Amateur Fax with your PC
The JVFAX System

Review

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Facsimile systems have always been very popular among radio amateurs all over the world. One reason for that is the excellent picture quality attainable, and another reason is that the picture will be on paper for archiving.

One can either use a photographic or an electrostatic system. The first uses a photosensitive paper and a modulated light source, whose beam will be directed to the paper. This is mounted on a drum that will be turned with a certain constant speed. The picture quality is excellent, but the system has many disadvantages. The paper must be attached and exposed in darkness and then developed with conventional darkroom techniques. The other method employs electrostatic paper, where a wire electrode burns away the uppermost white layer so that the black layer under it will be visible.

To build a fax machine from scratch puts great demands on your mechanical skill. It is a precision work that involves synchron motors, drum, drive mechanisms and, electronics of course. With a fax recorder you are stuck with paper size and drum speed. It will be complicated to receive and transmit in another mode.

JVFAX - A SUPERB COMPUTER PROGRAM

All of the above can now be considered as history and the fax machines can be put aside as antiquities through the introduction of a software program called JVFAX6.0, invented by a clever young German, Eberhard Backeshoff, DK8JV it is now possible for everyone equipped with a personal computer to receive and transmit fax, - even in colour. Various software that enabled the reception of WEFAX, APT and certain modes in amateur fax have been around for some time, but up till now it has not been possible to receive AND transmit amateur fax in colour.

The greatest advantage perhaps with JVFAX is that it will hardly cost you anything, provided of course that you own an IBM type personal computer. With version 6.0 recently released you can even receive AND transmit in the popular SSTV modes M1, M2, S1, S2, SC1, SC2 and the old fashioned B&W modes. You will not get ripped off any more like you were when buying SSTV gear such as converters, add-ons, interface boards, EPROMs and software. JVFAX will only cost you the normal price of the disk proper.

One will get maximum performance with at least a 386, Super VGA and minimum 4 Mb of RAM.

If you can refrain from the colour possibility, a 286, DOS 3.0 and graphics from CGA to EGA, Hercules and VGA will do. But, as mentioned above, colour requires SUPER VGA.

COMPETES WITH SSTV

JVFAX with its superior resolution and colour is consequently a severe competitor of colour SSTV. Furthermore it costs only a fraction of SSTV and it is very easy to set up. The only disadvantage with JVFAX is that a colour picture in mode "Ham Color 4" takes three minutes and 10 seconds compared to one minute and 50 seconds for SSTV in mode M1. You can also transmit B&W in mode "WEFAX" which has the best resolution, i.e. 1810 pixels/line. One "WEFAX" frame takes about 10

minutes and, strangely enough, this mode seems to be the least susceptible to QRM.

RECEPTION OF WEFAX AND APT

One can also use this software for the reception of WEFAX and APT and synthesized colours can be added. Pictures can be stored in memory and recalled and printed. A stored picture can be displayed again on the computer screen, it can be zoomed and retransmitted. Pictures are stored in the well known GIF format and therefore a wealth of picture material is available as shareware.

INTERFACES

The interfaces for reception and transmitting respectively are very simple in their simplest forms. The receive interface is shown in Fig.1 and consists of a 741 OpAmp and a few components. They can be mounted on a small Veroboard, connected to a 9p Dsub and plugged into the COM port. The other end is connected across the radio's loudspeaker. The transmit interface is in principle the same

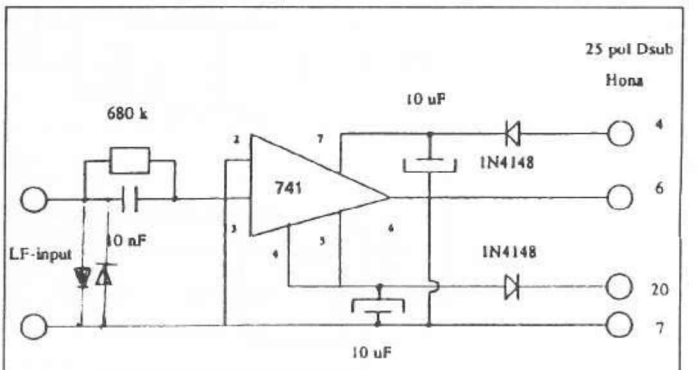

Fig.1: The Receive Interface

as used by the HAMCOM software for RTTY, (Fig.2) but in order to isolate the computer ground from the radio two miniature audio transformers are connected back to back on a small Veroboard. The two leads from one transformer is connected to the computer's loudspeaker and the two leads from the second transformer connected to a 9p Dsub mounted on the rear panel of the computer. The small board could preferably be taped to the computer chassis close to the loudspeaker. The balanced leads going to the switch box need not be shielded.

Figure 2 suggests how to wire the switch box for convenient switching between SSB, SSTV and FAX. Still another suggestion for Kenwood TS440 and TS850 owners is shown in Fig.3.

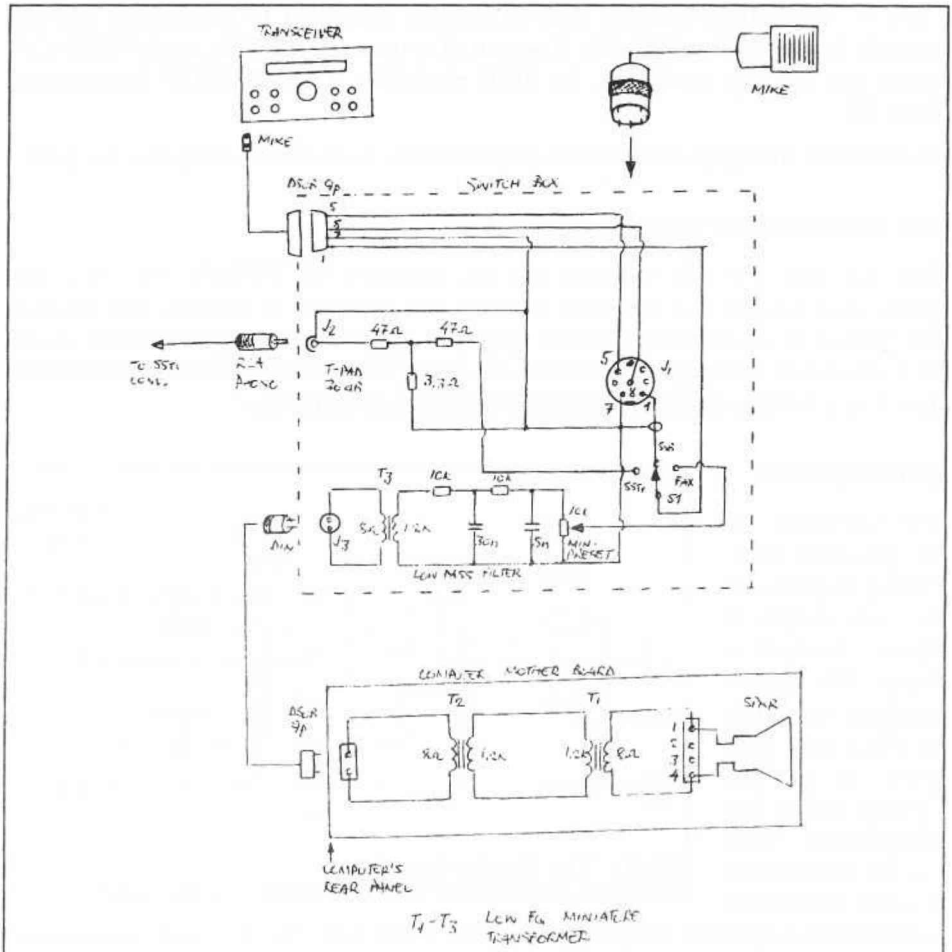

Fig.2: Switch Box Wiring

DOCUMENTATION

There is a manual in English as well as in German on the disk. One must read the 50 pages several times, but you should start practising at once to grasp the meaning of the text quicker. You can then use the manual as a reference.

CONFIGURATION

After having installed JVFAX you start the program and press "C" for the configuration menu. Following data should be written into the various fields. You move between the fields with TAB and you change the values by pressing the + key until you see the desired text. When you are done, press CTRL-ENTER in order to save the configuration. You can change the configuration at any time.

DEMODULATOR	7 bits comparator
ADDRESS	03f8h/IRQ4
BIT	0 is SSTV sync -YES
MODULATOR	6 bits on speaker
ADDRESS	0000h
BAUDRATE	57600
GRAPHICS	SVGA (256 colours)
ENABLE SCROLLING	Yes
SSTV GRAPHICS	SVGA (256 colours)
PRINTER	HP DeskJet 500C
FORMFEED AT END OF PICTURE	No
ALLOW TONE ALERT	Yes
MAX INTERRUPT FREQ	7500
ENABLE AUTOLOCK	Yes
CLOCK TIMER FREQ	1183181
DEFAULT PICTURE DIRECTORY	C:\JVFAX
STORE PICTURES IN GIF89a	Yes
MISC. SETTINGS	Blank
CALLSIGN	SM1BUO

Be VERY careful with the configuration. If you are using the simple receive interface it MUST read "DEMODULATOR 7 bits COMPARATOR" and nothing else. It is also important that you have the appropriate GRAPHICS data written in. If you have Super VGA you must get into a sub menu once you have reached "SVGA (256 colours)". Do exactly the same when you come to "SSTV GRAPHICS". A similar procedure applies to the "PRINTER" setting.

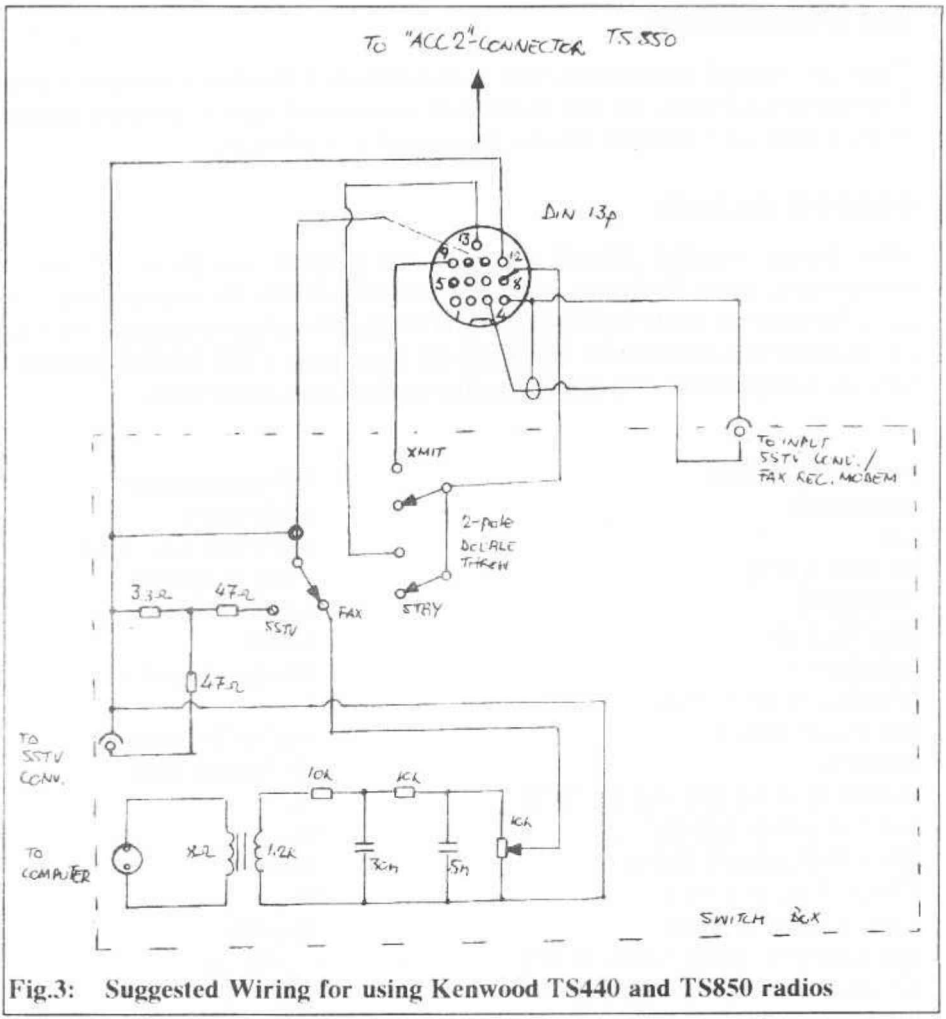

Fig.3: Suggested Wiring for using Kenwood TS440 and TS850 radios

SETTING THE VARIOUS MODES

After configuring it is time to set the various modes - there are 10 altogether. In my opinion it is sufficient for radio amateurs to use only three of these to transmit pictures, e.g. 1, 4 and 5. Consequently only those three are quoted below, and you could try anything you like in the other modes, but it is important that we establish a standard.

MODE	1	4	5
IOC	576	204	288
LPM	120	360	240
RESOLUTION	1810	640	905
DEVIATION	400	400	400
ATC	on	on	on
INTENS.LEVELS	64	64	64
APT-MODE	tone	tone	tone
PHASING SIGNAL	norm.	norm.	norm.
SCAN DIRECTION	dwn	dwn	dwn
APT START TONE	300	200	675
MIN. DURATION	3	3	5
APT STOP TONE	450	450	450
MIN. DURATION	3	3	3
DISPLAY WIDTH	100	100	100
PRINTER WIDTH	100	100	100
RECEIVE PIX INV.	off	off	off
COLOR PALETTE	standard	standard	standard
JVCOLOR MODE	off	on	off

HOW TO OPERATE JVFAX

Now is the time to go onto the air and start listening for a station transmitting amateur fax. When you press "F" in the main menu you get a black screen and a small square in one corner. The square contains text that can be changed by pressing various keys, and a mini-oscilloscope showing the signal if ATC is ON. The oscilloscope signal is the criterion for connection between the radio and your computer. If there is a signal on you have missed the start signal and must press "A" for "APT:running". There will now be scanning lines starting from the top, but if the picture cannot be read, you are in the wrong mode. You must press a key between 1 and 9. Take a chance on 4 since you will get into mode 5 when you start up.

If the picture is slanting you can adjust it with "APT" in the "waiting" mode. Pressing the forward slash ("/") places a vertical line in the middle of the picture. Move the line close to either of the picture's vertical margins with "CTRL-ARROW LEFT" or "CTRL-ARROW RIGHT". Now simply align this line with the picture margin using the cursor keys and hit "ENTER". A sure-fire calibration source is Darmstadt/Offenbach on 132.8 kHz USB.

If the start signal does not have any effect the phasing of the picture will be wrong and it will be displaced left or right. This can be remedied by pressing "R", which will give a short vertical line in the middle of the picture top. Move this line with one of the cursor keys until it coincides approximately with the picture margin.

When you press "ENTER" the picture will be correct again. It is important to do this while the scanning is in the picture header. There is ample time for this once you get the hang of it. When receiving colour pictures it happens very often that the colour sequence will be wrong. You can see that on the RGB plates in the header, but don't worry. Press "V" until you have the correct sequence and everything will be fine.

WHERE TO FIND AMATEUR FAX

The recommended segments for SSTV and FAX in Region 1 are:

3730 - 3740 (rather 3730 plus/minus 5 kHz)
7040 - 7045
14225-14235
21335-21345
28675-28685
144.700

The segment on 14 MHz is not a very clever choice it emanates from the childhood of SSTV. We now hear talk of moving FAX to 14245 away from SSTV but this does not make sense when one considers that with JVFAX6.0 and other systems you can receive and transmit both SSTV and FAX in colour, thus it does not make sense changing frequency when changing mode in a QSO with several slow-scanners.

HOW TO PRODUCE PICTURES

JVFAX will only accept pictures in GIF format. Thereby a lot of material is available through shareware. But this is boring in the long run - think of the endless transmitting of flowers on 14230 in SSTV, not to mention all the half naked girls. Personally I think that it is silly to transmit a picture that you can find in any coloured magazine. So please do not bore me any more unless it is something terrific - and I don't mean porno. We have had porno magazines in Sweden for 40 years and most people are tired of it. Besides it is bad taste and it is awkward for the receiving operator in case there are visitors or children in the shack. Maybe you want to use FAX and SSTV for what it is really meant, namely picture information. By that I mean a picture of yourself, family members, the shack, your house, the antenna farm, the vacation trip, circuit diagrams and so on. With a hand-scanner for B&W, such as Logitech's ScanMan Model 32 one can scan photographs, drawings and text and get the pictures in TIFF, PCX and IMG. These can then be converted into GIF by means of some software, such as HIJAAK, and moved into JVFAX.

Should you want to produce colour pictures you must have a colour scanner or colour video camera and some software like Video Blaster. This program can convert the color pictures into BMP, TGA, PCX, TIFF, GIF and MMP.