Gary Sargent WB8TPD
4227 Willow Run Drive
Dayton OH 45430

HF WEFAX for the ATARI

Software by Gary Sargent, WB8TPD

Circuit by Keith Sueker, W3VF

This circuit and software have been successfully used with the Atari 800, 800XL, 1200XL and 130XE computers by Gary Sargent.

Have you ever been tuning the shortwave bands and encountered the distinctive "screech screech" sound of a facsimile signal and wondered what type of information was being transmitted? Very interesting weather charts and satellite photographs are transmitted by various services continuously. These charts will allow you to answer pertinent questions such as: Will it snow on Kamchatka today?, Is the Gulf Stream changing its path?, or Should I take my umbrella to work tomorrow?

If you happen to have an Atari computer system available, using the circuit and computer program described here you will be able to receive and display these facsimile signals. The received charts are displayed on the computer's monitor or TV screen and are roughly two displays wide and three displays long. A joystick is used to scroll the screen around the chart.

The components of this system are: a good-quality communications receiver with SSB capability, a simple tone-detector circuit, an Atari 800 computer system, and the computer program, VISIFAX.

Capabilities

This system will properly display facsimile signals sent at a rate of 120 or 60 lines per minute (LPM). These rates (particularly 120 LPM) are used by most commonly heard stations.

The computer samples each received line a nominal 480 times and can display 512 lines horizontally. While this resolution can give good results, it is less than 50% of the resolution transmitted. Also, gray tones are not used. Thus this system is more suitable for high-contrast, large-format weather charts than for satellite pictures and similar charts with much fine detail.

Figs. 2 through 4 are samples of charts that I have received at my location and are representative of the system's capabilities.

Receiver Requirements

The receiver that you use should be a stable, good-quality general-coverage receiver with SSB capability. If your receiver provides acceptable ease of tuning and frequency stability for SSB voice signals, it should be usable for facsimile reception. I have used a Yaesu FRG-7 and a Sony ICF6500W with good results.

The Tone Detector

The tone detector is a simple circuit that connects between the receiver audio output and joystick port 2 of the computer. The detector converts the facsimile tones to TTL pulses that the computer can use. The circuit is shown in Fig. 1.

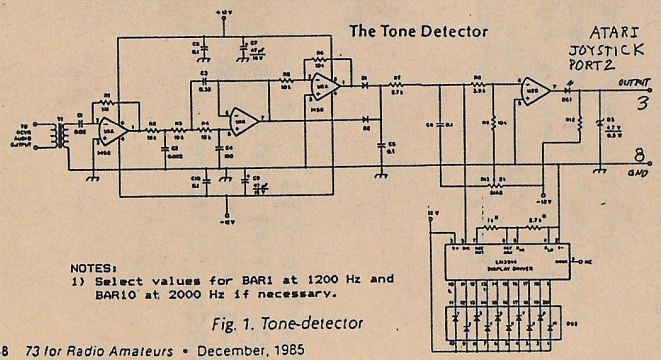

Fig. 1. Tone-detector

The Computer System

The Atari 800 computer and the VISIFAX program are the heart of the system and control all aspects of reading and displaying facsimile charts. The program is written entirely in assembly language and is not shown here because of its length (about 30 pages). It is a complex program that uses several of the Atari's sophisticated capabilities to do the job at hand. The computer is required to have 48K of RAM because of the size of the chart. A disk is required only to load in the program. An optional printer may be used to produce a hard copy of the received chart and was used to produce the charts that accompany this article.

VISIFAX At Work

VISIFAX begins by initialing for operation, which includes setting up the Atari's hardware timer #4 to interrupt to sample line data and plot it 480 times per line or 960 times per second.

Next, the program will check the joystick plugged into port one of the computer to see if the displayed chart is to be scrolled on the screen. The scrolling effect is accomplished by manipulating the computer's display list.

Finally, the program checks to see if a keyboard key has been pressed. If so, its corresponding command is performed.

The computer screen includes two lines of text at the bottom. These two lines display the available commands and certain status information. To invoke a particular command, only its first letter must be pressed. Any command may be used at any time. The commands are:

RESET: An R will start the process of displaying a chart. The chart is displayed as received from left to right and from the bottom to the top (so most charts are viewed normally...without your having to stand on your head!). Pressing the R again will reset the displayed chart to the left of the screen without altering the synchronization.

SYNC: An S will have the effect of displaying subsequent received lines down the display about one-half inch. This command should be used as required to properly center the received chart. Most stations precede charts with a short period of synchronizing lines that may be used for centering.

LINE-SKIP: An L will increment the number of received lines to skip between displayed lines. This feature will allow compressing of the received chart horizontally, fitting more of it onto the computer's screen. I find that a LINE-SKIP count of 1 is used most often.

MODE: An M will step through the three possible modes of operation. The present mode is shown on the screen's bottom line. Mode "one" indicates that the chart will be received and the process will complete when the right-most line is displayed. Mode "cont" allows the continuous display of charts, with one overlapping the last. Mode "wait" halts the display of any more received lines but does maintain synchronization. This feature may be useful to eliminate unwanted sections of a known chart.

PRINT: A P may be used to print a copy of the present chart on a Gemini 10X printer. The eight-by-eight-inch chart will require about three minutes to print. To abort the printing process, enter another P.

LPM: A 1 or 2 may be entered to select the desired received LPM rate. A 1 will select one line per second (60 LPM), while a 2 will select two lines per second (120 LPM).

Finally, the right portion of the bottom line of the screen indicates the present number of rows (or pixels per received line) and the amount of time between samples, both shown as hexadecimal numbers. The <, >, +, or – keys may be used to increment or decrement these values. This may be required to fine tune your computer to synchronize with the received chart.

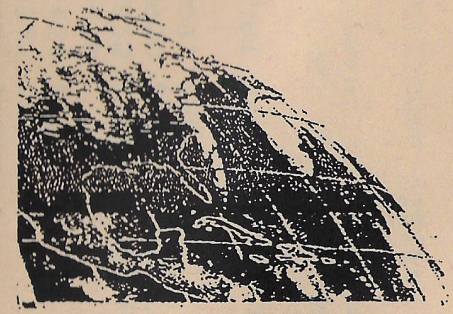

Fig. 2. GOES satellite picture as copied on 8080 kHz. Major cloud cover areas and fronts are readily observed.

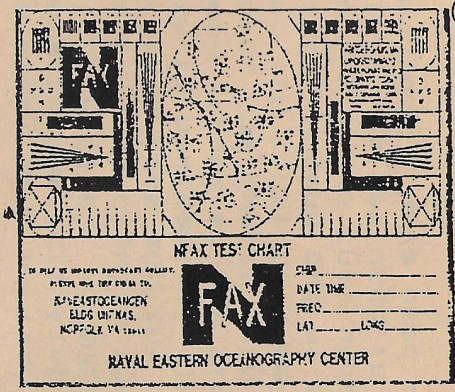

Fig. 3. Test chart copied from NAM on 8080 kHz. A good example of the resolution capabilities of this system.

How To Use the System

Before starting up your computer, make sure all cartridges are removed. If you have an 800XL computer, hold down the OPTION button while powering on to make sure that Basic is out of the way. 800XL owners will also have to load in the TRANSLATOR disk before loading in VISIFAX. After booting, use Atari DOS option L to load and start your copy of VISIFAX.

Fire up your receiver and then connect its audio output to the tone detector's input and the tone detector's output to joystick port 2 on the computer. Tune in a strong facsimile signal until its characteristic "screech screech" sound is of a medium pitch.

Press R on the keyboard to start displaying the chart. Use the S and R keys as required to properly position the chart vertically on the display. Fine tune to get the sharpest picture.

Except when printing a chart, the joystick may be used at all times to scroll the received chart around the display.

Where To Tune

By far the best facsimile signals at my location are from the Naval Eastern Oceanography Center (NAM) on 3357, 8080, 10,865, 16,410, and 20,225 kHz. Weather charts and satellite photographs of all types are broadcast nearly continuously.

Canadian station CFH out of Halifax, Nova Scotia, on 4217, 6330, 10,536, and 13,520 kHz also puts out good facsimile signals. CFH usually broadcasts one or two charts for the first 15 to 30 minutes of each hour.

I have also heard and printed charts from a number of other stations. Try 7640, 7670, 9400, 10,400, 12,125, 14,435, 14,5[illegible], 14,610, and 14,737 kHz.

The Atari Editor/Assembler cartridge was used to develop VISIFAX. The source-code file should be compatible (with a few minor modifications) with any 6502 assembler you might happen to have.

(3)

Gary Sargent WB8TPD
4227 Willow Run Drive
Dayton, Ohio 45430
Ph. 513-426-0946

SUPPLEMENTAL VISIFAX INFORMATION

CONTENTS OF THE DISKETTE

1) VISIFAX.ASM ... This file is the assembler language source code of the program as written by the Assembler-Editor cartridge.
2) VISIFAX.LST ... This file is the program listing file created by the Assembler-Editor cartridge when VISIFAX was assembled. You may copy this file to your screen or printer to view the assembled program.
3) VISIFAX.OBJ ... This file is the assembled VISIFAX program as created by the Assembler-Editor cartridge. Use DOS option 'L' to load and start this program.

ADDITIONAL FAX STATIONS HEARD HERE

FREQ.	TIME	NOTES
4050	1230	
12730	1200	NMC San Francisco, Ca.
13470		
13485	1830	
14365	1800	
14430	1800	
14690		
14825	1625	NPM Pearl Harbor, Hi.
15950	1240	Moscow ? 60 LPM
18091	1200	

ATARI SYSTEM USED FOR PROGRAM DEVELOPMENT

* ATARI 800 with 48kb ram, 850 interface, and 810 disk drive
* Gemini 10X printer (connected to 850)

ADDITIONAL VISIFAX NOTES

The right hand portion of the bottom line of the VISIFAX display contains the following general contents:

.... <R 01DC> -T 0751+

These items display the number of 'rows' or pixels per displayed vertical line and the current pixel delay time count, respectively, both in hexidecimal. The <,>,+, and - keys may be used to alter these values at any time. This option was provided to allow fine tuning the system such that the received chart is very closely in sync (in terms of time per pixel and line) with the transmitting station. Being out of sync will result in some level of tearing (or sloping lines that should be horizontal) of the received chart. The default values used in the program were correct for three different computers I have used ... it should be correct for your system too.