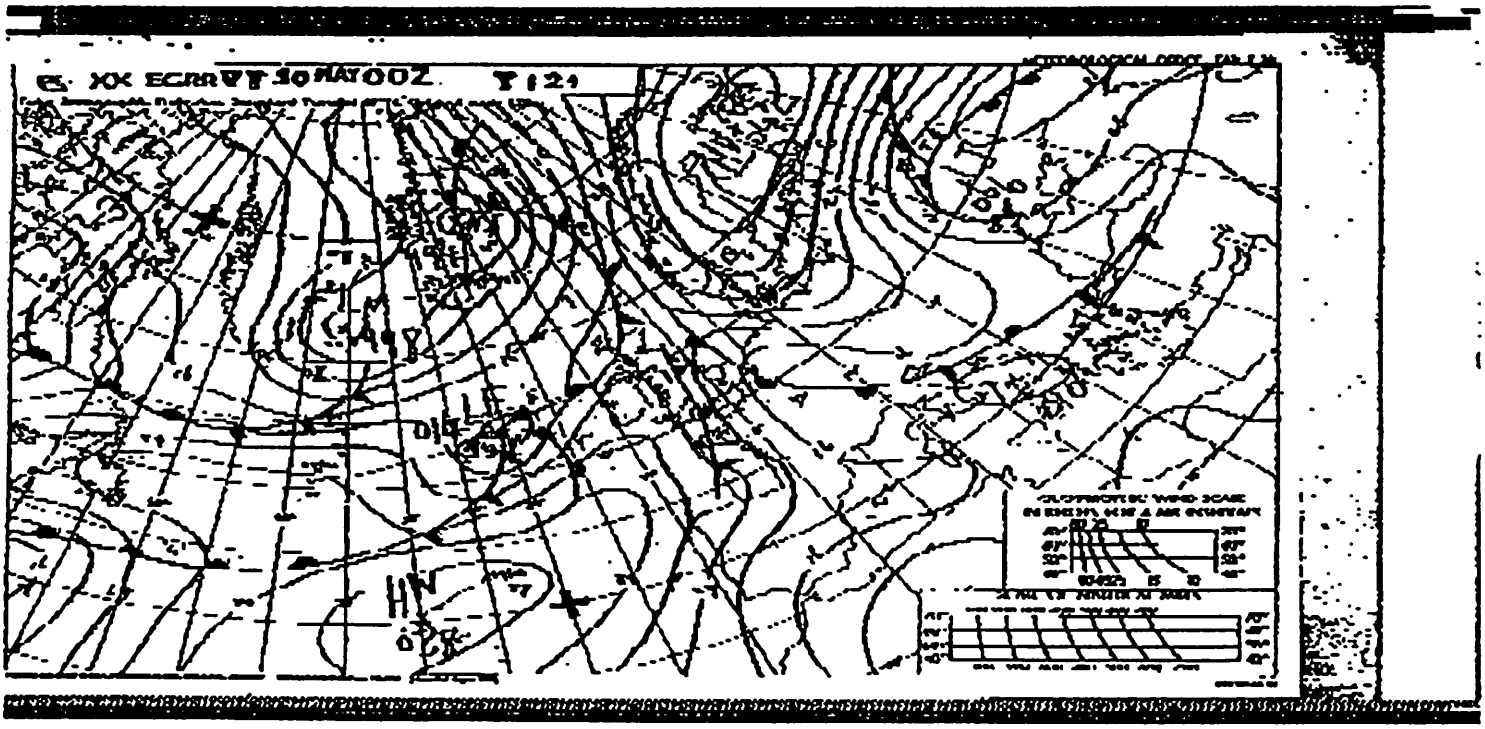
WEFAX

DECODE WEATHER FAX SIGNALS
BROADCAST ON SHORT WAVES.



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Although every attempt has been made to ensure that this software is suitable for the intended purpose, it requires a radio reciever to be plugged into the computer. Unsuitable equipment could damage both the radio and / or the computer. As this connection is beyond our control it is up to the user to establish the suitability of the equipment to be used.

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WEFAX

DECODE WEATHER FAX PICTURES ON THE DRAGON OR COLOUR COMPUTER

Facsimile -or fax for short- is a communication technique whereby graphic information is converted into electrical signals for transmission to a receiver which, ideally reproduces a hard copy printout of the original. Facsimile stations can be received on the short wave bands, and are intended primarily for the transmission of weather charts, press photographs, and hand written messages. A fax receiver is traditionally a rather complex electro- mechanical device which does not lend itself to DIY construction for it is usually based on the recording of the received image on either electrolytic or photosensitive paper. This paper is secured to the outer surface of a revolving drum and the signal is used to vary the brightness of a lamp (in the case of photo sensitive paper) and so produce the picture.

Fax pictures are mostly transmitted as a frequency shift keying signal (FSK; denotation F4) similar to the cassette system on the computer. The centre frequency is usually 1900Hz, and white and black correspond to a frequency shift of +400 Hz and -400 Hz respectivly. At the receiver side, a sheet of paper is secured onto a drum with a standard diameter of 152mm and a minimum length of 550mm. A worm drive and clutch assembly are used in conjunction with a precision electric motor to make the drum revolve at 120 revolutions per minute. Prior to the reception of a new picture, the system is synchronised with the aid of a number of black lines with an initial white period, as can be seen in fig. 1. After every complete revolution of the drum the lamp is moved laterally for the recording of the next vertical track. Apart from 120 rev/min stations there are also services that operate at 60, 90 and 240 Hz.

The size of the picture elements recorded on paper is usually of the order of 0.1 to 0.2mm, thus the need for precision parts in fax machines. The writing of the chart commences with the initial black 'sync bar' and in order for the picture to be drawn correctly the transmitter and reciever must operate at the same clock frequency. Any difference in the clock frequency will result in the picture slanting causing the picture to become confused and distorted.

All this may sound rather complicated but WEFAX enables you to decode these weather fax signals easily and cheaply on your Dragon or Tandy Colour computer. You will require a short wave reciever that is capable of single sideband reception (SSB) and at least 64K of memory. The disk supplied has two example pictures that you can view or print.

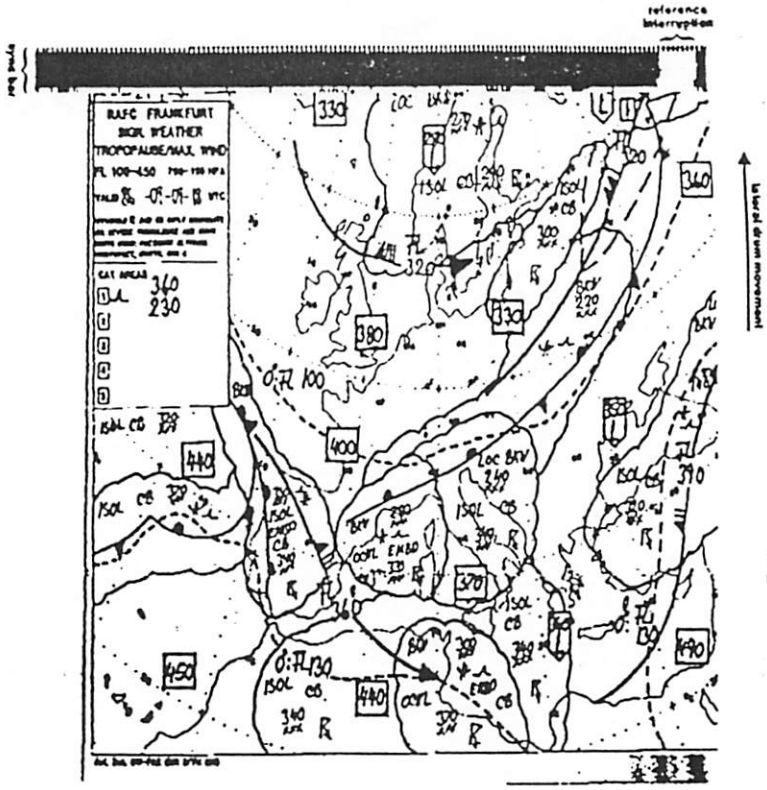


fig 1 A typical fax picture

WEFAX needs no expensive, or complicated equipment, just your computer and a good shortwave receiver. This must be able to receive single sideband transmissions (SSB) as almost all fax transmissions use Upper sideband (USB) for transmission. The connections between the radio and the computer are shown later.

ABOUT THE WEFAX DISK.

WEFAX has it's own disk routines and can save two picture on a single floppy disk. It is important to note that these pictures do not appear in the directory. As each picture is 54K in length there is very little room on the disk for other programs. For this reason do not try to save other programs on this disk. If you intend to make any alteration to the programs only do it on a backup copy.

By all means make as many backups as you require for your own use, but please do not pass these on to your friends (or any third party).

If you find it necessary to alter the timing loop values in the Basic loader (WEFAX.BAS) then you should use the following method (on a copy!).

1. LOAD "WEFAX.BAS"
2. KILL "WEFAX.BAS"

at this point the program is in the computer's memory, but has been removed from the disk (do not turn the computer off yet, until the program has been re-saved).

3. LIST the program and find the lines containing the timing values. Each value, there are three in all - for 60 Hz, 90 Hz and 120 Hz- will have to be altered individually. Although if you do not intend to use either 60 Hz or 90 Hz then these can be left.

4. Make the required change, remembering to make a note of the old value.

5. SAVE "WEFAX.BAS". The program now occupies the same space on the disk as it did before.

6. Now run the program and check the results.

ABOUT THE PROGRAM.

The program first appeared in the RAINBOW magazine in February 1985 and that version, for the Colour Computer was public domain. However, this version for the Dragon differs from that version in a number of respects and should under no circumstances be given to a third party.

The program, written in machine code, is about 2K long and uses the zero crossing detector of the cassette port to decode the fax signal, turning it into a 54K picture in memory. Now a 54k image is exactly nine times more information than can be displayed on the screen at one time, so the program allows the user to pan the High-Res screen over that larger 'virtual' image.

Disk access routines allow two pictures to be saved to, or loaded from disk as well as viewing single screens from the nine that make up the complete picture. Finally, the picture can be dumped to printer. All program control is via the joystick and one fire button.

Due to the 64k RAM memory limitation of the computer only about one half of the data contained in the fax broadcast can be processed, even so the images produced are of remarkable quality. During transmission a 6k compressed representitive image is displayed on the screen and when the picture is complete you are switched to the 54k image and the pan function.

Normally the extension speaker socket can be connected directly to the cassette port of the computer, but a simple interface that may help with reducing the effects of drifting or noise is shown in the appendix.

RUNNING THE PROGRAM.

Put the disk in drive 1 (drive 0 on the CoCo) and type RUN "WEFAX.BAS" and after the introductory screen the main menu screen will appear, as shown below.

```
                    WEFAX RECIEVE MENU PAGE

                RECIEVE  *60*  *90*  *120*  LPM


                  *PRINT TO EPSON PRINTER*

                 *REVERSE VIDEO THE PICTURE*

        DISK                *VIEW*   1 ***   2 ***
        PICTURE             *LOAD*     ***     ***
        STORAGE             *SAVE*     ***     ***

        TUNING              I--------------I
        METER:           1500            2300

        JOYSTICK                  RESTART SCAN
        USE WHEN            PHASE   HOLD   PHASE
        RECIEVING           <--     SCAN     -->
```

Control is via a joystick plugged into the right hand port.

Setting up the radio.

If you find that the computer interferes with the radio, try moving the two apart. Another thing to try is coiling the cassette cable around a ferrite rod. It also helps to use shielded cable to the aerial, at least 20 feet away. A simple wire, 15 to 20' long is often all that is needed, but will obviously depend on your location. Noise from electrical installations such as thermostats will show up on the picture as a band of dots, while fading of the signal will produce a light, or dark band across the picture. The optional limiter/monitor shown in the apendix will help in reducing these effects. It also lets you monitor the signal at a comfortable level, while maintaining a good signal to the computer. Set the volume control on the radio to between one third and one half.

The Menu.

The menu screen of WEFAX is in some ways like the control panel of a mechanical facsimile receiver. Try moving the joystick around, you will see the various functions highlighted.
To select any function, move the joystick until that function is highlighted, then press the fire button. When that function is complete, or if you dont select any function and press the button, you will pan over the picture (see PAN).

To abort any function, hold down the fire button until it stops (this may take a second or two for some of the functions like PRINT). Dont tap the button, just hold it down until the operation stops.

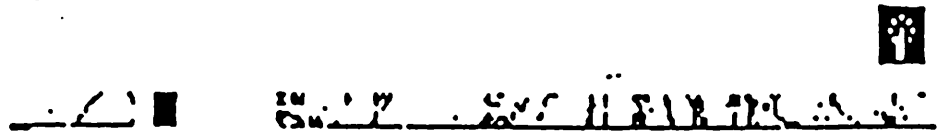
TUNING IN A FAX STATION.

Appendix B gives a list of some fax stations, but in the UK perhaps the best one to try first is Bracknel. One of the Bracknel stations will be transmitting almost any time during the day. Some times the station will broadcast a continuous 'high tone' corresponding to white, 2300 Hz. You can use this to set up the tuning meter. The sound a fax signal makes is quite unmistakable and after a while it is possible to pick out the various parts of the picture. Having found a station tune the radio to give the highest reading on the S meter (dont forget to switch to USB). Notice the black square moving on the tuning meter, adjust the BFO control until the movement of the pointer is mostly contained between the 1500 and 2300 Hz marks. Weather charts are mostly white, so the pointer will tend to be at the 2300 Hz side when tuned to the proper sideband.

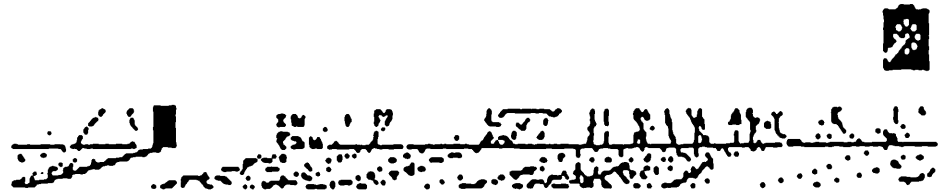
Weather signals:	I----------I 1500 2300
Phasing interval, mostly black:	I----------I 1500 2300
Effect of noise:	I--------I 1500 2300

RECIEVING THE PICTURE.

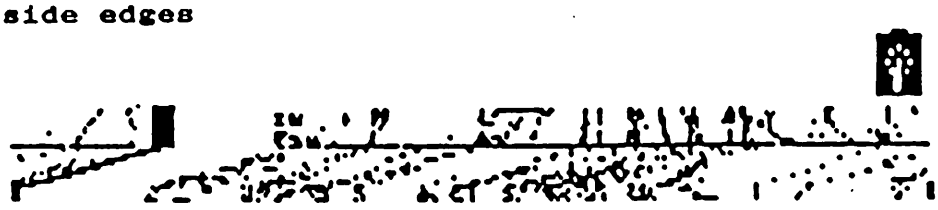
Now select 120 lines per minute (for most stations), and press the button, move the joystick to centre bottom and you are now receiving a picture.
If you start when a chart is in progress you may see that the chart is not properly centred.



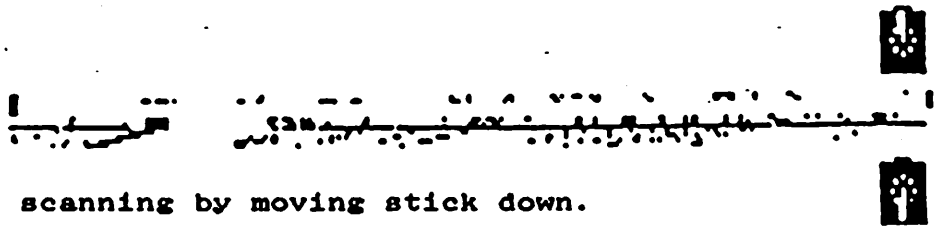
To centre (phase) the incomming picture, move the joystick in the direction that you want the picture to move.



Return the joystick to centre bottom again and see if picture detail is in from side edges



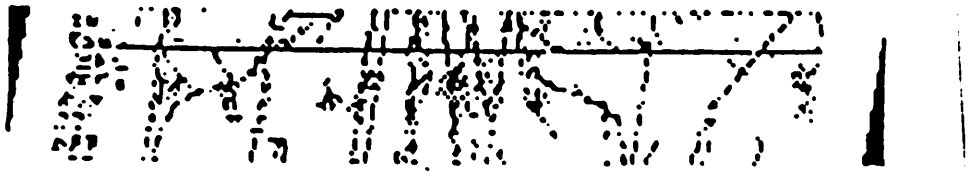
Move joystick to top centre and wait a second for the scanning to start at the top again



Then resume scanning by moving stick down.

SETTING THE FINE SPEED CONTROLS.

Since fax requires very accurate speed, the slight variation between different computers must be adjusted for. If the picture appears skewed on your computer adjust the numbers in the Basic program WEFAX.BAS (as detailed earlier, see About The Wefax Disk). This is an example of the number being too large:



If you were using 120 Hz then change that value (for example try decreasing it by 10 for the above example). Some experimentation will be needed to get it just right. Note each speed must be altered individually.

PAN OVER PICTURE.

Pressing the fire button when no function is highlighted shows you the picture in memory. Since this picture is much larger than can be displayed, the screen is made into a window which is used to pan over the high-res picture. Move the joystick around to see the rest of the picture. Pressing the button gets you back to the menu (Note: if you do this before a picture is in memory then you will see a memory start up pattern.

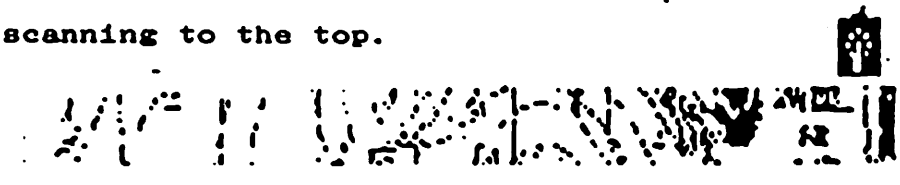
All the menu functions end with a pan over picture. After any function you can press the fire button to return to the menu.

STARTING AND PHASING.

WEFAX recieve uses a manual start, phasing and stop (abort). Many radios are not frequency stable enough to make use of the World Meteorlogical Organisation (WMO) remote control signals (300 Hz start, 25s 5% white phasing and 450 Hz stop). To start: select the speed appropriate for the station tuned in. When you hear a low tone followed by a 'tweedling' sound, press the button and move the joystick to centre bottom. This is a phasing interval and picture edge mark.

Phase the white break so that it is on the right hand edge, by moving the joystick that way.

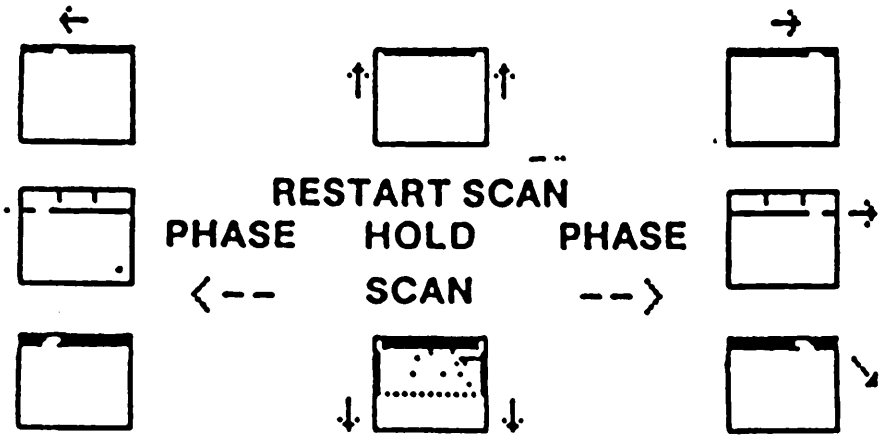
reset the scanning to the top.



return joystick to bottom to begin scanning.

RECEIVE PICTURE.

The joystick is used to control the starting and centreing of the picture during receive.



The picture that you see during receive is only one-ninth the size and resolution. When completed you will see a portion of a much larger picture (see PAN).

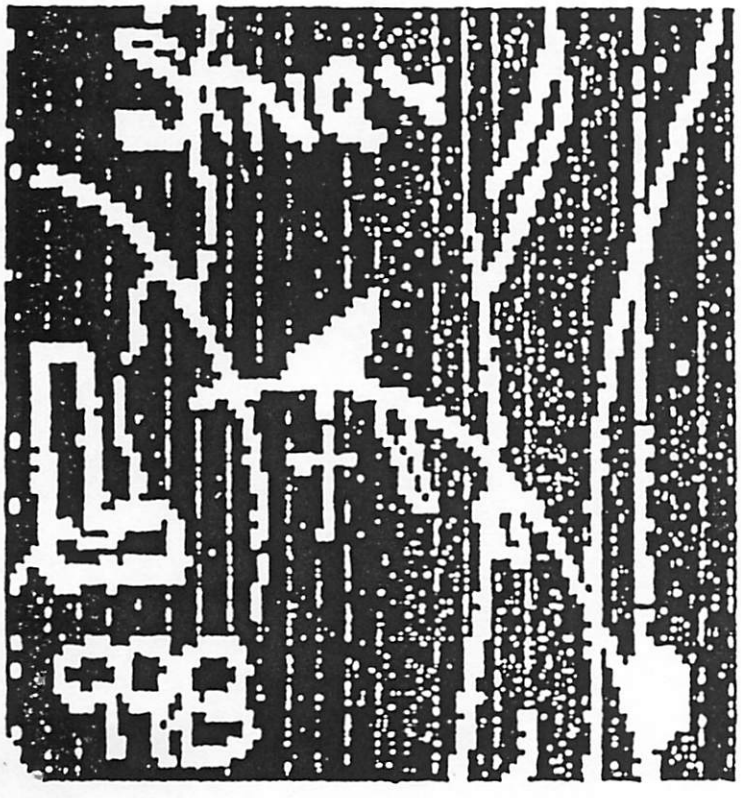
DURING RECEIVE. LARGER PICTURE WHEN DONE.

PRINT PICTURE.

The WEFAX program contains a printer dump to enable the picture to be printed. At the moment two versions are available, for the Tandy DMP105/6 and the EPSON MX80, RX80 and FX80 types. One of these may work with your printer. If not then it may be possible to adapt the screen dump to suit your printer, please note that programs like DUMPER or the normal screen dumps will NOT work with WEFAX. The picture is nine times the size of a normal High-Res screen.

REVERSE VIDEO THE PICTURE.

Charts are usually sent on a light background, however if you get a picture similar to that shown below, left, select REVERSE VIDEO THE PICTURE to make it look as shown below, right. This function is useful when printing because large black areas use a lot of ink and overheat the printer head. (note: since this does not change the information content of the picture, it can be done as many times as you like).



The pictures may be reversed if you are tuned to the wrong sideband for the signal being received. When finished receiving you may want to retune the radio so that you will not have to reverse the picture each time.

DISK PICTURE STORAGE.

If WEFAX is run on a computer with disks attached the following functions appear in the menu:

```
DISK      *VIEW*     1 * * *    2 * * *
PICTURE   *LOAD*       * * *      * * *
STORAGE   *SAVE*       * * *      * * *
```

These functions allow you to quickly save the pictures for later viewing. No attempt was made to use tape save, since it would be hideously slow. There are three disk functions that can be used. Two pictures may be saved to each disk. First select one of the functions, then select the disk picture you want to access. Note: when you use view, you must select one of the nine screens to view. On many charts the title is in the upper right-hand corner, so select the upper right hand asterisk. For SAVE and LOAD, you select the whole picture and all the screens will be transfered. You cannot print a screen loaded by the VIEW function, nor will the PAN facility work until you press the fire button, at which point the original large picture will be displayed. The pictures will not show up in the disk directory and you should not save any other programs to the WEFAX disk. Use blank formatted disks to save pictures on, each picture may be over written as many times as required and in this way you can build a library of the best pictures that you recieve.

A list of some fax stations can be found in the appendix, and should you have problems then I will be pleased to try and sort them out for you. Describe the exact problem and enclose a stamped, addressed envelope.

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CONVERT.BAS

WEFAX pictures cannot be easily loaded by other programs, such as alternative screen dumps. In order to make this possible the program CONVERT.BAS has been added to the disk. This program reads one of the two WEFAX pictures, then saves it as nine machine code files on a standard disk. These files are given the extension .PIX to enable them to be loaded by programs such as DRAGDRAW or other graphic's programs. This will allow the pictures to be 'cleaned up', or changed in any way that you choose. The pictures can also be printed double size (using any screen dump, then stuck together to give a picture some eighteen inches square.

The pictures are saved in the format name(n).PIX ,&HC00,&H23FF,&HC00 where 'name' is a name of up to seven letters, (n) is the screen number, from 1 to 9, added by CONVERT.BAS.

USING THE PROGRAM

With the WEFAX disk in drive 1 (for a two drive system) and a clean, formatted disk ready (or in drive 2 for a two drive system) type

RUN "CONVERT.BAS" then ENTER

Select either single or double drives, then the picture that you wish to convert. Picture 1 corresponds to the left hand picture on the WEFAX control panel and picture 2 the right hand picture.

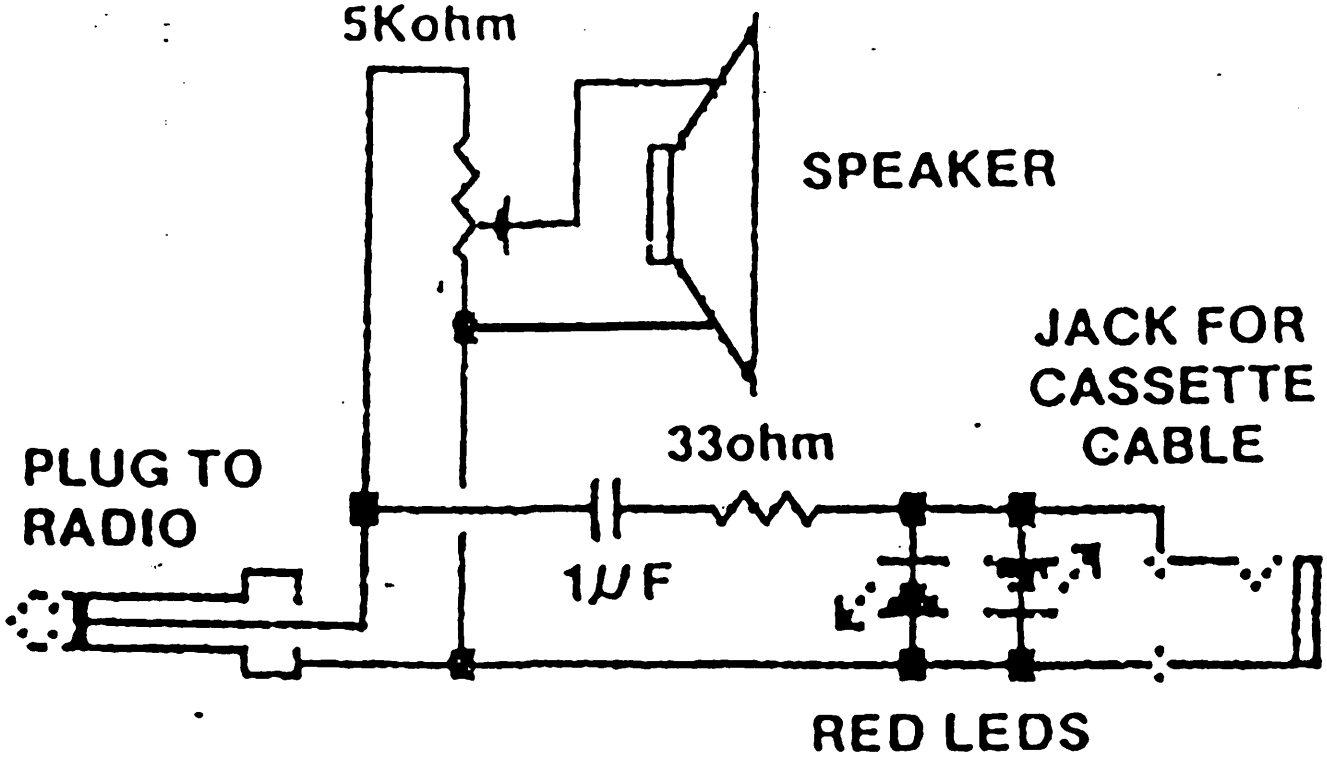
Single Drive Users:
Each screen is loaded from the WEFAX disk, then saved to the standard disk (after first checking that there is enough space). Swap disks as directed.

Double Drive Users:
The destination disk, in drive 2, is checked to ensure there is enough room to save the nine screens. If there is not enough room you will be warned, insert a new destination disk then press a key. When all nine screens have been saved you will be offered the option of converting another picture.

All Users:
To quit the program press BREAK. The name given for the converted screens must be no longer than seven letters as CONVERT.BAS will add the screen number (from 0 to 9) to this name.

APPENDIX A

OPTIONAL LIMITER/MONITOR



APPENDIX B

FAX FREQUENCIES.

Frequency (KHz)	Callsign	Operating Hrs (GMT)	Mode	Notes.
Bracknell, England (120 lines/min)				
2618.5	GFE 25	21.00 -	WX	
3289.5	GFA 21	00.00-24.00	WX	APT 09.00-12.00
4610.0	GFA 22	18.00 -	WX	GFA 21 Slave
4782.0	GFE 21	0.00-24.00	WX	APT 09.00-12.00
Mainflingen,Federal Germany (120 and 240 lines/min)				
117.4	DCF 37	00.00-24.00	WX	
134.2	DCF 54	00.00-24.00	WX/MET	
Paris,France (120 lines/min)				
8185.0	FZE 82	00.00-24.00	WX	special format
4047.5	FTE 4	20.00 -	WX	FZE 82 slave
12305.0	FTM 30		WX	
Moskow,USSR (60 lines/min *)				
5355.0	RND 77	18.00 -	WX	
7750.0	RAW 78	16.00-23.00	WX	
15950	RBI 77	10.00-22.00	WX	
Frankfurt,Federal Germany (120 lines/min)				
139.0	DFC 39	10.00-22.00	PIX	

WX= weather chart transmissions
MET= METOSAT occulsion charts
PIX= photofax service
APT= automatic picture transmission

* RAW 78 received at 120 lines/min on 2.5.88 at 21.00

APPENDIX C

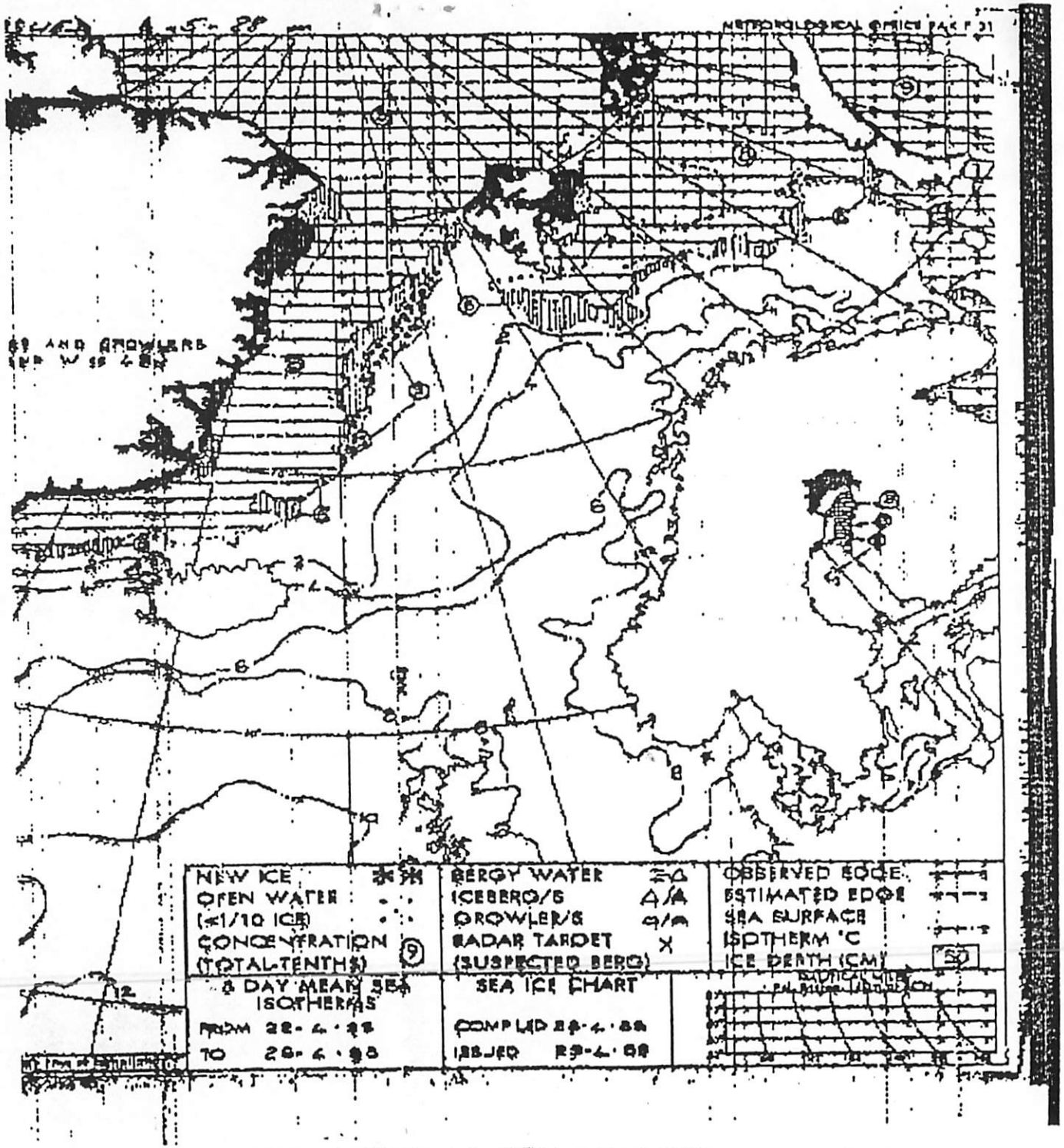
RUNNING THE DEMONSTRATION.

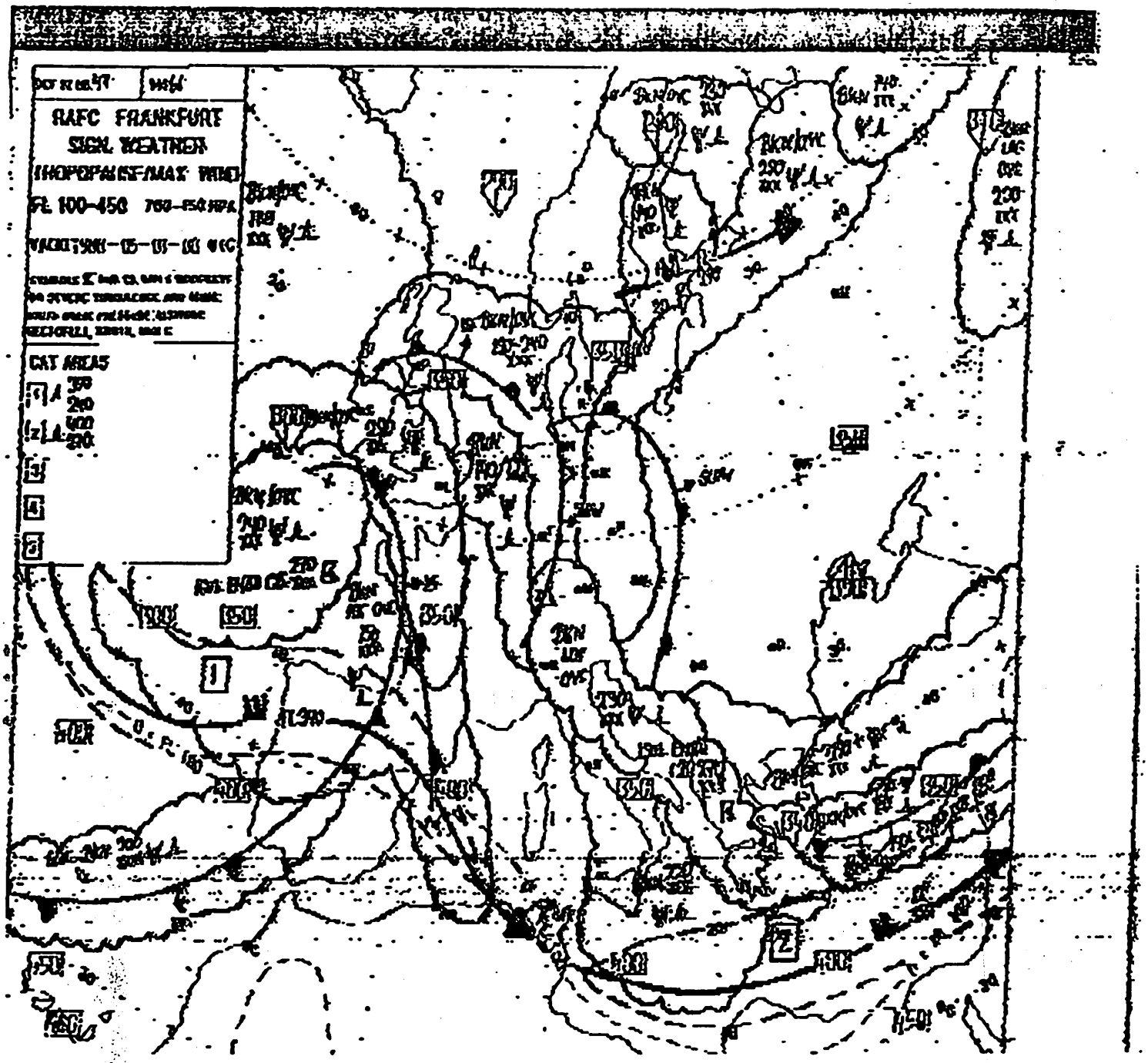
For those without a suitable radio who just want to collect fax pictures, two are supplied on this disk. It may be possible to start a library of these fax pictures and supply them on disk.

Run the program as described earlier and simply load either of the two pictures, these can be viewed, or printed as required. A number of printers are supported, but it should be remembered that not all so called EPSON compatible printers are in fact fully compatible. It may be possible to modify the printer dump to suit your printer and you should enquire.

APPENDIX D

The following pictures were all received with a Tandy DX132 and a simple 15 foot wire aerial. Weather conditions themselves can affect reception and cause fading of the signal. This will show up as a 'lightening' of the picture and can be corrected (during reception) by carefull adjustment of the BFO control.


METEOROLOGICAL OFFICE FAX F 21
NEW ICE
OPEN WATER
(≤1/10 ICE)
CONCENTRATION
(TOTAL-TENTHS)
9
BERGY WATER
ICEBERG/S
GROWLER/S
RADAR TARGET
(SUSPECTED BERG)
OBSERVED EDGE
ESTIMATED EDGE
SEA SURFACE
ISOTHERM °C
ICE DEPTH (CM)
50
5 DAY MEAN SEA ISOTHERMS
FROM 22-4-98
TO 26-4-98
SEA ICE CHART
COMPILED 23-4-98
ISSUED 23-4-98


RAFC FRANKFURT
SIGN. WEATHER
CAT AREAS