next integer zoom factor is 1X, as shown in Figure 64. Since there is more area in the integer zoom factor than is in the user generated zoom box, the program includes image material surrounding the user generated box to fill in the additional area.

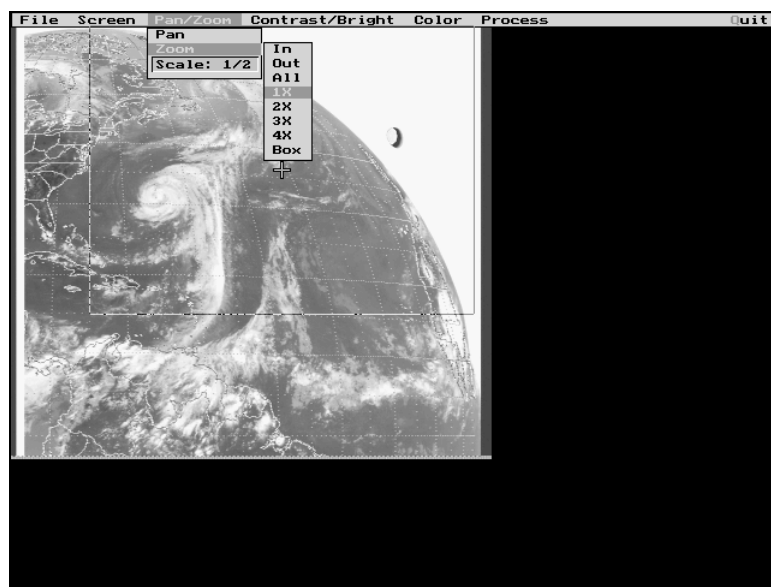


Figure 64 Resulting Zoom Image Is Same As 1X Zoom

Contrast/Brightness

The Brightness control in this window provides the controls necessary to adjust the brightness of the displayed image. The Low and High control the Contrast of the displayed image.



Figure 65 Contrast/Bright Adjust Window

The histogram graph in the top portion of the Contrast/Bright window depicts the distribution of pixels along the brightness scale. In this example, the majority of the pixels fall within the bottom range of possible pixel intensities. Since images are displayed in a 256 color grayscale, the possible pixel values range from 0 to 255.

The use of the Brightness, Low, and High adjustments can enhance image elements of interest, while suppressing other undesired spurious details. The results can be startling. Elements that are not initially visible in an image can be prominently highlighted using these functions. There are no empirical rules to use when enhancing features. It is best to simply try different settings while observing the image.

The Low, Reset, High, and Brightness controls perform the following functions:

BRIGHTNESS Increases/Decreases image BRIGHTNESS to a maximum value of ± 63

CONTRAST CONTROLS:

- Pixels below the Low value are displayed as black.
- Pixels above the High value are displayed as white.
- Pixels in between the Low and High settings are displayed in a linear grayscale.
- The Reset button sets the Low to 0 and High to 255 and restores the original image palette. Reset does not restore Brightness to zero.

NOTE: When adjusting BRIGHTNESS and CONTRAST, holding the left mouse button down over the DEC/INC buttons continuously increments the values. Pressing the button one time will sequence the count by one.

Color

The COLOR menu allows the user to Load saved palettes and Adjust the color settings of the current palette.

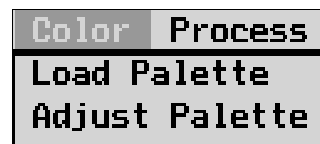


Figure 66 COLOR Menu

Load Palette

Loads and applies a user specified palette file. This palette remains in effect until the default grayscale palette or NOAA curve is activated. For example, if a color palette file is loaded, and the user goes to the ANIMATE function, the color palette will be used by ANIMATE until it is reset.

Adjust Palette

The Adjust Palette option allows the colors of the current palette to be changed, and is used to generate a new palette.

Each image pixel consists of a mixture of the primary colors Red, Green, and Blue. The amount of each of these primary colors varies numerically from 0 to 63. An image pixel that is black consists of a mixture of 0 Red, 0 Green, and 0 Blue. The most intense white is a mixture of 63 Red, 63 Green, and 63 Blue. The purest “Red” color would consist of 63 Red, 0 Green, and 0 Blue. Using these parameters, it is possible to construct 262,144 unique colors.

The display hardware limits the number of colors that can be displayed at any time to 256 colors out of the possible 262,144 colors. These 256 selected colors make up the current palette. Out of the 256 colors displayed, the program reserves a few of the upper colors for menu and text display use. This prevents menus and their text from disappearing due to palette manipulations by the user.

Once an image has been loaded, and Adjust Palette chosen from the menu, the mouse can be used to help adjust colors. When the mouse is located within the image:

Right Mouse Button - Clicking the left mouse button sets the color box to the value of the pixel pointed to by the mouse cursor. An arrow under the histogram and color scale in the Color Palette Adjust box also moves to the pixel value location. In Figure 67, the left mouse button was clicked on a pixel with an intensity of 150. If the Red, Green, or Blue values are changed within the left color box, all pixels with the intensity chosen assume the new color value set.

Right Mouse Button - Clicking the right mouse button sets the color box to the value of the pixel pointed to by the mouse cursor. An arrow under the histogram and color scale in the Color Palette Adjust box also moves to the pixel value location. In Figure 67, the right mouse button was clicked on a pixel with an

intensity of 150. If the Red, Green, or Blue values are changed within the right color box, all pixels with the intensity chosen assume the new color value set.

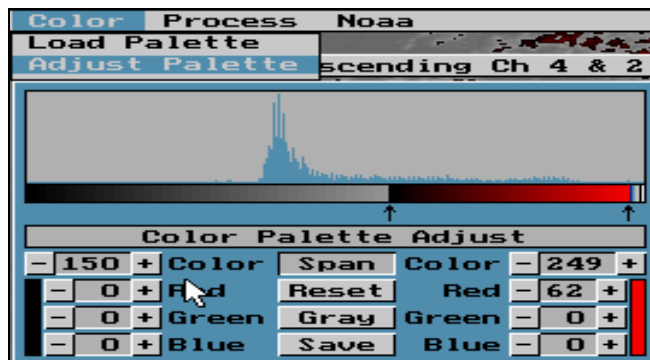


Figure 67 Adjust Palette Window

Span Button

A range of colors can be generated by setting the lower and upper color limits in the “Adjust Palette” window. There are two arrows that mark a range of the scale that will be effected by any color adjustments made. Initially, the numeric value in the left Color box corresponds to the pixel number of the left arrow. The numeric value in the right Color box corresponds to the pixel number of the right arrow. By clicking the mouse on the + and buttons on either side of each Color box, the value is increased or decreased. At the same time, the corresponding arrow moves along the scale to indicate the current pixel position (The span can also be selected as discussed in the preceding section using the right and left mouse buttons). The vertical box next to the Red, Green, and Blue adjust boxes shows the current color corresponding with each Color position. When Span is pressed, the color shifts from the lower color to the upper color selected within the span selected. In Figure 67, the color positions of 150 to 249 vary from black to pure red.

Starting from a gray scale, the following example is given to set the palette as shown in Figure 67. The color positions from 150 to 249 vary from black to a pure red when the adjustments are completed.

1. Select and adjust the left color number to 150. Use the mouse on the ‘+/-’ buttons to adjust the number until the left color box reads 150.
2. Adjust the Red, Green, and Blue color values below the left Color box with the mouse, until they all read 0.
3. Select and adjust the right color number to case 249. Use the mouse on the ‘+/-’ buttons to adjust the number until the right color box reads 249.
4. Adjust the Green, and Blue color values below the right Color box until they read 0. Adjust the Red color value until it reads 62.
5. Position the mouse cursor over the Span button, and press the left button to activate it.

6. Push the Save button to save the new palette to the hard drive.

Reset

Restores the previous palette that existed before adjustments are made.

Gray

Reset the palette to 256 color gray scale.

Save

Saves the colors selected to a palette file. Palette files end with the DOS file extension of “.plt”.

Process

The PROCESS menu includes functions that perform various image enhancement operations. Changes made by the Process menu items only change how data is displayed on the screen and consequently does not effect the actual image data.

Process	Noaa
Undo	
Filter	Smooth
Negative	Sharpen
Equalize	Sharpen Hard
NOAA Curve	Median
3D effect	Outline

Figure 68 Process Menu, Filter Submenu

Undo

Restores image to original data. Negates any changes made to the image in this PROCESS session.

Filter Submenu

Opens a submenu (Figure 68).

Smooth

SMOOTHing filter. This filter is useful for removing random noise shots from zoomed images.

Sharpen

Sharpens the contrast of the displayed image.

Sharpen hard

More severe form of the Sharpen contrast enhancement.

Median

Softens and smoothes the image by adjusting each pixel to the median value of neighboring pixels. This filter is useful for removing map lines from geostationary images prior to processing the image for 3D Effect.

Outline

Creates an outline picture. Brightest elements of the image become white outlines of areas, and darker areas are adjusted to black.

Negative

Inverts the video information. Black become white, whites becomes black, etc.

Equalize

Equalizes the distribution of gray scale values in an image. Histogram examination will often reveal that Infrared image pixel elements often lie within a narrow range of the palette. EQUALIZE processing spreads out the pixel elements to a wider portion of the available palette. This is useful in bringing out details that are otherwise lost.

NOAA Curve

When temperature differences in transmitted infrared images are small, it becomes difficult for the human eye to recognize significant cloud and surface features present in the images. The information may be present, but the observer cannot discern the features. Such phenomena includes convective weather features, haze, fog, ocean current boundaries, and terrain features. Image enhancement through the use of the built-in NOAA curves increases the contrast between targeted features and the backgrounds, which serves to make the features more apparent. The provided curves also serve as a convenient way to identify several different types of features within the images.

The NOAA curve submenu, accompanying histogram, and sample image are shown in Figure 69:

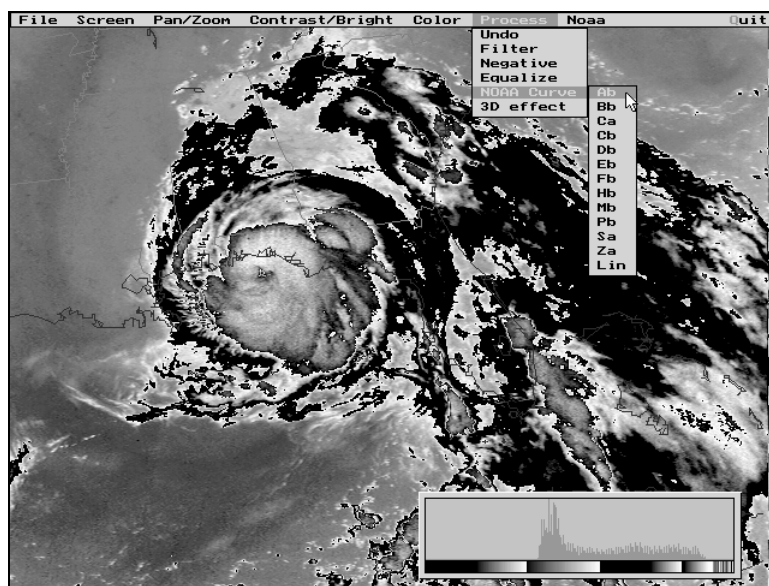


Figure 69 NOAA Curve Submenu

NOAA Curve Descriptions

Letter From Keyboard*	NOAA Curve Designation	Use
A	Ab	Hurricane Curve
B	Bb	Hurricane Pattern Recognition
C	Cb	Cold Cloud Tops
D	Db	Convective Activity
E	Eb	Middle Clouds & Convective
F	Fb	Hydrology Curve
H	Hb	Lower Clouds
M	Mb	All Season Clouds
P	Pb	Pacific Coastal Upwelling
S	Sa	Sea Surface Temperature
Z	Za	Lower & Upper Level Clouds
L	Lin	Reset to linear grayscale

*During the Animate function, the corresponding curve is displayed by pressing the accompanying key.

Table 14 NOAA Curve Designations

3D Effect

Creates a 3D effect based on the value of each pixel of the image. In infrared images, the apparent height of each pixel will correlate with its temperature. Hence, colder clouds will appear to be higher than lower clouds. The Median filter should be used to remove map lines from geostationary images prior to 3D processing.

NOAA

The NOAA menu option appears only when a NOAA APT polar orbiter image file is open.

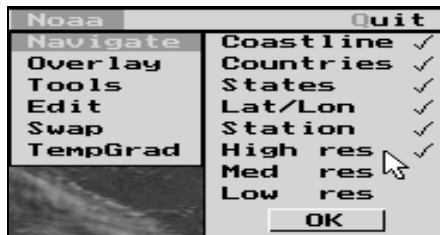


Figure 70 NOAA menu, Navigate Submenu

Navigate

The NAVIGATE function generates a user specified map overlay on the current NOAA image (see example overlay in Figure 71). Only NOAA images can be navigated.

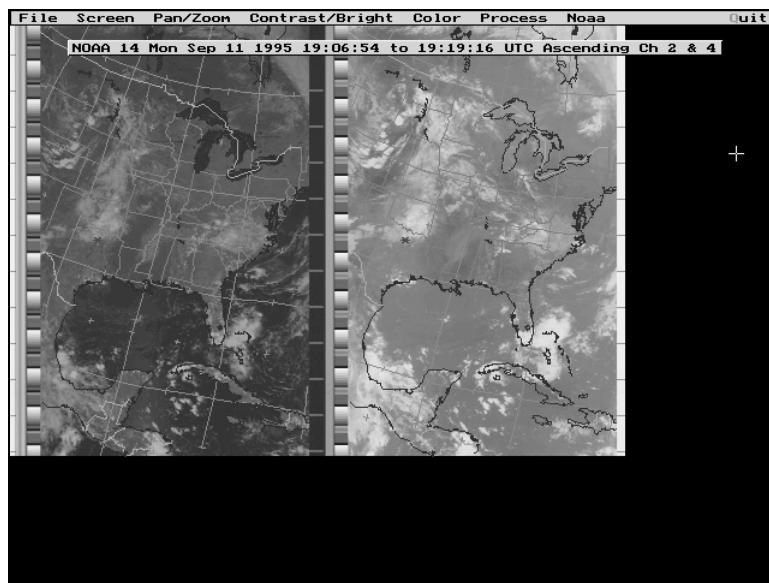


Figure 71 Completed Navigation Map Overlay

To navigate an image:

1. Load the desired NOAA image file
2. Select the NOAA navigate menu
3. Select desired map options with the mouse. Items to be included on the map will have a check mark showing next to them (see Figure 70 and Table 15).

MAP OPTION	DESCRIPTION
Coastline	Coastal boundaries and other large bodies of water.
Countries	National geopolitical borders.
States	State borders.
Lat/Lon	Latitude and Longitude grid lines.
Station	Places an '*' at the longitude and latitude of the receiving station coordinates (set within PREDICT Setup. Refer to "Initializing Local Station Information" in the "INSTALL" chapter of this manual for instructions).
High Res	Highest Map Resolution. Adds detail at the expense of map drawing speed. Use if you are interested in small object detail.
Med Res	Good compromise between speed and resolution. Good resolution and moderate map drawing speed.
Low Res	Lowest map resolution, fastest map generation.

Table 15 Navigate Map Overlay Options

- When all options have been chosen, select the OK button with the mouse to begin generating the map overlay.

A status bar appears to indicate the progress of the navigation process. The time required to calculate the overlay depends upon the speed of the computer used, the length of the satellite pass, and the options chosen.



Figure 72 NOAA Image Map Overlay in Progress

NOTE: Once the overlay is plotted, it can be moved up, down, left, and right using the arrow keys. This allows any misalignment of the overlay to be corrected before saving the image. Holding down the CTRL key will move the overlay ten pixels, while the arrow keys alone move the overlay one pixel at a time.

The map overlay position can be moved in any direction by 100 pixels (later versions allow a larger range of movement). If this still does not correct the position, renavigate the image again. This changes the time stamp and allows you to reposition the overlay. When map registration is correct, save the updated image, overlay, and updated time stamp as a “.QFX” file using the “Save” or “File Save” options of the File menu.

Vertical registration errors indicate that the computer’s time is incorrect. Reset the DOS clock to prevent future errors. Side errors indicate that the Ephemeris data is not current. Obtain an updated ephemeris data file and copy it to the Qfax program directory.

If the map image is inaccurate, check the accuracy of the DOS clock, and be certain that the “elements.dat” file is not too old. The “elements.dat” file should be updated every two to four weeks.

Another potential source of map overlay misalignment is caused by incorrect spacecraft orientation (yaw & pitch). The orbiter’s imager scan line should be perpendicular to the direction of travel of the spacecraft. Due to orbital perturbations, the orbiters will periodically drift from a position of perfect orientation. Ground controllers periodically perform spacecraft maneuvers to correct for this yaw condition. This accounts for an intermittent small source of inaccuracy that cannot be compensated for in the software. The condition corrects itself when the spacecraft is maneuvered.

NOAA Overlay

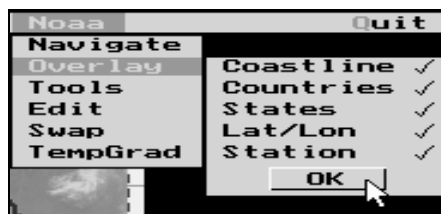


Figure 73 NOAA Overlay Submenu

Toggles the selected map overlays on/off. On images that have been navigated, any map element with a check beside it will be displayed.

Tools

The Tools submenu (Figure 74) is used to enable or disable the display of the Cursor and Reference boxes. This information is used to determine the distance and bearing of weather features in relation to the receiving station. Temperatures are measured under the cursor for infrared frames in order to determine relative cloud heights and water or land temperatures (within limitations imposed by the satellite's sensors and the transmission format).

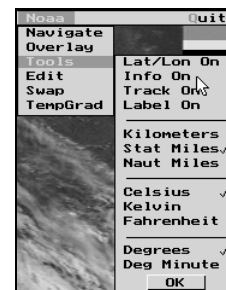


Figure 74 NOAA Tools Menu

Opens two windows at the bottom of the screen (Figure 75):

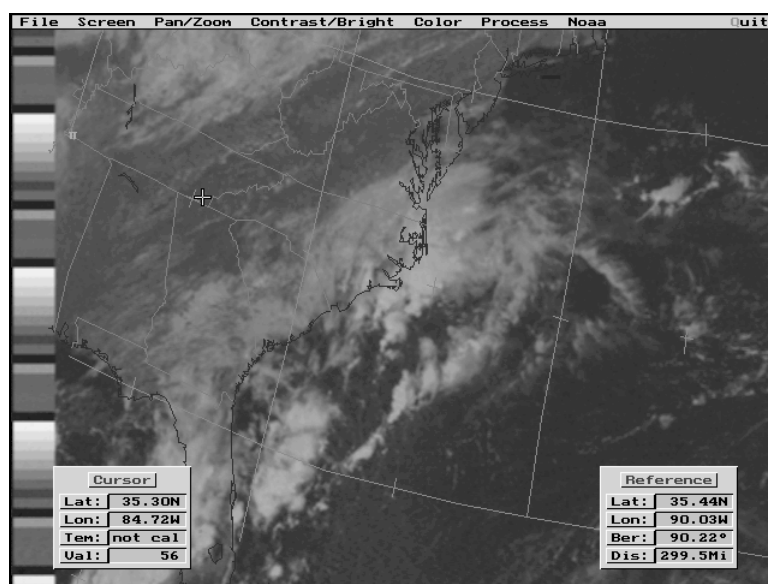


Figure 75 Lat/Lon Cursor & Reference Boxes

The Cursor windows shows the current cursor latitude, longitude, temperature, and pixel value.

Reference Windows

Latitude/Longitude, Bearing and Distance - The Reference window shows the reference point latitude and longitude, bearing to the cursor and distance to the cursor from a reference point. The reference point can be moved to any point on the image by placing the cursor in the desired position and clicking the left mouse button. This places a green ' π ' (Greek pi) symbol at the new Reference position. Distance and Bearing now measure from this point. Clicking the mouse over the Reference window resets the Reference to the station location.

Cursor Window

The cursor Window displays the current latitude, longitude, temperature, and pixel value of the pixel pointed to by the cursor.

Temperature - The cursor window displays the temperature of the pixel under the cursor. Temperature only functions on infrared NOAA orbiter frames! When a visible frame is being displayed, “Tem:” will read “not cal”, since the visible frame does not contain temperature information. Temperature measurement units can be changed between Celsius, Kelvin, and Fahrenheit.

Pixel Value - The pixel value displays the intensity of the pixel under the cursor. Pixel values range from 0 (black) to 255 (white).

Lat/Lon Keyboard Shortcuts

Distance, bearings, and temperatures, can be displayed in several different units of measurement. Units can be selected from the “Tools” submenu, or dynamically using the keyboard while observing an image.

Key(s)	Units Displayed
Distance	
‘k’	Kilometers
‘m’	Statute miles
‘n’ or ‘N’	Nautical miles
Temperature	
‘c’ or ‘C’	Celsius
‘K’	Kelvin
‘f’ or ‘F’	Fahrenheit
Lat/Lon	
‘d’ or ‘D’	Decimal Degrees (ex.: 32.20 N)
‘M’	Degree Minutes (ex.: 32 11 N)

Table 16 Units of Measurement Short Cut Keys

Info On

Toggles a display window which contains the satellite name, time of pass, and image channels:

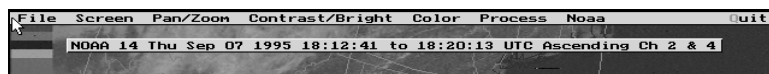


Figure 76 Info On Information Banner

Track On

Toggles the Track box (Figure 77) on or off. The Track box displays:

- The ground path (nadir sub-point)
- The total ground area captured in the image file (image limits).
- A box showing the part of the image currently being displayed.

If Lat/Lon is also enabled, then an 'x' cursor will appear in the Track window that corresponds to the location of the mouse cursor over the image.

To reposition the track box:

1. Place the mouse cursor inside the Track box.
2. Press the left mouse button and hold it down.
3. With the left button still depressed, move the mouse to the desired new position for the Track window.
4. Release the mouse button when the box is located in its desired location.

An outline of the new Track window position will move as the mouse is moved. When the left mouse button is released, the screen will be redrawn with the Track box in its new location.

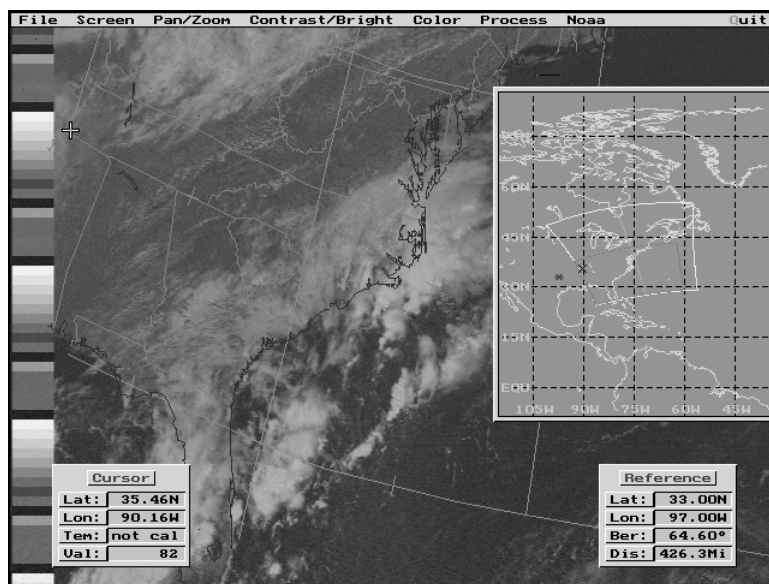


Figure 77 Track Window

NOTE: In order show the 'x' cursor in the Track window, the Lat/Lon Boxes must be enabled. See Lat/Lon for details.

Label On

Enables or disables latitude/longitude markers that appear along the edges of the screen on or off.

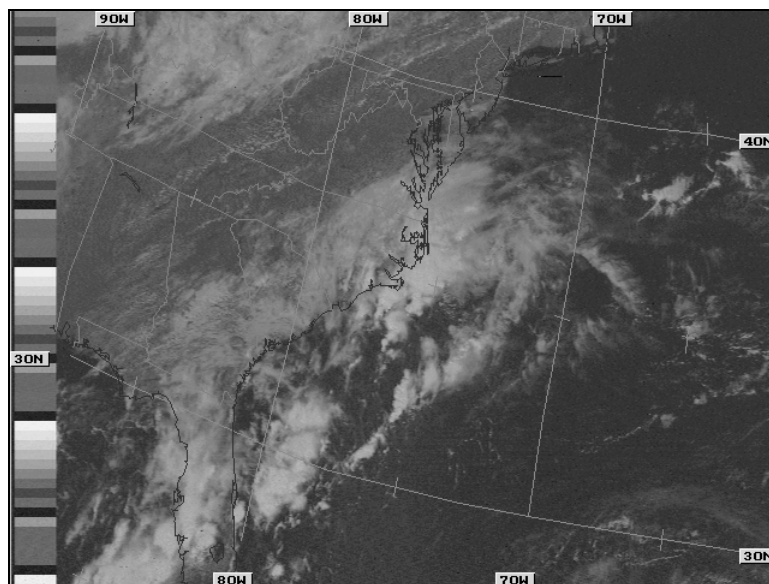


Figure 78 Latitude and Longitude Labels

Edit

When a NOAA satellite pass is captured from the CAPTURE screen, navigation data is NOT saved to the file. In order to navigate a file saved in the CAPTURE Screen, the satellite and its direction of travel must be added to the file. The EDIT DIRECTION and SATELLITE options allow the user to manually add this information. Once inserted into the file, navigate can generate the appropriate map overlays.

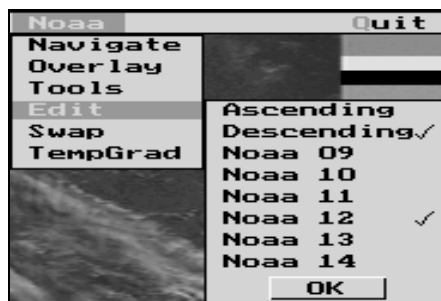


Figure 79 NOAA Edit Menu

Swap

Swap is used to exchange the left with the right NOAA image channel that is currently displayed.

Tempgrad

NOAA satellites always transmit at least one frame of infrared information. During daylight passes, one frame will be visible and the other infrared. For night passes, both frames will be infrared (different wavelengths). The different video levels we see as an image actually consists of the energy radiance of the observed body (earth) at a specific wavelength. In the Tempgrad function, the energy radiance at a known wavelength is compared to fixed temperature references and translated into a correlating temperature.

When derived temperature gradients are small, it is difficult for the human eye to discern the changes. The Qfax Tempgrad feature converts temperature ranges into color enhancements which make it easier to see temperature ranges of interest. This feature is displayed on the Channel 4 infrared frame only. Channel 4 is always available, and for this purpose, Channel 3 and 4 contain essentially the same information.

The assignment of image types to the Channel “A” and Channel “B” picture frames is arbitrary, and the positions of the two channels swap frames between the ascending and descending passes.

TIME OF PASS	FRAME	FRAME
Daylight Pass	CH 2 Visible	CH 4 Infrared*
Night Pass	CH 3 Infrared	CH 4 Infrared*

*Temperature gradients are displayed on Channel 4 ONLY.

Table 17 NOAA Satellite Sensor Use and Assignments

Tempgrad opens a list box which allows the selection of different temperature spans:



Figure 80 Tempgrad Menu

Once a temperature span is selected, the image is displayed with a color scale. The current temperature to color assignments are displayed in a legend box as shown by the color/temperature scale on the right side of the image:

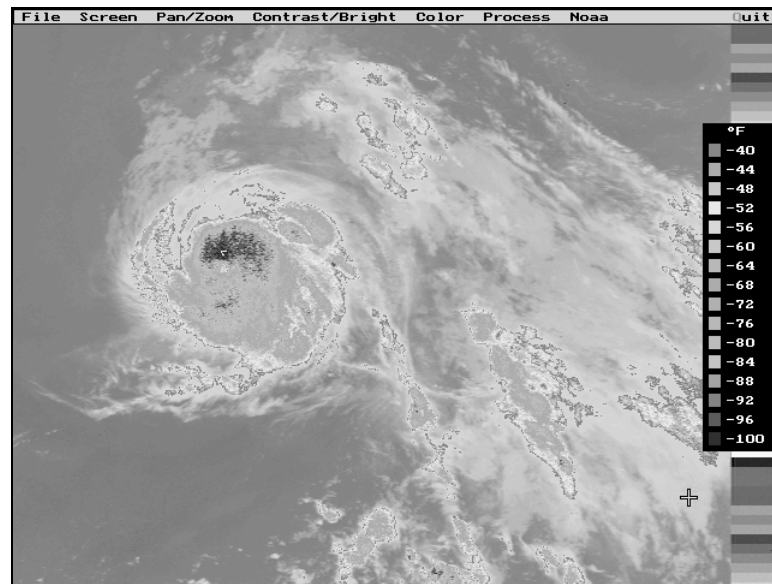


Figure 81 Tempgrad Image Display

To display one temperature span only, click the left mouse button over one of the color bars adjacent to a temperature in the Tempgrad Legend Box (Figure 82). Tempgrad will display that range and color on the image against a dark background for the other temperatures in the range selected. Click the right mouse button to restore the full color range.

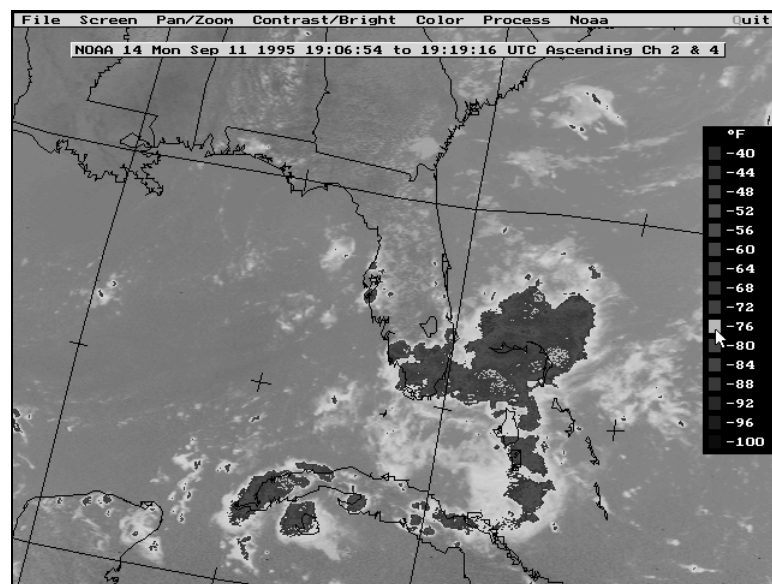


Figure 82 Using Tempgrad to display one temperature span (74-78° F)

NOTE: Tempgrad ONLY works on infrared image channel 4.

Additional Technical Information:

The Qfax program uses reference information sent in the APT signal to translate the video level information (i.e., the energy radiance observed by the sensor at a specific wavelength, ranging from 0 to 255) into temperature information. Several factors combine to limit the temperature resolution accuracy available at the receiving station. When all factors are taken into account, an APT receiving station's satellite measurement to actual temperature can vary by as much as approximately $\pm 4^{\circ}$ Celsius. On some days, the discrepancy between actual observed temperature and that measured by the satellite will be closer than others. This can be influenced by humidity, presence of fog or low-level clouds, season of the year, or an error induced by the reflection of the Sun's energy from the Earth to the sensor (in IR images taken in daylight), as well as a host of other factors (Infrared night pass measurements are usually more accurate than day passes due to the Sun factor).

Quit

The Quit menu options allows the user to "quit" VIEW and move to other Qfax functions, or is used to exit the program to the operating system.

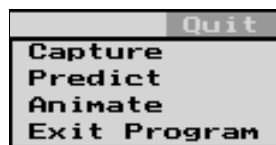


Figure 83 Quit Menu

The Quit menu allows the user to quit the view function and move to other program functions or exit DOS:

CAPTURE	quit to CAPTURE screen
PREDICT	quit to PREDICT screen
ANIMATE	quit to ANIMATE screen
EXIT PROGRAM	EXIT to DOS

Chapter 7 - Animation Operation

General Description

The Animation function is used to capture and animate images. The ANIMATE scheduler is used to repetitively capture and save specified views from a geostationary satellite. The software then continuously “loops” the saved images to effectively form an animation of the images.

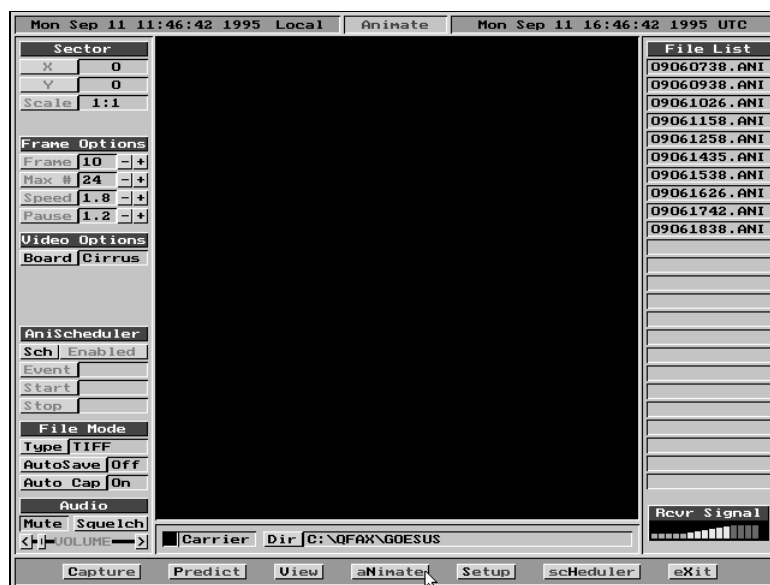


Figure 84 Animation Screen

Setting The Animation Sector Size - Set_Sector and Make_Sector

The Animate function makes an “.ANI” file for each image received. While regular Qfax image files (GIF, PCX, TIFF, etc.) contain all of the raw image information received, “.ANI” files only hold a subset of the total file. This subset consists of a smaller amount of data required to display a selected portion of the full image (a “Sector”) on the screen. The smaller file size and data format removes the need for processing the raw file’s image data each time Animate writes an image to the screen. Since the “.ANI” file format is smaller and formatted for a direct screen write, the amount of time required to write the image to the screen is greatly reduced which allows effective animation



Figure 85 Animation Sector Settings Window

speeds. The process of selecting an image based on coordinates which are a subset of the total image file is known as “Sectorization.”

The Animation Setup menu option permits the user to select the area of an image that is displayed during the animation loop. The default sector upper left hand positioning coordinate is set to X=0 and Y=0, and the default scale is 1:1. This information is displayed in the ANIMATE function in the Sector window (see Figure 85) in the upper-left part of the Animate screen.

To change the sector view, receive and save the type of image you wish to animate by manually using CAPTURE, the CAPTURE scheduler, or the ANIMATE scheduler. For this example, a GOESUS image is received and saved using the ANIMATE scheduler.

1. If not previously done, set up the ANIMATE scheduler to receive and save the next transmission of the image type to be animated. Be sure to turn AutoSave *On* so the image file is saved.
2. Allow the scheduler to capture and save the image at its next scheduled time. Once the image is received, since AutoSave is *On*, ANIMATE saves both the animation sector file and the regular image file is saved. These are two different files.
3. Once you have saved an image, turn AutoSave to OFF. This allows you to save only the animation sectors to the hard drive. ANIMATE maintains only the latest number of images specified by the MAX # option of the FRAME SAVE OPTIONS (see “Setting Animate Frame Save Options” section below). If AutoSave is left *On*, the hard drive eventually fills to capacity with regular image files since these are not purged automatically by ANIMATE.
4. To set a new sector to be used for Animation, click on the SETUP button in the menu bar at the bottom of the screen. This opens a screen similar to VIEW.
5. Click on LOAD, and select the image just captured.
6. Use ZOOM and PAN select the portion of the image you wish to animate. Figure 86 illustrates how the screen should appear at this point.
7. Once the area is set, click Set_Sector. This action stores the view coordinates chosen in step 6. These coordinates are used to create “.ANI” images captured by ANIMATE for animation purposes.
8. If you wish to use this image in the Animation loop, click on the Make_Sector Button. This creates an “.ANI” file from this image for use by Animation.
9. Press the “Quit” button to exit the *Setup* screen and return to ANIMATE.
10. When animated, the resulting sector created in this example looks like Figure 87. The new X, Y and SCALE settings are shown in the Sector window. All “.ANI” images received using the GOESUS configuration now display the same portion of the total image which was chosen in the procedure above.

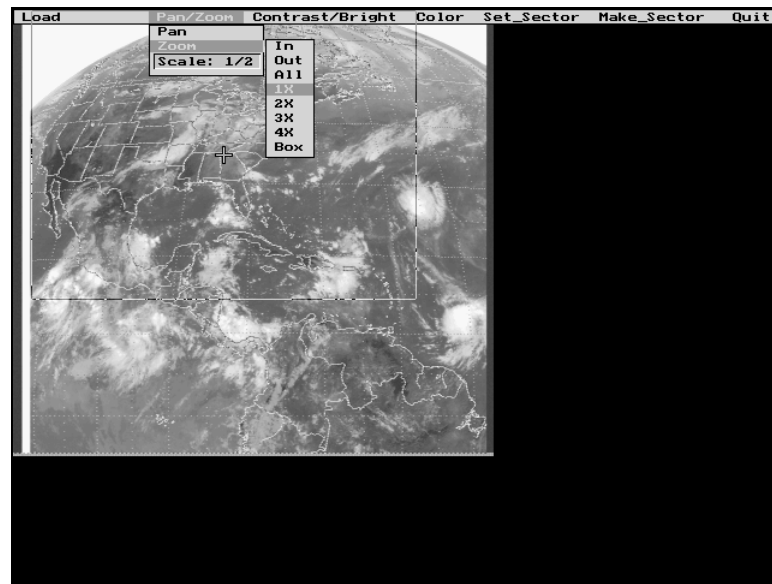


Figure 86 Setting Sectorization Size and Position

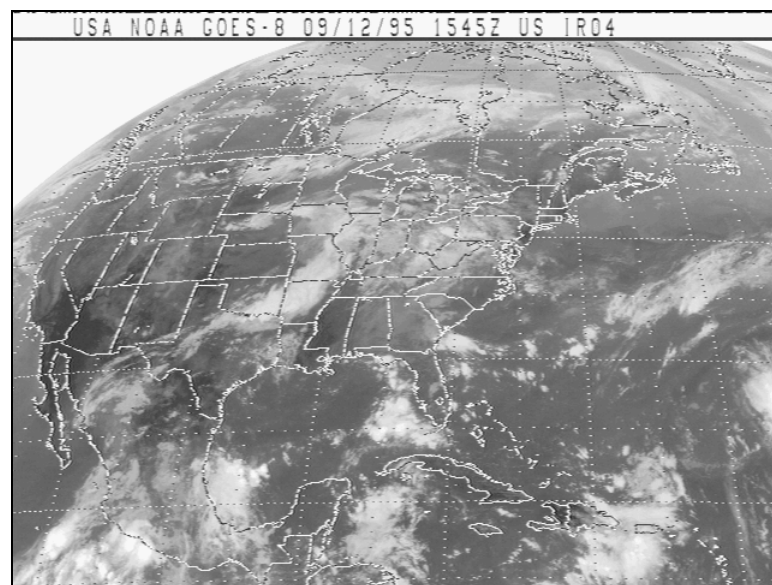


Figure 87 Sectorized Image Appearance During The Animation Loop

NOTE: A different image sector can be saved in the directory associated with a configuration. By this mechanism, it is possible to create a unique sectorization for each configuration. Thus it is possible to create different sectorizations for GOES Visible, Infrared, and full disk images, and so forth. If you do not create a new sectorization, Qfax uses the default 1/2 zoom setting for the animated image sector size.

Setting Animate Frame Save Options

A frame is one image of the total number of images used in an animation sequence. Qfax animates the number of frames set by the Frame option. The maximum number of frames that can be animated is 24, and each image requires a total of 307,200 bytes of hard drive storage space. There must be 8 meg of memory in the computer to get the full 24 frame capability.

The program automatically deletes the oldest files while creating new animation files. If the Max # of files is set to a number n, then the latest n “.ANI” files are kept. Any attempt to increment past a Max # of 99 results in an “*” being displayed. When the “*” is displayed next to the Max # button, then Qfax does not delete “.ANI” files from the drive. If the “*” is chosen, at some point, the drive will run out of storage space.



Figure 88 Frame Options Window

Animation Speed/Misc. Controls

Animation speed is set by the number selected to the right of Speed (see Figure 88). The ‘+’ and ‘-’ keys on the keyboard can be used at any time to increase and decrease the frame speed, even while animation is in progress. Speed is specified in Frames per second and pause is specified in seconds.

The Pause between the last frame of the sequence and the first is set by the number next to the Pause button. Holding down the CTRL key while pressing the ‘+’ and ‘-’ keys can be used at any time to increase and decrease the pause time, even while animation is in progress (this does not work on all keyboards).

Setting Display Adapter Options

Video adapter cards using Tseng 4000 or Cirrus Logic chip sets can display flicker free animation loops. Click on Board button within the Video Options window to sequence through the options. If you do not have a Tseng 4000 or Cirrus Logic video board, select VESA. Depending upon the speed of the computer and video adapter card, some wiping effect may be noticed in the VESA mode.

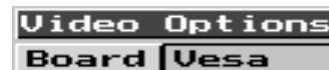


Figure 89 Video Options Window

Assigning Directories For Loop Sequences

The ability to assign different directories to satellite configurations allows Qfax to create multiple animation sequences of different image types (refer to the “Overview” chapter in this manual for a detailed discussion of configurations). For example, by creating the proper sub-directories, satellite configurations, and initializing the Animation Scheduler, it is possible to store GOES visible and infrared sequences. The images in each directory can then be rapidly displayed (“looped”) to provide the illusion of movement or animation. This concept can be expanded to allow the user to animate a number of image types, limited only by the number of available subdirectories, hard drive storage space, and image types.

To select the directory used to store a specific image type, the first step is to load and modify an existing configuration for the satellite of interest. In the following example, we create the configurations for GOES IR images and GOES VS images by changing the GOES configuration included on the Qfax Program Disk. We can then store the new configurations as a new GOESIR configuration and as a GOESVS configuration.

Creating A Directory To Store An Image Type For Animate

The procedure for making the GOESIR subdirectory is shown in steps 1-4 below. The Directories screen is shown in Figure 90 for reference.

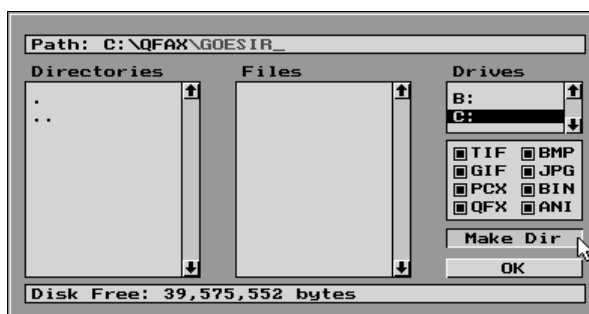


Figure 90 Making A Directory To Hold An Image Type

1. If you are not in the CAPTURE Screen, change to it now.
2. Next click on the *Dir* button below the main image window. This brings up the directory menu.
3. Select the *Make Dir* button. The cursor moves to the “Path: “ box at the top of the Directories window. The current path (C:\qfax in this example) is displayed followed by a red ‘\’.

After the red ‘\’, type in the subdirectory name:

GOESIR<Enter>

You will see the new subdirectory added to the Directories window. If needed, refer to the “Overview” chapter for more details on using the Directories window.

4. Once the subdirectory name is correctly set, select the *OK* button to close the Directories window.

Repeat steps 2-4, substituting the GOES visible configuration name GOESVS in place of GOESIR.

The Directories window should now look similar to Figure 91:

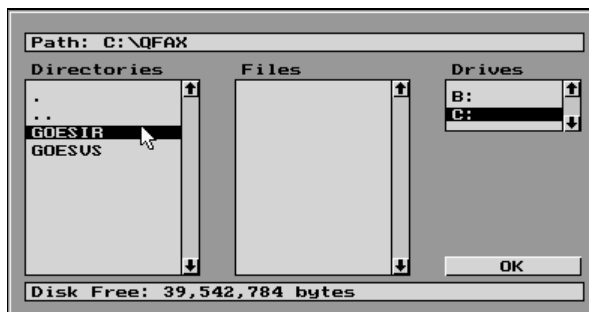


Figure 91 Completed Animation Subdirectories

Once this procedure is completed, the subdirectories are in place for use by the ANIMATE function.

Next, Animate must know where to store each image type.

Informing Qfax Where To Store The Images

For Qfax to animate images of a given type, the images must all be stored in the same directory. In our example, we are saving GOESIR images to the \QFAX\GOESIR directory and the GOESVS images to the \QFAX\GOESVS directory. The following procedure creates a link that informs Qfax in which directory a given configuration should be saved:

This example illustrates the steps for setting the GOESIR configuration. The procedure can be repeated to set the GOESVS directory link. Simply substitute GOESVS for each occurrence of GOESIR.

1. Move to the CAPTURE screen.
2. Load the desired satellite configuration, in this case *GOESIR*. If a configuration does not exist, refer to the “Setting Satellite Configurations” section of the Satellite Configurations chapter for instructions, and create the required configuration(s).
3. Click on the *ST* button with the mouse. The following prompt appears in the prompt window at the bottom of the screen:

A screenshot of a command-line prompt. The text reads: "Enter Configuration Name (12 chars max) <Enter> for current: _". The prompt is displayed in a monospaced font within a rectangular box.

Figure 92 SToRe Configuration Name Prompt

4. a) If you have modified an existing configuration's parameter[s] and wish to save the configuration with the same name it was loaded as, and press **<Enter>**.

b) If you have created an original configuration (not previously stored) or modified an existing configuration, and wish to save it with changes as a new configuration name, type the new filename (with extension, maximum of 12 characters) and press **<Enter>**.
5. If a new name was entered above using the procedure in 4a, the next prompt appears once the configuration name has been entered:

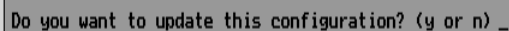
A screenshot of a command-line prompt. The text reads: "Do you want to update this configuration? (y or n) _". The prompt is displayed in a monospaced font within a rectangular box.

Figure 93 Save Configuration Update Option Prompt

7. Type **'y'<Enter>** to save the changes you have made in the configuration's settings.
Type **'n'<Enter>** to abort without saving the changes made to the configuration.

The next prompt allows you to choose the directory where images captured with this configuration are saved.

The use of this feature provides a powerful tools for organizing images on the hard drive and avoiding hard drive chaos! It is usually advantageous to store each type of configuration in its own directory!

A screenshot of a command-line prompt. The text reads: "Do you want to save directory information? (y or n) _". The prompt is displayed in a monospaced font within a rectangular box.

Figure 94 Save Directory Information Prompt

8. Type **'y'<Enter>** to specify a new directory where images captured with this configuration name are stored. The Directories window appears in the image window of the screen.
9. Use the mouse to click on the GOESIR subdirectory located in the Files window.
10. Now click the left mouse button on the OK button to close the Directories window. With this action, the link is established that informs Qfax to save GOESIR ".ANI" files in the "\\QFAX\\GOESIR" directory.

Next, the scheduler must be established in order for Qfax to receive the proper images at the right time.

Animation Scheduler

Before ANIMATE can function, an Animation schedule must be created. To set up the schedule, you need to know when the image type you wish to Animate is transmitted. To obtain the operating schedule for GOES satellites, receive and save the Operations Schedule sent at 10:54 UTC and 10:58 UTC each day.

The Animation Scheduler allows the user to establish time slots when images are automatically received and saved as animation images (*.ANI files). Regular image files are stored to the hard drive by turning the AutoSave feature ON. When ANIMATE is displaying an animation sequence, it pauses to capture a new image when a time listed in the scheduler is reached. This allows unattended reception of images for animation use or analysis at a more convenient time. If ANIMATE has been looping an image sequence, the loop continues as soon as the new image is received and the end of the event time is reached in the event schedule.

Scheduler Concepts

The ANIMATE Scheduler is essential to the operation of ANIMATE. The scheduler allows the system to continuously monitor a user generated schedule for the next image event time. When the scheduler determines it is time for a new image to be saved, it captures the image, and returns to what it was previously doing. In this fashion, it is possible for ANIMATE to display an animation loop which is continuously displayed and updated.

It is helpful to understand how the ANIMATE Scheduler works and the differences between the ANIMATE and CAPTURE schedulers. The ANIMATE and CAPTURE schedulers are separate and distinct entities. The key features of the ANIMATE and CAPTURE schedulers in Qfax are:

- Both CAPTURE and ANIMATE capture images according to their respective schedule, as input by the user.
- Both CAPTURE and ANIMATE save images as a GIF, TIFF, JPEG, BMP, or PCX formatted files (in ANIMATE, AutoSave must be enabled).
- Only the ANIMATE scheduler saves sector images in the “.ANI” format required by ANIMATE in order to loop images. “.ANI” files can only be made from configurations where the SIG type is GOES, Meteosat, Goestap, HF, or GMS.
- Images can only be looped within ANIMATE.
- Both Geostationary Wefax and polar orbiter APT can be scheduled, captured, and saved by the ANIMATE and CAPTURE schedulers.

Use ANIMATE to schedule, capture, save, and loop geostationary satellite Wefax images.

Use CAPTURE to schedule, capture, and save both geostationary Wefax and polar orbiter APT images for later viewing with the VIEW function.

Animation files are saved as a special “.ANI” file. “.ANI” file names use the date and time format of “*moddhmm*.ANI”, where *mo* is the month, *dd* is the day of month, *hh* is the hour, and *mm* is the minute that reception of the image began. The file “09061538.ANI” is an Animation file captured on September 6, at 15:38UTC hours. The “.ANI” files are automatically sorted by Qfax for proper animation sequencing.

Setting Up The Scheduler

To set up the scheduler, click the mouse on the Scheduler button located in the menu bar at the bottom of the screen, or press 'H' on the keyboard. The Scheduler window opens (Figure 95). Functions within the Scheduler window includes:

EVENT - A unique number ranging from 0 to 199 that refers to each scheduled event line in the scheduler. To modify an event line, depress the event number button for that line. More than one event can be selected for modification at one time. This saves time when setting parameters that are common to several events.

Click the mouse on the EVENT number to select the line. *No schedule line can be modified unless one or more EVENT lines are selected.*

DAY - Determines which day[s] the event is active. This can be set to any day of the week or all days of the week. NOTE: If ALL is selected in this field, the event occurs every day at the designated START and STOP time.

START - Sets the start time that the scheduler is to look for image to be transmitted. This should normally set to one minute before the scheduled image transmission time.

STOP - Specifies the time after which no new images are captured. Any current image being captured is completed if it spans beyond this time. This is normally set to one minute after the scheduled transmission start time.

REPEAT - Determines whether to capture a scheduled event only the first time it is scheduled, or every day it is encountered.

If REPEAT is set to YES, the EVENT occurs every time it is scheduled. If set to NO, the EVENT occurs only once, on the first occurrence of the DAY selected, and the EVENT line is cleared.

CONFIG - Specifies which satellite is received and to which the directory the image file is saved. See the “Overview” chapter for instructions on setting configurations.

CLEAR - Clears all EVENT lines in the Scheduler which are selected (see “EVENT” above). Use this to erase an EVENT line when it is no longer needed.

NEXT - Displays the Next page of the scheduler.

PREV - Displays the Previous page of the scheduler.

DONE - Saves the scheduler information and closes the scheduler window.

Event	Day	Start	Stop	Repeat	Configuration
0	All	13:41	13:43	Yes	Goes 8
1	All	13:53	13:55	Yes	Goes 8
2	All	14:39	14:41	Yes	Goes 8
3	All	16:01	16:03	Yes	Goes 8
4	All	16:29	16:31	Yes	Goes 8
5	All	17:45	17:47	Yes	Goes 8
6	All	19:01	19:03	Yes	Goes 8
7	All	19:29	19:31	Yes	Goes 8
8	All	21:13	21:15	Yes	Goes 8
9	All	22:53	22:55	Yes	Goes 8
10	All	23:49		Yes	Goes 8
11					
12					
13					
14					
15					
16					
17					
18					
19					

Mon	Tue	23:51 UTC		Repeat	Next
Wed	Thu	-	Hours	+	Config
Fri	Sat	-	Minutes	+	
Sun	All	Start	Stop	Clear	Print
				Done	

Figure 95 Configuring the Scheduler

Example Scheduler

In the following example, the scheduler is set up to automatically capture eleven GOES-8 visible images transmitted each day. Figure 95 illustrates the setup in this example. All times used in the scheduler must be specified in UTC!

Important note! The scheduler must be set up using UTC times, not local time!

Normally, you should set each event in the scheduler to start one minute before the image is transmitted and the stop time to one minute after transmission has begun. This allows a margin of error for the time set in the computer as well as any reasonable variance in transmission time.

Events 0-10 set up the schedule to capture the desired eleven visible images. Transmission times for these images are:

13:42 UTC	13:54 UTC	14:40 UTC	1602 UTC
16:30 UTC	17:46 UTC	19:02 UTC	19:00 UTC
21:14 UTC	22:54 UTC	23:50 UTC	

Since we wish to receive these images each day, Repeat is set to Yes. Also, since the source for all images is the GOES-8 satellite, the configuration for each time slot is set to GOES-8.

Shortcut: You can press more than one event button at one time. This allows you to set the same parameter for multiple days in one operation. In the example above, Event buttons 0-10 were all pressed On. Then, by using the mouse, the All button was pressed at the bottom of the screen, followed by the Repeat button. Finally, the Configuration button was pressed, and GOES-8 was chosen. In this way, the day was set to All, Repeat was set to Yes, and the configuration was set to GOES-8 for all of these events in one operation. The Start and Stop times were set individually.

Once all parameters are entered, select the Done button to close the scheduler window.

Note: These scheduled events were in effect at the time this section was written. Wefax schedules can change relatively often. Do not assume that the times for these events are accurate now! Refer to the current Operations Schedule transmitted from the satellites (typically 10:54 UTC and 10:58 UTC for GOES) or an appropriate Bulletin Board for the current schedule.

Activating The Scheduler

Once a schedule has been established, the ANIMATE Scheduler is used to capture the scheduled images in an unattended mode:

1. Set the DOS clock to the correct time (if needed).
2. Run Qfax.
3. If not previously done, set up the ANIMATE Scheduler for the desired events.
4. Set up the desired image sector size if sector size is to vary from the default sector sizing. See the "Setting the Animation Sector Size" section earlier in this chapter for instructions.
5. Set AutoSave (in the File Window) to *Off* unless you really want to save the full image files in addition to the ".ANI" files!
6. In the Scheduler window (on the left side of the screen), toggle the *Sch* button until *Enabled* is displayed to the right of the button.
7. To loop images while waiting for the next event in the ANIMATE scheduler, select a directory containing the image type you wish to animate. Push the *Dir* button located below the image window. Next, select a directory containing animation files you wish to loop.
8. Press the 'n' key on the keyboard, or press the ANIMATE button with the mouse. ANIMATE loads and loops the images displayed in the *Files List* window. When a scheduler event time is encountered, ANIMATE automatically switches to capture the scheduled event image. When the file is received or the event stop time is encountered (if no image is transmitted), then ANIMATE resumes looping the latest images.

NOTE: Before starting any scheduler function, the time, date, and UTC offset should be checked. If these are not correct, then at least some, if not all scheduled events are not saved!

1. Verify the PC time and UTC offset are correct.
2. Check the date to insure the PC's date is correct. The animation scheduler operates from the PC time. The suggested +/- 1 minute window set up for the event start time is to allow for slight time errors in the PC clock. Once a scheduled event has started, the program does not stop capturing the image until a stop tone is detected or the 2400 Hz carrier detect drops and times out.

<Esc> or the right mouse button stops the animation loop.

Setting The Directory Path

The Dir window located at the bottom of the screen shows the current directory that Qfax reads “.ANI” files from in order to create the animation loop. To change directories, click on the Dir button and select a new path within the Directories window. Press the OK button to close the directories window. The File List on the right of the screen shows the files currently stored in the selected directory.

Audible Beep Warning - Insufficient Disk Space

Note: If there is insufficient disk space to save an image, ANIMATE generates an audible beep when it attempts to save the file. The scheduler continues to capture images, but is not able to save them to disk until adequate space is made available on the drive. Lack of adequate disk storage space is the only condition that generates the audible beep.

Applying NOAA Enhancement Curves During Animate

When temperature differences in transmitted infrared images are small, it is difficult for the human eye to recognize significant cloud and surface features present in the images. The information may be present, but the observer cannot discern the features. Such phenomena includes convective weather features, haze, fog, ocean current boundaries, and terrain features. Image enhancement through the use of the built-in NOAA curves increases the contrast between targeted features and the background, which serves to make the features more apparent. The provided curves also serve as a convenient way to identify several different types of features within GOES images. While the NOAA curves can be used on NOAA orbiter APT transmissions, the curves do not match the sensor calibration of the orbiters, which is different from GOES satellites.

While looping the sequence of images, NOAA enhancement curves can be called on the fly by using the keyboard. The first letter in each curve typed from the keyboard enables that curve. The NOAA curves available are as follows:

Letter From Keyboard	NOAA Curve Designation	Use
A	Ab	Hurricane Curve
B	Bb	Hurricane Pattern Recognition
C	Cb	Cold Cloud Tops
D	Db	Convective Activity
E	Eb	Middle Clouds & Convective
F	Fb	Hydrology Curve
H	Hb	Lower Clouds
M	Mb	All Season Clouds
P	Pb	Pacific Coastal Upwelling
S	Sa	Sea Surface Temperature
Z	Za	Lower & Upper Level Clouds
L		RESET TO LINEAR

Table 18 NOAA Enhancement Curves

Animate Setup Screen

Setup Screen Overview

The ANIMATE Setup Screen allows the user to choose parameters to be used while looping image sequences. By using the Pan/Zoom option, the user can select a view from the total image file to be displayed in the Animation Loop. Selecting a portion of the total image is known as “sectorizing” an image. A sector set for a particular image type is recalled each time the accompanying satellite configuration is used in animate, so the sector size is uniform.

The Color option permits the user to create and load color palettes. Once a palette has been created or loaded, it remains in effect when returning to the Animate window.

Set_Sector stores the current sectorization parameters. Any time the current satellite configuration is loaded and captured by ANIMATE, the sector size and position saved by Set_Sector is used.

Make_Sector is used to make an “.ANI” file from an existing image file. An “.ANI” file can be made from any image in the GIF, PCX, TIFF, JPEG, BIN, or BMP format.

The Contrast/Bright option allows the user to adjust the contrast and brightness of an image loaded in the Setup screen, as well as resetting the palette to the default gray scale.



Figure 96 Animation Setup Screen Menu Bar Options

Pan/Zoom

The Pan/Zoom menu options are used to select the view that is displayed in the ANIMATE loop. Figure 97 shows the pull-down menu that is displayed when Pan/Zoom is chosen:



Figure 97 Pan/Zoom Menu

Pan

Pan repositions the image on the screen without resizing it. To Pan an image, select *Pan* with the mouse. An outline box with a '+' cursor in its middle appears over the image. Position the box over the new center point, and click the left mouse button

Zoom

Zoom allows the user to resize the image from zoom factors of 1 to 99.

Menu Option	Zoom Function
IN	zoom IN x1
OUT	zoom OUT x1
ALL	zoom to image limits. Displays all of the image.
X1	jump to zoom x1
X2	jump to zoom x2
X4	jump to zoom x4
Box	See the "Using The Box Option In Zoom" section below.
SCALE: n/n	Display of the current zoom factor ratio (n/n)

NOTE: Each time you select ZOOM IN, 1X, 2X, 3X, or 4X, an outline box appears. As illustrated in Figure 98, the interior of the zoom box show the area included in the

subsequent zoom of the image. To complete the zoom, position the box until it outlines the area you wish to enlarge, and click the left button. Each time you use ZOOM IN, the magnification of the image increases by x1 until x99 is reached. ZOOM OUT decreases the magnification by x1 each time it is selected. The 1X, 2X, 3X, or 4X settings zoom directly to the specified zoom factor.

The zoom process is illustrated in Figure 98, and the resulting image is shown in Figure 99.

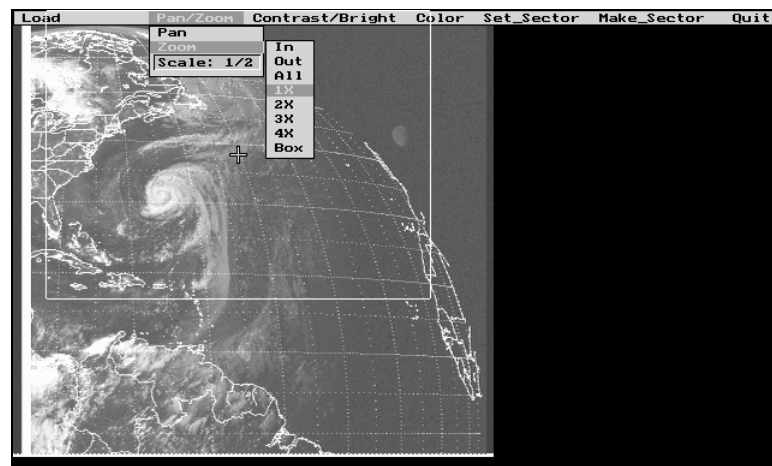


Figure 98 The Zoom Outline Box.

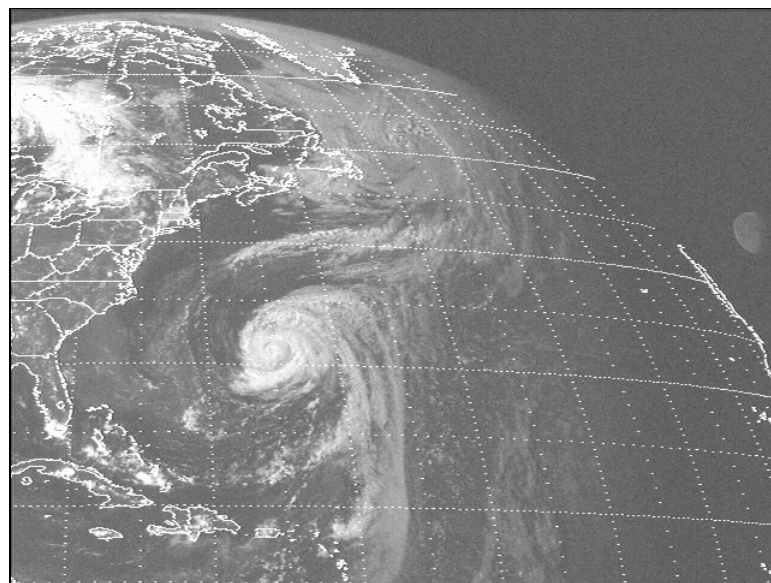


Figure 99 Resulting Zoom Image

Using The Box Option In Zoom

The Box menu option allows the user to draw a free-hand box on the displayed image. Zoom selects the proper zoom ratio and enlarges the image to show all of the area the user selected.

To create a zoom box:

1. Press the Box button on the Zoom submenu.
2. Position and click the mouse on the beginning corner of the box. As the mouse is moved, a box is displayed.
3. Move the mouse until the box covers the area of the image to enlarge.
4. Click the left mouse button. The stop-watch cursor appears and the zoomed in image area is displayed.

In most cases, the Zoom Box displays more of the image than is originally selected because Zoom uses whole number integer ratios only. Therefore, zoom selects the ratio which includes all of the image selected, plus whatever amount of the image that is required to fill the remainder of the integer ratio zoom box area.

The next three figures illustrate the Zoom Box process and results. In Figure 100 the area of the image to zoom is selected:

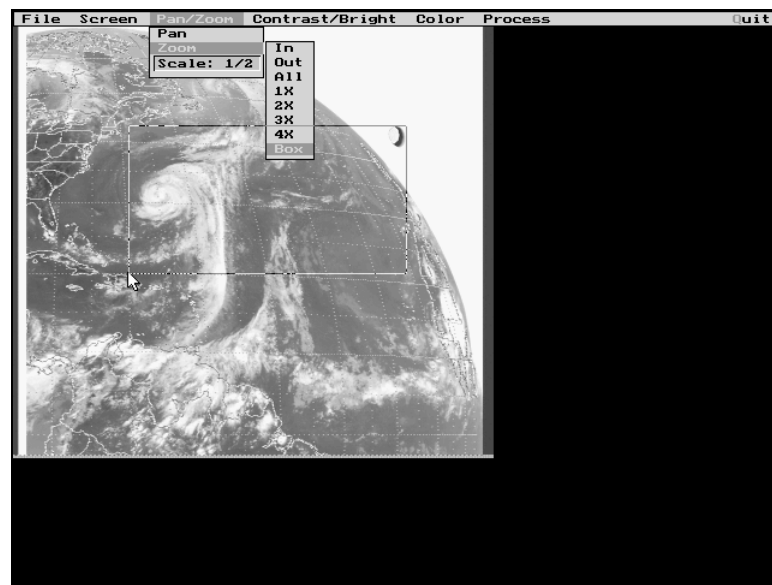


Figure 100 User Generated Zoom Box

Figure 101 shows the screen after the image has been zoomed. The resulting image includes all the area in the user zoom box, plus additional image areas not included in the user generated zoom box:

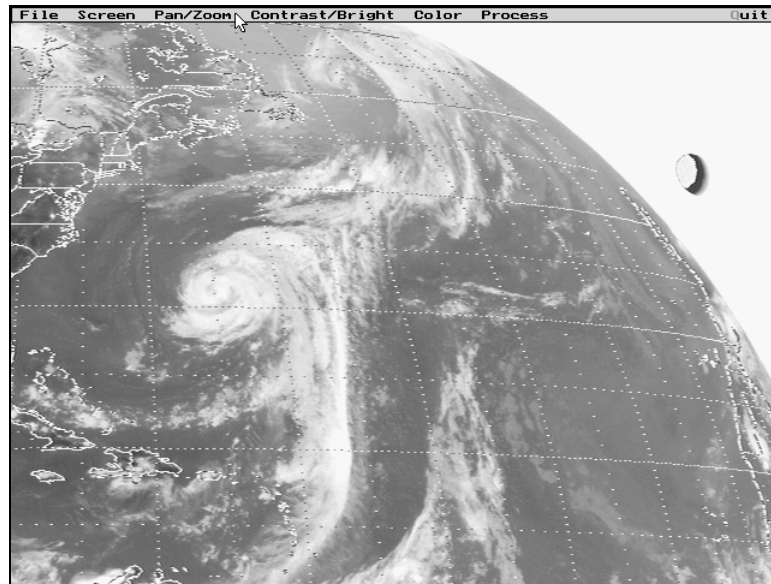


Figure 101 The Screen After Zooming

The reason additional area has been added is due to the fact that pixels are integer numbers. Since it is not possible to display a fraction of a pixel value, zooms must be done in integer steps, i.e., 1, 2, 3, etc. So the end effect of the user generated zoom is that the program selects the closest integer zoom factor, and enlarges the image by that increment. In this example, the next integer zoom factor is 1X, as shown in Figure 102. Since there is more area in the integer zoom factor than is in the user generated zoom box, the program includes image material surrounding the user generated box to fill in the additional area.

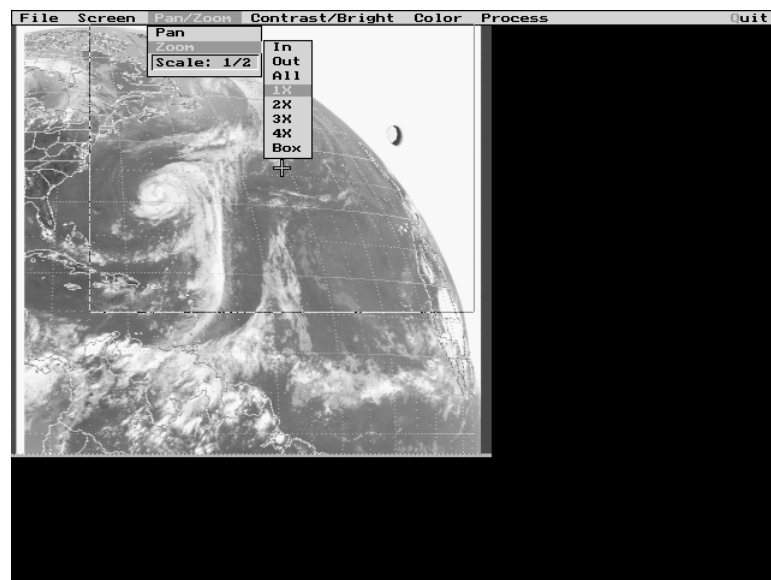


Figure 102 Resulting Zoom Image Is Same As 1X Zoom

Contrast/Bright

The Contrast/Bright menu option opens a window that allows the user to adjust the screen image's brightness and contrast attributes. These adjustments are not saved unless the screen image is stored to disk with the Screen Save or Save As options. Selecting the Contrast/Bright menu opens the following window:



Figure 103 Contrast/Bright Adjust Window

The histogram graph in the top portion of the Contrast/Bright window depicts the distribution of pixels along the brightness scale. In this example, the majority of the pixels fall within the bottom half of possible pixel intensities. Since images are displayed in a 256 color grayscale, the possible pixel values range from 0 to 255.

The use of the Brightness, Low, and High adjustments can enhance image elements of interest, while suppressing other undesired spurious details. The results can be startling. Elements that are not initially visible in an image can be prominently highlighted using these functions. There are no empirical rules to use when enhancing features. It is best to simply try different settings while observing the image.

The Low, Reset, High, and Brightness controls perform the following functions:

BRIGHTNESS	Increases/Decreases image BRIGHTNESS to a maximum value of +/- 64.
LOW	Increases the low threshold to a higher scale position.
HIGH	Decreases the high threshold to a lower scale position.
RESET	Resets the Low to 0 and High to 255. Reset does not restore Brightness to zero.

NOTE: When adjusting BRIGHTNESS and CONTRAST, hold the left mouse button down over the DEC/INC buttons to continuously increment the values. Press the button one time to sequence the count by one.

Using Color Palettes In Animate

The Color menu allows the user to Load saved palettes and Adjust the color settings of the current palette.



Figure 104 COLOR Menu

Load Palette

Loads and applies a user specified palette file. This palette remains in effect until the default grayscale palette or NOAA curve is activated. For example, if a color palette file is loaded, and the user goes to the ANIMATE function, the color palette will be used by ANIMATE until it is reset.

Adjust Palette

The Adjust Palette option allows the colors of the current palette to be changed, and is used to generate a new palette.

Each image pixel consists of a mixture of the primary colors Red, Green, and Blue. The amount of each of these primary colors varies numerically from 0 to 63. An image pixel that is black consists of a mixture of 0 Red, 0 Green, and 0 Blue. The most intense white is a mixture of 63 Red, 63 Green, and 63 Blue. The purest “Red” color would consist of 63 Red, 0 Green, and 0 Blue. Using these parameters, it is possible to construct 262,144 unique colors.

The display hardware limits the number of colors that can be displayed at any time to 256 colors out of the possible 262,144 colors. These 256 selected colors make up the current palette. Out of the 256 colors displayed, the program reserves a few of the upper colors for menu and text display use. This prevents menus and their text from disappearing due to palette manipulations by the user.

Once an image has been loaded, and Adjust Palette chosen from the menu, the mouse can be used to help adjust colors. When the mouse is located within the image:

Right Mouse Button - Clicking the left mouse button sets the color box to the value of the pixel pointed to by the mouse cursor. An arrow under the histogram and color scale in the Color Palette Adjust box also moves to the pixel value location. In Figure 105, the left mouse button was clicked on a pixel with an intensity of 150. If the Red, Green, or Blue values are changed within the left color box, all pixels with the intensity chosen assume the new color value set.

Right Mouse Button - Clicking the right mouse button sets the color box to the value of the pixel pointed to by the mouse cursor. An arrow under the histogram and color scale in the Color Palette Adjust box also moves to the pixel value location. In Figure 105, the right mouse button was clicked on a pixel with an intensity of 150. If the Red, Green, or Blue values are changed within the right color box, all pixels with the intensity chosen assume the new color value set.

Span Button

A range of colors can be generated by setting the lower and upper color limits in the “Adjust Palette” window. There are two arrows that mark a range of the scale that will be effected by any color adjustments made. Initially, the numeric value in the left Color box corresponds to the pixel number of the left arrow. The numeric value in the right Color box corresponds to the pixel number of the right arrow. By clicking the mouse on the + and - buttons on either side of each Color box, the value is increased or decreased. At the same time, the corresponding arrow moves along the scale to indicate the current pixel position (The span can also be selected as discussed in the preceding section using the right and left mouse buttons). The vertical box next to the Red, Green, and Blue adjust boxes shows the current color corresponding with each Color position. When Span is pressed, the color shifts from the lower color to the upper color selected within the span selected. In Figure 105, the color positions of 150 to 249 vary from black to pure red.

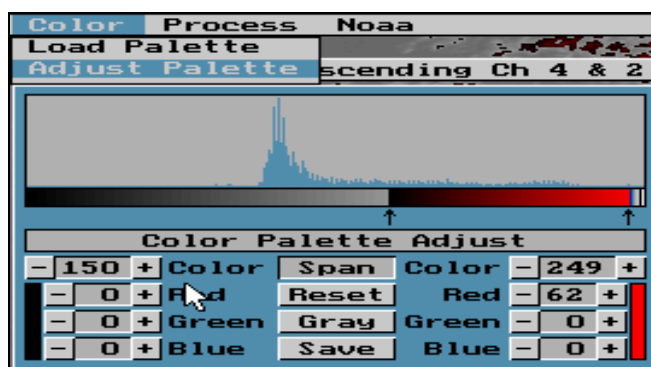


Figure 105 Adjust Palette Window

Starting from a gray scale, the following example is given to set the palette as shown in Figure 105. The color positions from 150 to 249 vary from black to a pure red when the adjustments are completed.

1. Select and adjust the left color number to 150. Use the mouse on the '+/-' buttons to adjust the number until the left color box reads 150.
2. Adjust the Red, Green, and Blue color values below the left Color box with the mouse, until they all read 0.
3. Select and adjust the right color number to case 249. Use the mouse on the '+/-' buttons to adjust the number until the right color box reads 249.
4. Adjust the Green, and Blue color values below the right Color box until they read 0. Adjust the Red color value until it reads 62.
5. Position the mouse cursor over the Span button, and press the left button to activate it.
6. Push the Save button to save the new palette to the hard drive.

The Color menu of Animate Setup allows the user to Load or edit user generated color palettes.

The basic steps required to create or adjust a user palette include:

1. Go to the ANIMATE Setup Screen and load an image file.
2. Load the desired user palette by pressing *Load Palette* on the menu bar (Figure 104). If you do not load a user color palette file, then the default grayscale image is the starting point. Note: You cannot modify or save NOAA curves.
3. Using the Adjust Palette window to adjust the palette until the image looks the way you want it to look.
4. Save the palette using a unique filename.

Upon returning to ANIMATE, The palette loaded in Load Palette/Adjust Palette remains active. The color palette can be removed at any time by applying a NOAA curve. In ANIMATE, press a key from the keyboard to load the corresponding NOAA curve, or press the 'L' key to reset the palette to the default linear grayscale palette. See "APPLYING NOAA ENHANCEMENT CURVES DURING ANIMATE" in this chapter for instructions on applying NOAA curves.

Reset

Resets palette to the palette in place before the latest palette modification was performed.

Gray

Reset palette to 256 color gray scale.

Save

Saves the colors selected to a palette file. Palette files end with the DOS file extension of ".PLT".

Set_Sector

Set_Sector is used to establish the image view used in capturing and animation loop sequences for the currently selected configuration. The view position and size is selected through the use of Zoom tools. To set the sector view of an image to be used in an animation loop:

Sector	
X	0
Y	0
Scale	1:1

Figure 106 Sector Parameter Display

1. Capture an image of the type to be captured by the specified configuration. For example, if a configuration named GOESVS exists for the purpose of saving and animating GOES Visible images, capture a GOES Visible image. It must be saved in the GOESVS directory.
2. Load the desired configuration. This will automatically change to the directory where the images for this configurations are stored.
3. Load a sample image file using the Load menu.
4. The next step is to create the view of the image that you wish to use in the animation loop. Use the Pan/Zoom menu to select the desired view. Detailed instructions for using the Pan/Zoom menu options are in the “Pan/Zoom” section of this chapter. The resulting upper left x and y corner coordinates and the “.ANI” image Scale are displayed in the “Sector” window in the ANIMATE screen (Figure 106).
5. Once the view has been set as desired for use in the animation loop sequence, press the Set_Sector menu store the x, y, and scale parameters. These parameters are used to create “.ANI” animation image files for this configuration from the images captured by ANIMATE.

Make_Sector

Make_Sector is used to create an “.ANI” image file from a regular image file. The resulting “.ANI” file can then be used in an animation loop. The sector size is determined by the parameters selected in Set_Sector for the currently loaded configuration (see above). To manually make a sector from a regular image:

1. Move to the directory containing the desired image(s) to use for making the sectors. If the directory “c:\qfax\goesvs” was created to store the GOES Visible images, move to this directory.
2. Load the desired image.
3. Press the Make_sector button.

Quit

Clicking on Quit returns the user to the ANIMATE screen.

Chapter 8 - Appendix

Glossary Of Terms Used

The following terms are defined in relation to their use in this manual. More explicit definitions may exist. A dictionary should be consulted for other uses of these terms.

AOS - Acquisition of Signal. When an orbiting satellite appears above the horizon at an height specified in degrees, the Acquisition Of Signal point is reached. For the purposes of this manual, this is the minimum elevation above the horizon where the signal from the satellite is noise free and can be received reliably. This is either:

1. The elevation at which it is possible to hear or “acquire” the radio signal from the satellite reliably and noise free. This elevation is dependent upon the type of antenna used. A Quorum Quadrifiler’s AOS is approximately 5 to 10 degrees above the horizon. Turnstile antenna’s generally give noise free reception when the satellite reaches 10 to 15 degrees above the horizon.
2. The point when the satellite reaches the height above the horizon (in degrees) that the user has established as a criteria to acquire the satellite signal.

APT (Automatic Picture Transmission) - The format used in real-time images of earth transmitted from polar orbiting weather satellites. APT data from U.S. satellites provides a resolution of 4 kilometers.

AZ - Azimuth. A compass heading, specified in degrees, from a given location. The Qfax PREDICT function shows the Azimuth for any satellite that is being tracked. This reading is only of use when the satellite is above the horizon of the receiving station.

Downlink - A transmission from the satellite to the earth.

EL - Elevation. The height of a satellite above the horizon (measured in degrees). The Qfax PREDICT function shows the Elevation for any satellite that is being tracked. This reading is only of use when the satellite is above the horizon of the receiving station.

FM - A radio system using frequency modulation to convey information. In frequency modulation, the principal frequency deviates in relation to the information stream being transmitted. Low earth orbiting satellites use an FM carrier in the 137 MHz band.

Geostationary Orbit - An equatorial orbit high enough above the earth that the speed of the satellite matches the rotation of the earth. Because the orbital velocity matches the rotation of the earth, satellites in this orbit appear to always be in the same sky position relative to a ground station.

GPS - Global Positioning System. A satellite system, which when used with an appropriate receiver, allows the receiver to calculate the receiver's location (in latitude and longitude) and the station's height above sea-level. This is particularly useful for marine vessels, since their position is not always fixed. With GPS, orbiting weather satellites can still be used, since the GPS establishes the receiver's position so an accurate map overlay can be determined.

LAT / Latitude - A measurement used to specify the north/south location component of any earth location. The unit is measured from +/- 90 degrees above or below the equator.

LON / Longitude - A measurement used to specify the east/west location component of any earth location. Longitude is measured in a range of +/- 180 degrees east or west of the Prime Meridian. The Prime Meridian is great circle line which is oriented north to south through the old site of the Royal Observatory at Greenwich, England.

LOS - Loss of Signal. When an orbiting satellite travels below the local horizon, or below an angle above the horizon specified in degrees, then the Loss Of Signal point is reached. This is either:

1. The time when it is no longer possible to hear the radio signal from the satellite. This time is dependent upon the type of antenna used. A Quorum Quadrifiler's LOS typically occurs when the satellite goes below 5 to 10 degrees elevation. The Quorum Turnstile antenna typically gives noise free reception when the satellite is at least 10 to 20 degrees above the horizon.
2. The point when the satellite goes below the height above the horizon (in degrees) that the user has established as a criteria to quit receiving the satellite's signal.

NADIR - The point on the surface of the Earth which is directly below a satellite.

Orbital period - The time it takes an earth orbiting satellite to go around the earth one time. For polar orbiting weather satellites, this is typically 102 minutes.

Polar Orbit - Polar orbiting satellites travel at approximately 600 miles above the earth in a path that carries them almost directly over the poles. Weather satellites in this orbit pass over any earth location once in the morning and once in the afternoon.

PR - PREDICT screen PRiority "Off/On" button. When on, Qfax observes a hierarchy of satellite priorities - A higher priority satellite always takes precedence over a lower priority satellite. See the PREDICT chapter for detailed description and instructions.

Transponder - A transmitter located on the satellite. Many transponders are capable of transmitting more than one signal simultaneously.

UTC - Universal Time Coordinated. The mean solar time of the longitude meridian located through the location of the old site of the Royal Observatory at Greenwich, England. UTC is used as the reference basis for time throughout the world.

VESA - Video Electronics Standards Association. A video standard used for interfacing to different video card adapters through a universal command set. Video Adapter cards must adhere to this standard in order to be compatible with Qfax.

Wefax - Weather facsimile or Wefax images. Geostationary satellites transmit weather imagery in this format. Wefax imagery is not real-time. Data from the satellite sensors is sent in a digital form to a NOAA ground station for processing, is converted to an analog signal, and relayed back to the satellite for transmission to Wefax ground stations. The ground processing includes the addition of map overlays, image enhancements for weather interpretation, header inclusion, etc. U.S. Goes satellite Wefax has a resolution of 8 kilometers for visible images and 4 kilometers for infrared images.

VESA Video Drivers and Compatibility

The Qfax software requires a video card with VESA version 1.20 (or later) support. Most recently produced VGA cards have VESA support included in their BIOS. Some VGA cards may require that the VESA mode be initialized by running a terminate and stay resident program (TSR). If you get an error message while trying to run Qfax, you may need to activate the VESA mode with the proper TSR. Included with the Qfax distribution disk are VESA TSR drivers for several video card manufacturers. The appropriate TSR should be run before Qfax is started.

Installing the driver in your computer's AUTOEXEC.BAT file insures the video card is initialized for VESA support each time you turn your computer on. Use an editor, such as the EDIT.COM, to add the name of the driver to the AUTOEXEC.BAT file. See your DOS manual for information on creating an AUTOEXEC.BAT file for your computer.

The VESA drivers are available from the Quorum BBS or Internet ftp site (see the “Updating Ephemeris Information” section in the Predict chapter for BBS phone number and Internet address):

DRIVER FILE NAME	VIDEO CARD NAME
37VESA.COM Oak	Technology OTI-37
67VESA.COM	Oak Technology OTI-67
APVESA.EXE	Appian
CRUSVESA.COM	Cirrus Logic
EVVESA.COM	Everex
GVESA.COM	Genoa Systems
ORCHDVSA.COM	Orchid Technology
PVESA.EXE	Paradise
SIGVESA.COM	Sigma Designs, Inc.
STB-VESA.COM	STB
TLIVESA.COM	Tseng Labs ET3000 and ET4000
TVESA.EXE	Trident TVGA 8800 and 8900
V7VESA.COM	Video 7
VESA451.COM	Chips and Technology 82C451
VESA452.COM	Chips and Technology 82C452
VGAVESA.COM	Techmar
VVESA.COM	ATI

Table 19 - VESA Drivers

Install the TSR for the VGA card you have. If you still are unable to run the Qfax program, you may need to upgrade to a new video card. Contact your video card manufacturer for assistance. If you purchase a VGA card, be sure it supports VESA V1.20 (or later).

Troubleshooting

This section lists common error messages and provides possible solutions for the causes of the errors. Most sources of errors can be corrected by carefully matching the problem being experienced with the displayed symptom or error code and following the instructions listed in the accompanying “Resolution”.

NOTE: We can assist with your problems with Quorum Equipment. We can not assist in troubleshooting other vendors or home-built equipment. If you are using other manufacturer's equipment, you must contact them for support of their equipment!

Qfax Software Does Not Run or Does Not Work Properly

If you experience problems running Qfax, begin by checking the following:

- Remove all unnecessary software TSR'S.
- Do not attempt to run Qfax from any shell program.
- Run Qfax from the MS DOS environment only.
- Check your mouse driver version. Some older versions cause problems. Be sure you are using a recent driver.
- If you are using a Logitech mouse, use Microsoft mouse driver version 9.0 or later.
- If your computer has less than 8 MB of RAM, set SMARTDRIVE CACHE to 256K (this will free memory for HF and APT images)

If you still have problems, check the following error messages.

Mouse Error

Error:

Qfax cannot continue because -

a Microsoft Mouse driver was NOT detected!

Resolution: If a Microsoft compatible mouse is not present

- Install Microsoft compatible mouse
- - or -
- If a suitable mouse driver is not installed
- Install appropriate mouse driver
(refer to mouse manual for installation instructions)

Video Becomes Scrambled And Unreadable

Error: The video screen becomes unreadable. The VIEW/RESOLUTION menu option allows the user to choose the screen resolution to be used by QFAX when displaying images. Allowable options are 640 x 480, 800 x 600, 1024 x 768, 1280 x 1024. The options are controlled by the type of video card and amount of video ram present in the system. If a video mode is selected that is not compatible with the system hardware, the monitor can become unreadable or scrambled.

Resolution: If this occurs, hold the left and right mouse buttons down together for 3 seconds to restore the hardware to the standard VGA 640 x 480 mode.

Video Adapter Related Errors

Error: Qfax could not detect a VESA Video Driver

Resolution: Check to be sure that you video adapter supports VESA modes and that any required VESA driver TSR is installed correctly.

Error Message:

Qfax cannot continue because -

Video Memory Window size MUST be 64K
Video Memory Granularity MUST be greater than 0K
Could not find a readable Video Memory window
Could not find a writeable Video Memory window
640 x 480 256 color VESA mode is not compatible
Mode 0x101 is not supported by Video Bios or VESA Driver
Not enough memory to set 640 x 480 mode
Your video system does not support 640 x 480 mode!

Resolution: These errors indicate that the video card in use does not meet program requirements. Qfax requires a video driver card with the following minimum specifications:

VESA 1.2 or greater compatibility
512 Kb or larger Video memory
Video Memory Window size of 64K
Video Memory Granularity greater than 0K.
Supports VESA video mode 0x101, 640 x 480 x 256 color mode.

Contact your preferred PC or video card vendor to obtain a suitable video card that meets the listed video card requirements.

Error:

Your video system does not support 800 x 600 mode!
Your video system does not support 1024 x 768 mode!
Your video system does not support 1280 x 1024 mode!

Resolution:

The computer's video card does not have sufficient memory to support these modes or does not support higher resolution SVGA video modes. You can:

Use a lower resolution (640 x 480 x 256)

- or -

Upgrade to a VESA compliant video card with adequate memory to support the desired modes.

Qfax Program Setup Errors

Error: NO CONFIGURATION FILES FOUND!

Resolution: The program needed, but did not find any satellite configuration files (*.CFG). Copy the “.CFG” files from Qfax program disk or create new ones. See the “OVERVIEW - SATELLITE CONFIGURATIONS” chapter of this manual for detailed information about configurations and configuration files.

Error: No more room for configuration files!

Resolution: A maximum of 50 satellite configuration files is allowed. When this message is received, erase any unused configurations to create space for new configurations.

Error: Qfax detected a Setup Error - Review Setup

Resolution: When the Qfax programs starts, it checks to verify that the Wefax adapter and optional receivers specified in the CAPTURE setup screen are working. This message indicates that the address specified in the CAPTURE setup screen and the address set on the adapter card (and receiver cards if applicable) do not match. Refer to the appropriate hardware manual for instructions on setting the address on the hardware, and to the “INSTALL” chapter of this manual for instructions on using the CAPTURE setup screen.

File Errors

Error: Error saving file

Resolution: An ambiguous error message was returned to Qfax from the operating system file handling routines. This error should not occur. If it does, suspect that the Qfax program or operating system files are corrupt. Reinstall the programs and restart the computer.

Error(s):

Qfax can not read this GIF file!
Qfax can not read this PCX file!
Qfax can not read this TIFF file!
Qfax can not read this BMP file!
Qfax can not read this JPEG file!

Resolution: The image file:

- May be corrupted.
- Does not meet image format specifications.
- Is written in a format that is not used by Qfax.
- For TIFF or JPEG - File could be a 24 bit color file.

Generally, this error indicates that the file is not a 256 color file. *Qfax is not a general purpose image viewer.* Qfax is designed to read the image formats supported in satellite reception and viewing modes.

Error: File is not a valid QFX file!

An attempt was made to open a file as a “.QFX” file, but the file was not saved in the .QFX format or has been corrupted.

Polar Orbiter Satellite Errors

Error: No Space Available! Do you want to Delete a Satellite First?

Resolution: Eight slots are available for tracking satellites. This error occurs when eight satellites are currently be tracked, and the user attempts to add another satellite. Delete another satellite before attempting to add a new one.

Error: Duplicate Satellite Names Not Permitted - Press a key!

Resolution: Each satellite configuration must be saved with a unique name. Save the configuration using a name that is not currently in use.

Error: A CONFIGURATION DOES NOT EXIST FOR SAT dddd

Resolution: In order to receive a satellite, the Qfax program must know what type of signal to receive and how to setup the receiver. Create a configuration for the desired satellite to resolve this error. Refer to the “OVERVIEW - SATELLITE CONFIGURATIONS” chapter in this manual for more information regarding configurations.

Error:

Format Error for sat *name* in Line 1 of Ephemeris Data - Press a Key!

Format Error for sat *name* in Line 2 of Ephemeris Data - Press a Key!

Resolution: The ephemeris data file “elements.dat” does not match the expected format. Obtain a new copy of the data file and copy it to the Qfax directory.

Error: Checksum Error in Ephemeris Data for sat *name* - Press a Key!

Resolution: The ephemeris data file “elements.dat” is corrupt. Obtain a new copy of the data file and copy it to the Qfax directory.

Error: Satellite *name* not found in Ephemeris file - Press a Key!

Resolution: An attempt was made to use a satellite that was not contained in the Ephemeris data file “elements.dat”. Be sure that the correct name and spelling have been used for the satellite. A common error is to make a configuration with a name that is slightly different that the satellite’s name in “elements.dat”. For example, if “NOAA 14” is in “elements.dat”, a configuration added to PREDICT using the name “NOAA-14” will cause this error. The names must be exact! If the satellite is not listed in the ephemeris file, correct the configuration and save it with the correct name or obtain a file that contains this satellite. Refer to the “OVERVIEW - SATELLITE

CONFIGURATIONS” chapter in this manual for information and instructions for setting configurations.

Error: Can’t find file ELEMENTS.DAT - Press a Key!

Resolution: The “elements.dat” file contains information required for Qfax to track satellites. This file must be present in order for the PREDICT function to operate. Refer to the “UPDATING EPHEMERIS INFORMATION” section in the PREDICT chapter for instructions on obtaining this file.

Error: File does not contain ephemeris data!

Error: Ephemeris data for this satellite is not in this file!

Resolution: When the image was saved, the “elements.dat” file did not contain information in the expected format or the name of the configuration file did not match any satellite names in the “elements.dat” file. The file must conform to Norad 2-line ephemeris data format. Refer to the “UPDATING EPHEMERIS INFORMATION” section in the PREDICT chapter for instructions on obtaining a correct copy of this file. The ephemeris data does not exist in this image file, and the image cannot be navigated.

The conditions that cause these errors can be corrected by

- If the “elements.dat” file is corrupted, obtain a valid “elements.dat” file. See the “Predict” chapter for instructions on obtaining suitable ephemeris data files.
- Use Norad formatted 2 line ephemeris data files. Do not use AMSAT ephemeris data files.
- Use satellite names exactly as listed in the “elements.dat” file when saving a configuration. The names “Noaa 14” and “Noaa-14” are not the same. If “Noaa 14” is the name in the ephemeris file, then the configuration must be named exactly the same! See the EDIT option of the NOAA menu of the “VIEW” chapter in this manual for complete instructions for editing configurations.
- Occasionally, when a new satellite is launched, there may be a delay before ephemeris data is included in the Norad ephemeris data files. The error will no longer occur when an updated ephemeris data file containing the satellite’s name and tracking data is used.

Error: File does not contain a satellite name!

Resolution: When a NOAA satellite pass is captured from the CAPTURE screen, the satellite’s name and direction of travel is NOT saved to the file. In order to navigate a file saved in the CAPTURE screen, the satellite name and its direction of travel must be added to the file. See the EDIT option of the NOAA menu of the “VIEW” chapter in this manual for complete instructions.

Error: The Ephemeris data for this satellite contains an error!

Resolution: The ephemeris data sent to the numeric processor was incorrect, probably due to a corrupt “elements.dat” file. The “elements.dat” file should be replaced. Refer to the “UPDATING EPHEMERIS INFORMATION” section in the PREDICT chapter for instructions on obtaining a copy of this file.

Error: The Ephemeris information in this file is not usable!

Resolution: The ephemeris data in the “elements.dat” file is corrupt. The file should be replaced. Refer to the “UPDATING EPHEMERIS INFORMATION” section in the PREDICT chapter for instructions on obtaining this file.

Error:

Can't find file SATS.DAT - Press a key to continue

Resolution: Copy the “SATS.DAT” file from the Qfax Program Disk, or create new satellites within PREDICT.

Error:

Can't find MAP.DAT - Press a key to continue

Resolution: Copy the “MAPS.DAT” file from the Qfax Program Disk to the Qfax directory.

Polar Orbiter Predict Errors

If *all* satellites cannot be heard during predicted times, it is most likely due to a hardware or software problem. If only a few are not heard when expected, then it is probably due to the fact that the ones not heard are not transmitting.

If you are unable to receive polar orbiters, carefully check the following items. The most probable causes of problems relate to software settings. Carefully check all settings, and do not assume they are correct!

If satellites cannot be received when expected, you should be aware of the following possible causes:

1. The UTC offset is incorrect. Correcting the offset resolves the problem.

Important! If the UTC time offset is not set correctly, satellite tracking will not be correct! The Predict function uses the offset to determine when satellites are within range of the receiving station. To assure that that orbital predictions are correct, be certain this offset is correct! Refer to the “Initializing Local Station Information” section in this manual for instructions on how to set the UTC offset.

2. Satellites are routinely switched off:
 - For maintenance purposes

- To avoid transmission conflicts with satellites that transmit on the same frequency when they are in close proximity of each another.
3. The computer's internal clock is set to the wrong time. Refer to the TIME command in the MS DOS manual for information on how to set the correct time.
 4. The computer's date function is set to the wrong day. Refer to the DATE command in the MS DOS manual for information on how to set the correct day.
 5. Preamp power is set to *off* in the satellite(s) configuration. Correct the configuration from within the Capture Screen.
 6. A hardware problem exists. Be certain all cables are plugged in.

Goes Image[s] Are Upside-down

Error: Maps and Meteosat images relayed through GOES satellites are sent upside-down due to the way the images are uplinked to GOES for Wefax transmission. Earth images taken by the GOES satellites will appear correctly oriented on the screen.

Resolution: Meteosat images relayed through GOES and maps sent by GOES can be correctly oriented using the VIEW Rotate 180 command, located in the File menu. Save the rotated image to disk to make the change permanent.

Memory/Disk Space Errors

Error: Qfax could not save this image because there is not enough disk space available.

Resolution: Not enough storage space exists on the hard drive. Delete unnecessary and unused files to create more space, or add a larger capacity hard drive to the computer.

Error: Qfax could not allocate the maximum required memory for this image type. The image size will be limited to nnn lines!

Resolution: There was an insufficient amount of system RAM available to Qfax to hold an image beyond the specified number of lines (nnn). Additional system RAM must be added to the computer to eliminate this problem.

Error: Error attempting to allocate image buffer!

Resolution: This usually indicates that a defective area of system RAM was detected. Check and replace RAM as necessary.

Error:

Not enough memory or Disk error attempting Print

Not enough memory or Disk error attempting rotate 90 degrees

Resolution: Qfax utilizes a RAM buffer while printing or rotating an image. There may not be enough RAM or disk space available for the required buffer. In either case,

the program attempts to create a buffer in RAM. If there is not enough RAM, then it tries to use space on the hard drive. If space cannot be found in RAM or on the drive, then this error message appears. Add additional RAM or make more storage space available on the hard drive.

Error: Error allocating conventional memory!

Resolution: A very low amount of conventional memory is available. This can be caused by an excess number of TSR programs or inefficient TSR's being resident in system RAM. Clear more conventional memory or boot the computer using a clean "boot-disk" that does not load unnecessary TSR's. Refer to the MS-DOS or operating system manual for information on clearing conventional memory.

Error: VIEW ERROR. This image file is too large to load. Press RIGHT mouse button to continue.

Resolution: This message appears under two different circumstances:

1. If you are running QFAX within a Windows 3.1 DOS-PROMPT window and get this message, then Windows has not left enough memory for the Qfax image buffer. You can try using the Windows PIF Editor to increase the amount of XMS memory available to DOS applications, or exit windows and run QFAX from MS-DOS.
2. If this error occurs when QFAX is running from MS-DOS, then there is not enough system memory available to hold the image. If you are using VIEW in a high-resolution video mode, try reducing the resolution. If the image still fails to load, the system needs to have more system memory added.

Error: This image is too large for Qfax to load into available memory!

Resolution: There is insufficient EMS or XMS RAM available to hold the data in the image file. Reduce screen resolution, or add additional RAM to the computer.

Error: Qfax could not read this image file!

Resolution: Qfax attempted to read a file and encountered an unexpected error in the process. This message does not normally occur. This message may indicate there is a corrupted image file or Qfax program file. Try to load other images. If the problem continues to persist, copy the program files from the Quorum Program Disk to the Qfax directory.

Error: Qfax could not allocate enough memory for a screen buffer!

Resolution: This error should only occur with low memory conditions in a computer with 4 megabytes or less RAM. Try using a lower screen resolution, or add additional system memory.

Timezone Environment Variable Error

Error: Qfax attempted to set the TZ (timezone) environment variable but failed...

Certain functions of the Qfax program require that the Timezone Environment Variable be set up in the computer's AUTOEXEC.BAT file, which sets variables specified in the file each time the computer is booted or rebooted. Satellite prediction and navigation rely on storage and conversion to true UTC time and may not operate correctly if this variable has not been properly initialized.

Resolution: This resolution is only required if the Qfax software displays the TZ environment failure error message (above). To initialize the Timezone Environment Variable add the following statement to your AUTOEXEC.BAT file:

```
SET TZ=GMT0
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Reboot your computer, and restart Qfax.

If you still have problems after checking the error messages, before calling, Quorum Technical Support, please have the following information available:

- Video card chip manufacturer and video RAM on the card
- DOS version
- Mouse manufacturer and driver version
- CPU type and speed
- Amount of RAM installed on the mother board.

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