In this issue

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Maarten Janssen
Ian Pawson
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Editorial

First let's start with an apology, CQ-DATV89 it was a little thin, one or two things conspired against us and created the perfect storm. Sorry, please don't cancel your subscription, oh sorry you don't pay one do you. In this edition we have contributions from readers that are their first time writing for CQ-DATV so can we say a huge thanks for stepping up to the mark and not only contributing to this edition, but adding to what was an empty in-tray and ensuring future editions are not endangered.

The news carries the updates about GB3EY which is back on the air, while at the same time we ask what happened to the BBC that went off the air for 15 minutes and why the poor fill, but nice VTR clock. Shame about the music, to quote their famous Christmas tape.

Well we are about to enter what was once called the festive season before we ever heard the word COVID.

Sad to see the sun setting on 9 cm in the states. N0YE and KH6HTV made the most of it before it was lost to some cell phone or fixed links that we cannot possibly manage without!

Trevor has produced part 23 of the Grass Valley Mixer, does that mean that the next issue will mark 2 years of this project? The Mk2 PCB is a re-order something somewhere got lost, but it looks very smart. The robot camera software has changed so you can work the mixer and pan or tilt the camera at the same time (if you have enough hands) and the camera might get a jack plug connection, but we have to admit to never really considering the compatibility of 3.5mm jacks before.

Trevor has also promised the Positioner or Joystick as we have been miscalling it. This will be in action to move the Robot camera but sorry that's in issue 91.

Dave Pelzar AH2AR is one of the new authors that has stepped up to the mark and contributed using a drone and a QRP 70 cm transmitter.

This is an excellent article Dave, there have been so many "Oven Ready Drones" in the UK its really good to see one being adapted to proper ATV, rather than just showing us what you bought off the shelf. This was originally a two-part story, but now you won't have to wait as we have joined the two parts together as an early Xmas present.

We have also been looking back on ATV with a view to refocusing "One From The Vault" which originally was an idea at looking back at a previous CQ-DATV articles and adding some updates, but sometimes there weren't any updates, but that never got in the way of a good story.

The new focus is on looking back but not restricting it to things that only appeared in CQ-DATV. This time we came up with two projects, Ernie and Bert from Maarten Janssen which was a way of getting a picture from a PIC with a little help from some 4040 counters and an EPROM. We have put this as a full article and reserved "One From The Vault" for the other contender "PIC Dream", this appeared in so many different forms and guises. The originator was French so it's only fitting that Pierre Col F8EGQ introduces his variation of this ATV classic.

Also looking at the past, but with their feet firmly planted in the present, BECG (Broadcast Engineering Conservation Group) have produced their second newsletter and bought a generator truck and a vintage sound mixer for Viviat, the reconstruction of a 1959 outside broadcast unit. BECG might be a professional home for collectors of broadcast TV equipment, and they might be the new kids on the block, but there is no stopping them. We will keep you in touch with developments as they unfold from this dedicated group of enthusiasts.

Returning to modern times, Jim K6HTV when he is not out working ATV on 9 cm before it sunsets, has discovered a low cost DVB-T and DVB-S receiver and is exploring the menus and putting it through its paces.

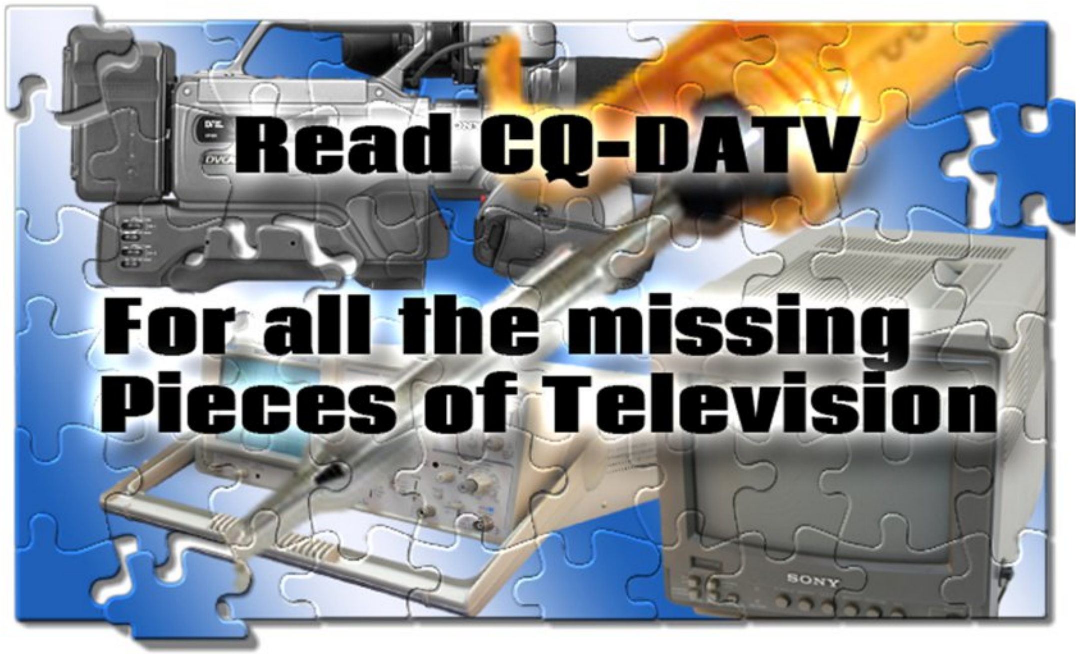
Ian, yes, our editor in Chief, (but he does not like being called that) has sharpened up his contribution pencil and looked as the new ATEM mini pro. We have looked at this before in CQ-DATV in its earlier incarnation before the pro got added. It lacked the important feature of letting you see what the cameras were doing, this was reserved for its bigger brother. What Ian does not tell you is, that deep on the internet is a project to use the GVG panel to drive either the ATEM mini or full size ATEM. Just don’t tell Trevor or we might get another 2 years of software development e.g. a dual control Grass Valley Panel for Vmix and ATEM.

Ok, that is it for this issue. Please excuse the jokes, they were originally fillers for the page ends so each new article could start on a clean page in the PDF version. Some are funny some just well do just fill the page ends. This is the last issue for this year and 2021 will be our 8th anniversary year if our maths is correct.

Wishing you all a Merry Christmas and a Happy New Year and we hope the new year will bring the solution to COVID, so we can all spend more time with our loved ones. There is still room in the CQ-DATV in-tray for your pictures, projects and anecdotes so please keep the copy coming, no more perfect storms.

CQ-DATV Production team

The CQ-DATV editors gratefully acknowledge all those authors that have contributed articles for this free magazine.



GB3EY status update: delayed

Mon Nov 02

The repeater was taken off-site shortly after it was first put in due to an issue with the receiver. Unfortunately my rotator had failed at the time and as a result I wasn't able to get any test signals into it for diagnostics. It was therefore necessary to get it home to put on the bench.

Bench testing showed that the receivers needed a very strong signal to switch between H262 and H264. A marginal signal would create a 'signal locked' condition which was passed to the logic which duly switched the transmitter video path to the receiver. However, despite being locked there was no video at all, just a black screen from the receiver.

Another problem found with the little bit of on-site testing that I was able to do showed that the receivers were still being bothered by the Claxby radar despite over 120dB of filtering. Not only did they freeze or drop the video altogether but they also took far too long to recover; sometimes they hadn't got the picture back before the next burst of radar came along eight seconds later. A desense issue was seen that needed bench checks.

After a lot of experimentation with different receivers, where I deliberately injected the radar into a combiner with a weak DATV signal (the peak radar signal from my antenna and preamp combination is almost 10mW when beaming at Claxby), I concluded that set top boxes are just not suitable for our site.

I then tried the Ryde and noticed a substantial improvement. It copes with the radar much better than any of the set top boxes because it mainly freezes briefly and then carries on whereas the set top boxes drop lock.

A bonus was that the logic needed no modification to use the 'Locked' output from the Ryde.

The symbol rate is not restricted to 1MS/s or above using the Ryde. Tests with the Ryde using DVB-S2 @ 333kS/s, 8PSK, H264, FEC 3/4 have been very encouraging with good quality audio and video. Swapping between H262 and H264 does not cause a problem and provided the number of symbol rates scanned is kept to two the lock time is short. Another advantage is that the Ryde has remotely accessible menus for configuration changes and diagnostics.

The desense issue has been traced to wideband 'crud' from the transmitter when modulated. Specifically, it's the result of IMD products in the driver and PA stages. The filtering on the transmitter output appeared initially to be adequate but there's about 5µV of noise near the input frequency when the transmitter is relaying. That's enough to make it seem deaf although the problem is much less noticeable with a 333kS/s QPSK FEC1/2 input that wasn't possible with the set top box receivers.

To fix the desnse issue we are going to need one of the duplex filters from here: *https://tinyurl.com/y2wlk7qs*; further progress is on hold until funds can be raised for its purchase.
Clive G3GJA

Source: *https://tinyurl.com/y4rzuf64*

Rudi Pavlič comments, 01 November 2020

Hello

Today I received two comments on the new issue of the CQ-DATV magazine: The CQ-DATV magazine is increasingly scarce, with fewer articles; Rudi, if you don't write, it's nothing new.

I am not directly part of the editorial staff, but like all ATV-ists I am indirectly involved in the creation of the magazine.

The magazine is our mirror, the reality of our hobby.
If we don't write, if we don't complain, if we don't show our successes… we can't expect the magazine to be better.

Our Slovenian association ZRS had among their ranks, until several years ago, some good RAs who are also good builders (S53MV, S53WW, S57UUD, S57UUU,…). With a strategic move he put them all at the door.

Our branch of the amateur radio »tree« is very dependent on builders. For us the market offers us monitors, cameras and…. We have to do everything else by ourselves or by our builder friends.

I wanted to quote a sentence from President Kennedy, but we all know it, we just don't use it.
73 s58ru

NASA re-establishes contact with 43-year-old Voyager 2

Voyager 2 has been travelling through space since launching in 1977 The spacecraft is now more than 11.6 billion miles away from Earth NASA cut off communication with the probe in March to repair a satellite. The Deep Space Station 43 antenna in Australia went back online and sent Voyager 2 a signal. The craft received the signal and sent a reply that reached NASA 34 hours later.

NASA has re-established contact with its Voyager 2 spacecraft as it travels more than 1.6 billion miles from Earth - after the probe was left flying solo for seven months while repairs were made to the radio antenna in Australia they use to control it. Mission operators sent a series of commands to the 43-year-old probe using the ground-based Deep Space Station 43

The Deep Space Station 43 (DSS43)

(DSS43) antenna, which established a signal confirming the 'call' was received.

DSS43 had been offline since March while NASA completed a series of hardware upgrades, but tested the new components by sending commands to the craft.

However, due to the distance, the ground team had to wait more than 34 hours for a reply, but Voyager 2 received the commands and sent back a 'hello.'
DSS43 is located in Australia and is part of a collection of radio antennas around the world that combine to communicate with any spacecraft beyond the moon.

Source: *https://tinyurl.com/y5lskkqw*

Continued next page...

GB3FT Update

8th Novemeber 2020

GB3FT is currently under going tests at the QTH of G4WIM IO83NS. It is now using 500kS DVBS2 H265 which increases path loss performance by over 10dB when compared to its original 2MS DVBS signal.
It is hoped to have it back on site by the end of November at which time it may be possible to receive the signal further a field - possibly as far as Angelsey conditions permitting.
Brief summary

GB3FT is a 24cm TV repeater with an input frequency of 1249MHz. The input signal can be 333, 500 or 1MS using DVBS, DVBS2, H264 or H265
The output frequency is 1315MHz at 500kS and is also streamed on the BATC website.

Source: *https://QRZ.com*

Theresa, DC1TH, at AMSAT-DL Bochum

November 6, 2020 by DL4KCK

On November 3, 2020, WDR television broadcast a report about the radio amateur Theresa, DC1TH , who is part of the winter team of the Neumayer III base 2021/22.

It is expected to be broadcast from Antarctica under callsign DP0GVN using the geostationary satellite amateur radio transponder QO-100.

Theresa, DC1TH, visited AMSAT-DL in the amateur radio station of the Bochum observatory for a short training in QO-100 usage before traveling to the Neumayer III base.

Source: *https://tinyurl.com/y3vajnu4*

What is all this tinyurl stuff anyway?

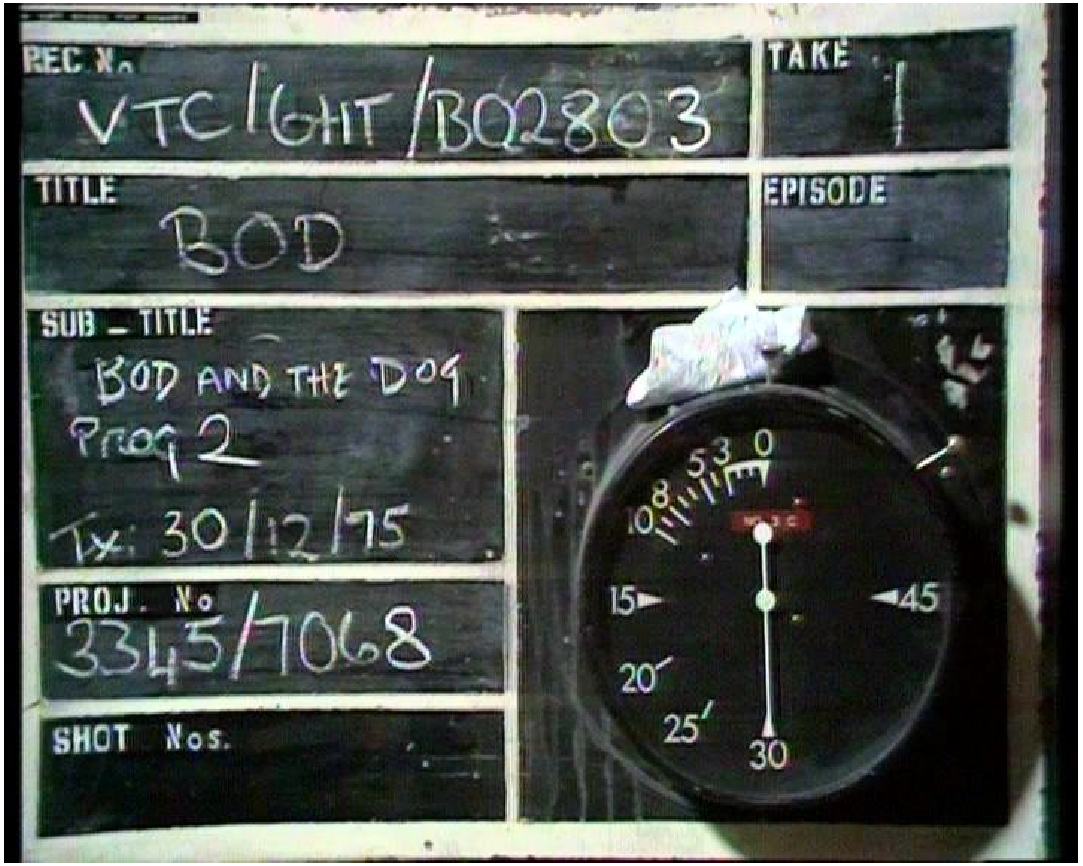
You may have noticed that all the web URLs (links) in CQ-DATV have taken the form of https://tinyurl.com/xxxxxxxxx.

If you look through back issues of CQ-DATV, you will find links that are just strings of apparently random letters, numbers and symbols that take up a lot of space

The editorial team have decided to settle on using a shortened form of URL's to save space.

You can find more information here *https://tinyurl.com/*

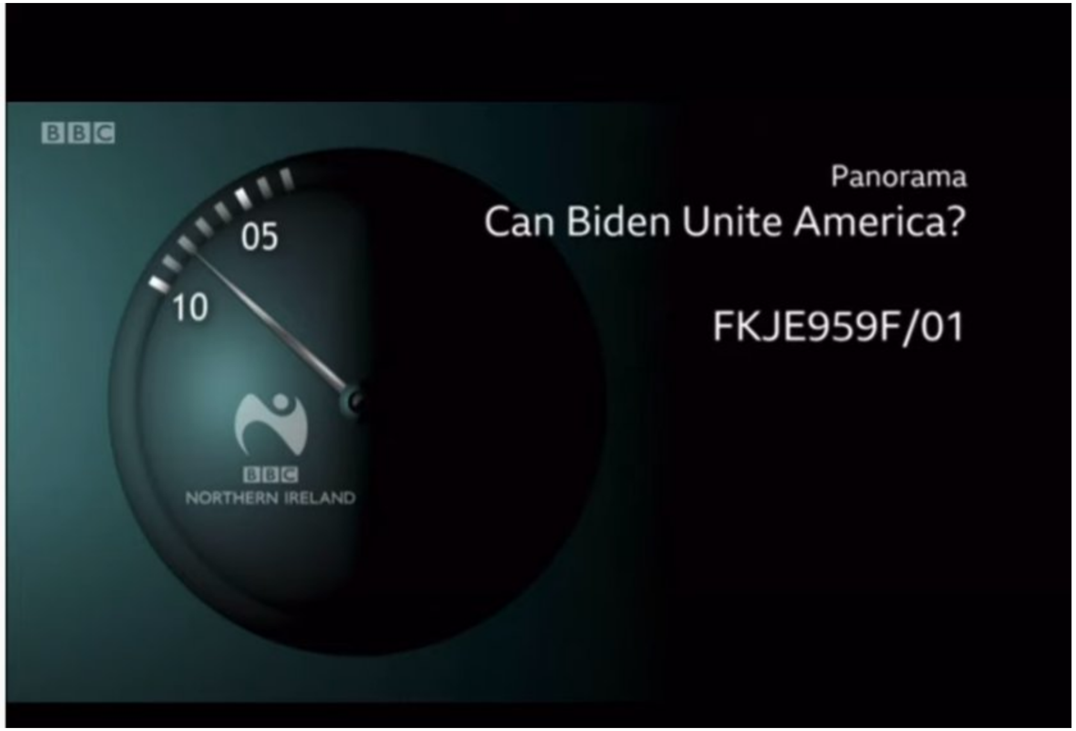
BBC clock



Its nice to see that the VTR clock is still evolving. It started with a mechanical device and then evolved to the much smarter and accurate electronic clock thanks to Mike Cox.

We as viewer don't often see the developments but due to a mishap at the BBC with an almost 15 min on air outage, when Panorama failed to appear we did get two glimpse of this rather elegant development.

Unfortunately they were only two short glimpse as the rest of the 15 mins was filled with a rather boring caption and not even any music, whatever happened to the potters wheel?



USA bids farewell 9 cms

FAREWELL to 9 cm BAND: Don, N0YE, and Jim, KH6HTV, made a recent decision to make a last effort to work with DATV an unworked, microwave band before it was lost.

With the recent FCC announcement that radio amateurs are sun-setting on the 9cm (3.5GHz) band, they lashed together some gear to make a DVB-T, two way QSO on the band

On Oct. 30th, when the Boulder weather turned nice again after a recent snow storm, Don set up his gear at his favorite microwave location, NCAR, on the mesa south-west of the city of Boulder.

Jim set up his gear in his backyard, south-east of Boulder. The distance between the two sites was 7.9km (4.9 miles). With dish antennas visually aligned, contact was established immediately upon turning on transmitters.

We operated on 3.395 GHz with 6 MHz bandwidth, DVB-T, using QPSK and normal digital parameters. Perfect P5 / Q5 video and audio was received at both locations.

Jim used a calibrated Hi-Des HV-110 receiver and reported that Don's signal strength was -61dBm with a perfect 23dB s/n. Jim used a 3dB noise figure preamp and his transceiver had a -93dBm sensitivity.

Don was transmitting +30dBm (rms) of DVB-T rf power, while Jim was transmitting +13dBm. Both were using identical 13" dish antennas fitted out with WA5VJB logperiodic antennas as the feed. Don estimates their gain at perhaps +14dBi

Source: Boulder Amateur Television Club TV Repeater's REPEATER November, 2020

GB3EY operational with Ryde Rx

GB3EY was returned to service today, 22nd November.

It has been fitted with an ID-Elecktronik duplexer that replaced a low power 1.4GHz unit that was retuned to 23cms. It was prone to flashover at the 15w level and as 10w was needed to achieve the NoV limit it was too close. The 0.5mm wall Teflon tube used to tune the duplexer down to 1275MHz and the same 0.5mm gap in the resonators just wasn't enough. There was also an issue with the lack of a notch at the Rx frequency in the transmitter leg. (However, it will make a good look-through filter!)

The original set top box receivers that were going to give 1 or 2MS/s reception proved to be incapable of changing modes on weak signals. A locked condition was shown on the front panel but there often was no video output unless they were rebooted. They have been replaced by the BATC Ryde receiver in a headless format and set up to give a composite output for the logic and DTX1 modulator.

The receiver is on 1275MHz and will work with DVB-S / DVB-S2, 333 / 500 /1000 kS/s, H262 / H264. FEC selection is automatic. Experimentally, the Tx has been reduced to 1000kS/s, with DVB-S, H262 and FEC 3/4.

The Ryde receiver has been funded by the BATC Bursary which supports repeater groups with upgrades to modern hardware and funds development of new projects for the ATV community such as the Ryde receiver software. The East Yorkshire Repeater Group thanks the BATC for their generous help.

Clive G3GJA Chairman EYRG

Source: *https://tinyurl.com/y3csusns*

Grass Valley Mixer Conversions - Part 23

Written by Trevor Brown, G8CJS

The normal way of contributing a project to CQ-DATV is to make something work, either an original design or some useful additions to something that already exists. Get it working and then write it up so others can benefit and possibly avoid reinventing the wheel.

The GVG project was different, it was a much loved surplus panel taking up space in my loft that I kept because one day I would like to revisit it and see if it could be made into something other than the head end of an old vision mixer. I wrote the project up each month as it evolved. I made decisions, some good some not so good, but all with the best of intentions.

It was obvious from the outset that disassembling the resident 6801 processor was not going to happen and that I would remove it and replace it with three 8-bit port chips. I used PCF8574's because they could be I2C controlled so if anyone wanted to use my research and develop their own software revolving around any of their favourite micro's they could and interface via the I2C bus. I used the ESP8266 and initially ESP BASIC and then moved to Annex BASIC.

I know it's an unusual choice of language to write the software in, but I wanted a code that could be viewed and edited by all; a code where everything is visible and open so my work was as transparent as possible. I wanted to move away from the current trend of software being something you download with no knowledge of how its being crafted, install it and gripe if it does not perform or does not deliver the result you wanted.

I started this project by just trying to make the lights and push buttons on the panel work, then Mike G7GTN came up with the Vmix interface and the OLED screen. I in turn came up with the small PTZ head, all these were not envisaged at the outset, but are stunning additions and all interface via the I2C.

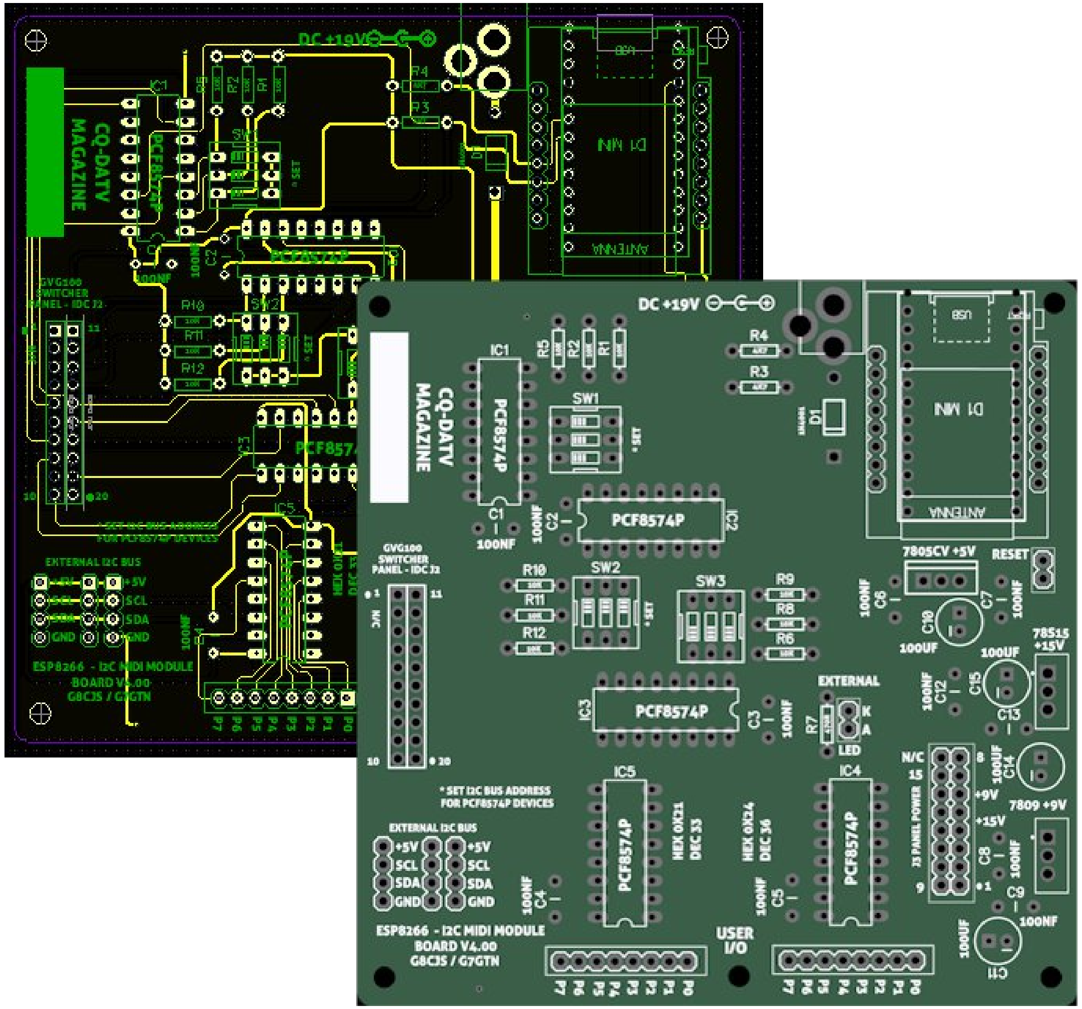
The software needed a few revisions to the code to include them, but when you add additional hardware this will always be the case. The current ANNEX BASIC, the Arduino code, the panel schematics and some useful notes on the story so far are all in GVG16.zip which is on the CQ-DATV download site.

Mike also designed a MK1 PCB which is mounted inside my mixer panel and is working well. It did not have the pads for the Arduino, but that did not stop me adding it. Mike has since designed a MK2 PCB with pads for both the ESP8266 and Arduino, more external I2C connectors and some voltage regulators. We ordered a sample batch of the MK2 PCB's and after a considerable delay something somewhere got lost, so we have re-ordered a small production run and leapfrogged the small batch for testing, fingers crossed.

Enough of how we got here, what has happened since last month. The Robot camera bracket has left the scuba weight and been mounted on a small section of PCB board and I have salvaged and added a small tripod mount from an old CCTV camera.

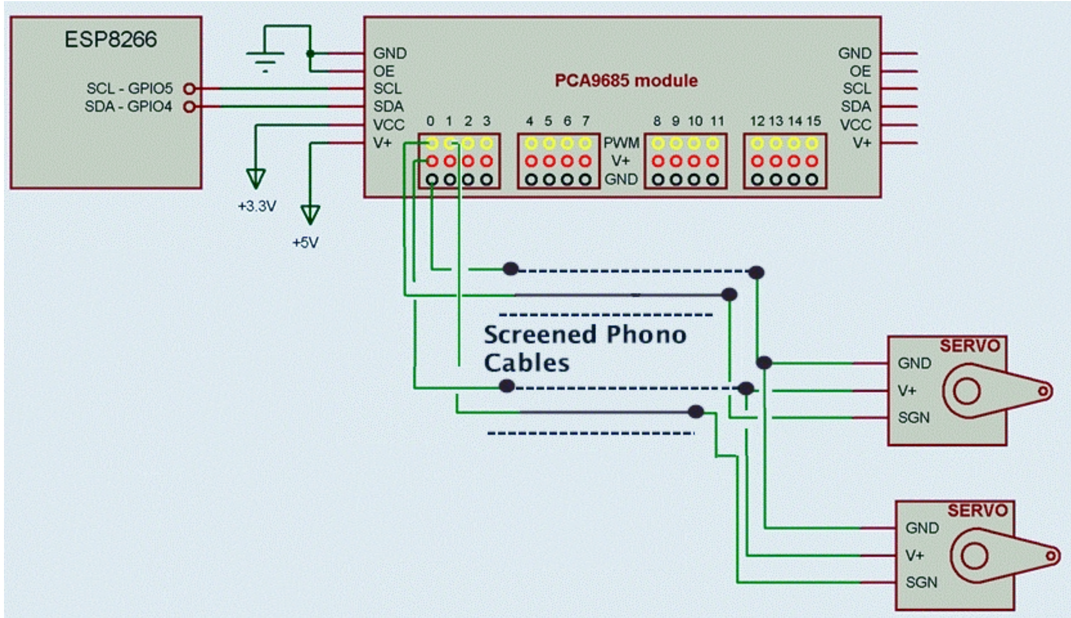
The camera is now tripod mountable, it looks a little Heath Robinson and is something I will be re-visiting at a future date. I have extended the control cables . If you remember each motor required +5V, a ground and a PWM (Pulse Width Modulation) signal.

The Pan Motor and the Tilt Motor can share +5V and ground but require a separate PWM signal so that is a 4 wire interface for a Pan and Tilt head.



MK2 PCB is now re-ordered, the Arduino pads are part of the revised board along with additional I2C connectors. The regulators for +9 and +15 are also now on the revised board. They require separate heat syncs or a common heat-sync with isolation kits added, EG the metal base plate of the GVG panel

I have brought the signal down a couple of screened phono plug leads. Using the screen of one for +5V and the screen of the other for ground, and the two inners as the PWM conduit to deliver position information to their respective motors. The cable is some 3m long and no problems have occurred.

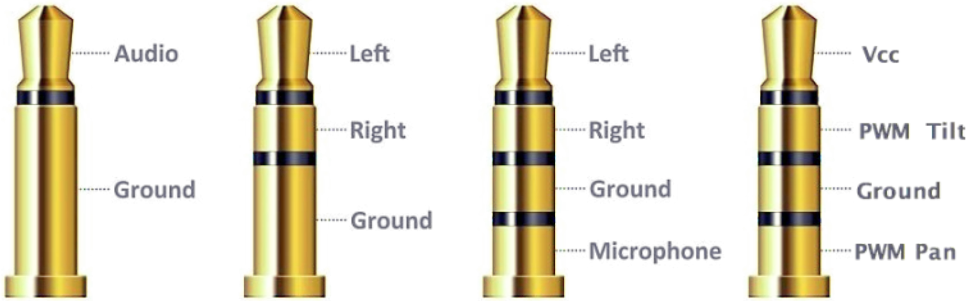


PCA 9685 Module available on E-bay

The PWM signal is 50Hz and I expected it to be robust and the only limit is the USB cable to the webcam. I know it is brave in that you can cross the phono plugs over, but they are colour coded.

The alternative was a 4 pole 3.5mm jack plug, which I have not tried, but the smart pre-made leads using two screened cables have their screens joined. There are also the compatibility problems associated with 3.5, 2 pole 3 pole and 4 pole jacks. They are mechanically compatible eg, they are all physically the same size and can be interconnected. The problem would be if the kit were rigged with a 2 or 3 pole jack lead, so further thought is required.

I have kicked this into the long grass because I would also like another connection to the robot camera for a tally cue light to show when the camera is on air. This would require five connections or more if it incorporated the web cam USB connection into the camera cable.



The 3.5 mm Jack plug range and the proposed connections for the Robot Cameras (far right) keeping the Vcc and Ground at the extremes, but the use of a wrong lead could still do harm

For now, the phono screens looked like a meatier solution for the DC currents involved and I suspect could be extended further if required, but this will be a revisit as its not holding up the project.

I have also been experimenting with a small home-made camera jib to see if any creative moves can drop out of this kit, but the autofocus on the webcam does tend to destroy any remotely artistic moves, but ok for static shots. Its down to a better camera or some super glue poured into the auto focus mechanism, not sure if a replacement camera would perform better, it's a small piece of glass to move, so either the focus detector is a little slow witted or there is an even slower witted processor inside doing its own impression of thinking. Either way neither could be classed as artificial intelligence and external focus might be preferable.

One solution would be a bigger more intelligent camera and there are also PTZ units that will support larger cameras that still use a PWM connection, which might be the way to faster thinking less problematic auto focus. The servo motors become more substantial. But the three-wire interface provided by the PCA 9685 still works. The GVG selection software can still select four of these devices with up to three motors, one for each selection.

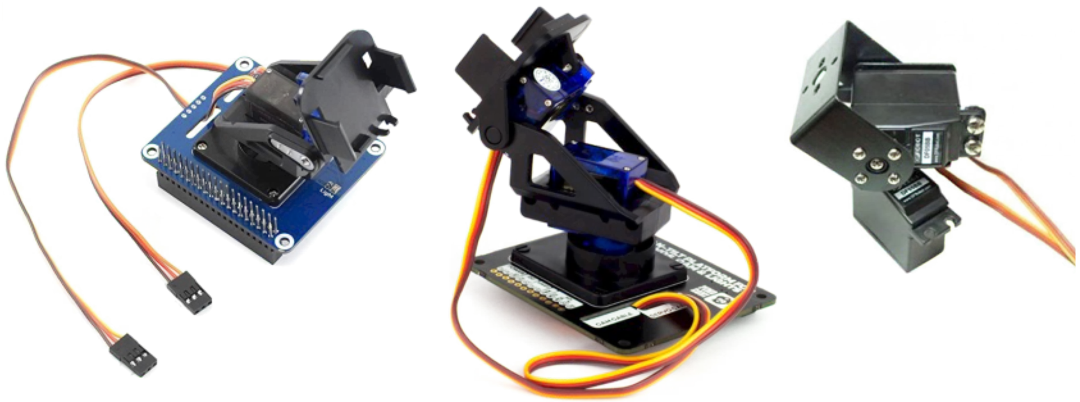
It is a good idea to power larger motors from a source other than the GVG mixer +5V regulator. I will leave you to experiment, you can only control one motor at once, but the stall current can be high, so far, the smaller SG90 motors have not given any problems. Please keep me in the loop if you come up with an improved set-up. Controlling four cameras remotely and doing the vision mixing is quite a handful, it depends on the level of action in your production.

Bugs, Complaints or Requested Changes.

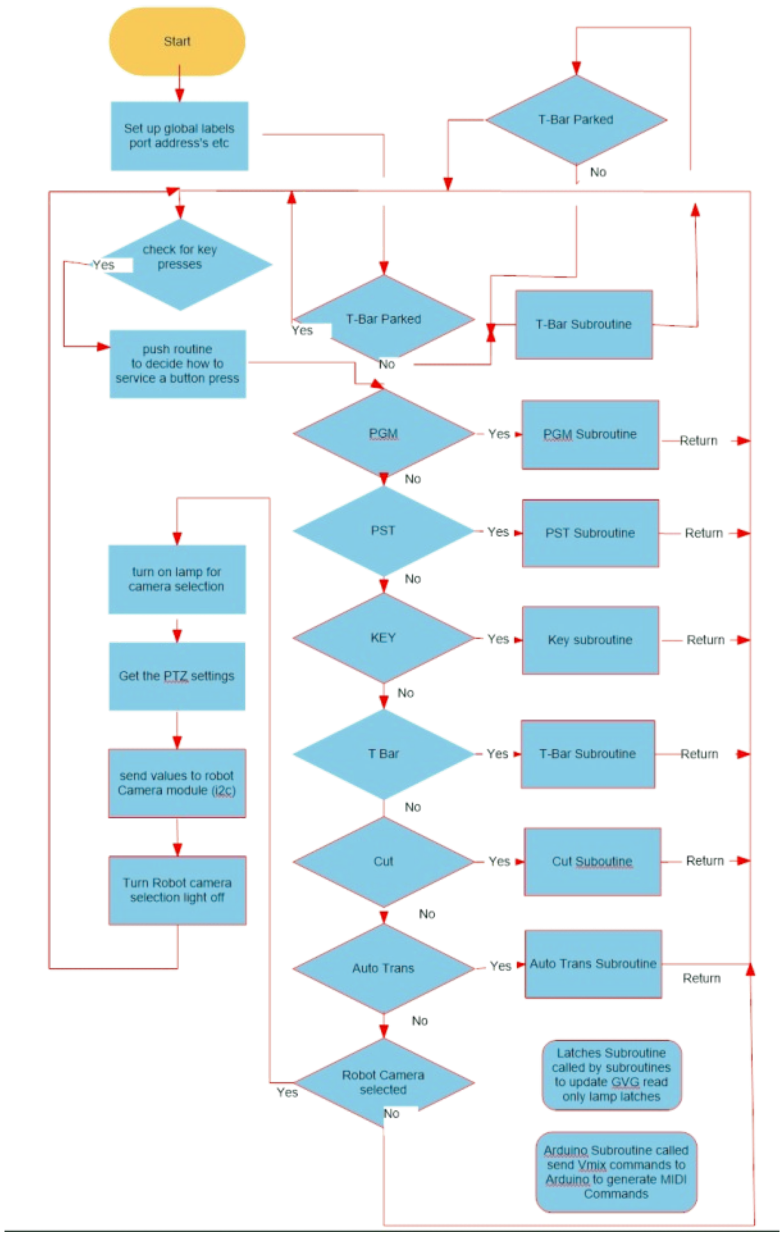
Now REV 16 of the software is released and working I will report each month any request for changes. These are the only requests so far.

The mixer is inoperative when a PTZ is selected.
Not possible to jump from one PTZ to another, the normal key is required to return to Vmix and then a different PTZ can be selected.

Ok I have looked at both and yes that is how the software works. I have revised it so when you select a PTZ on REV 17 software the appropriate PTZ selector button needs to be held down while that camera is being adjusted. The button flashes while held down and the panel will time share Vmix and PTZ.



PWM Robots camera solutions (Lots on the net)



Simplified Software flow shows if the T-bar is not parked it hangs, (arrow lights out when parked) If you keep your finger on any of the four Robot cameras you can still work the mixer and Pan and Tilt the camera at the same time

When the PTZ selector is released it becomes Vmix only and the PTZ selector then ceases to flash. When the button is lit the PTZ controls work when it goes out only the mixer controls are active. The flash is almost a flicker but shows the CPU is switching tasks.

This does involve a two-handed operation, but it stops you having an inactive mixer and opens a door to using the joystick. The idea being the joystick controls the camera motion and direction, but not the ultimate position as the pots did. Work is ongoing and I will report back in the next issue.

Any other request you can reach me at *editor@cq-datv.mobi* that is not my title, its an email address shared by the CQ-DATV production team.

Between issues of CQ-DATV a GVG panel did turn up on e-bay in the UK and did not sell at £65, so if you are interested, keep your eyes peeled.

Let me wish you all a Merry Christmas and I will see what I can add to the GVG panel in the next issue.

All referenced GVG software can be downloaded from here:

https://cq-datv.mobi/downloads.php

To be continued in the next issue

Drone Test Flight using a QRP 70cm ATV Payload

Written by Dave Pelaez AH2AR

Providing interesting ATV signals for reception is a worthwhile project. To that end, ATV balloon activities has been occurring since the late 1980's.

The high-altitude ATV balloon pioneer, WB8ELK and others such as the Dayton Amateur Radio Association and a number of individuals and groups have provided numerous opportunities to test their ATV receiver limitations that have allowed for a line-of-sight ATV DX range out to 400 miles or more.

Aeronautical ATV is also nothing new, as a number of private-plane equipped hams have also tried aeronautical mobile ATV with various degrees of success.

Relatively recently, hobbyist drone activities have taken off (no pun intended) and employment of a drone as an ATV transmitter platform provides yet another opportunity to mix the new drone hobby with amateur radio.

FAA restrictions for recreational drone flyers that limit the drone altitude to no higher than 400 ft AGL does certainly limit the line-of-sight ATV signal path. However, for hams in the Midwest United States where mountainous terrain is obviously not an option, even a 400ft altitude above terrain will still provide extended range viewing of QRP ATV signals and can result in an interesting signal catch, where a band opening is not necessary.

There are still a number of ATVers within the Midwest region that are using 70cm point-to-point AM composite video analog ATV for scheduled DX contacts.

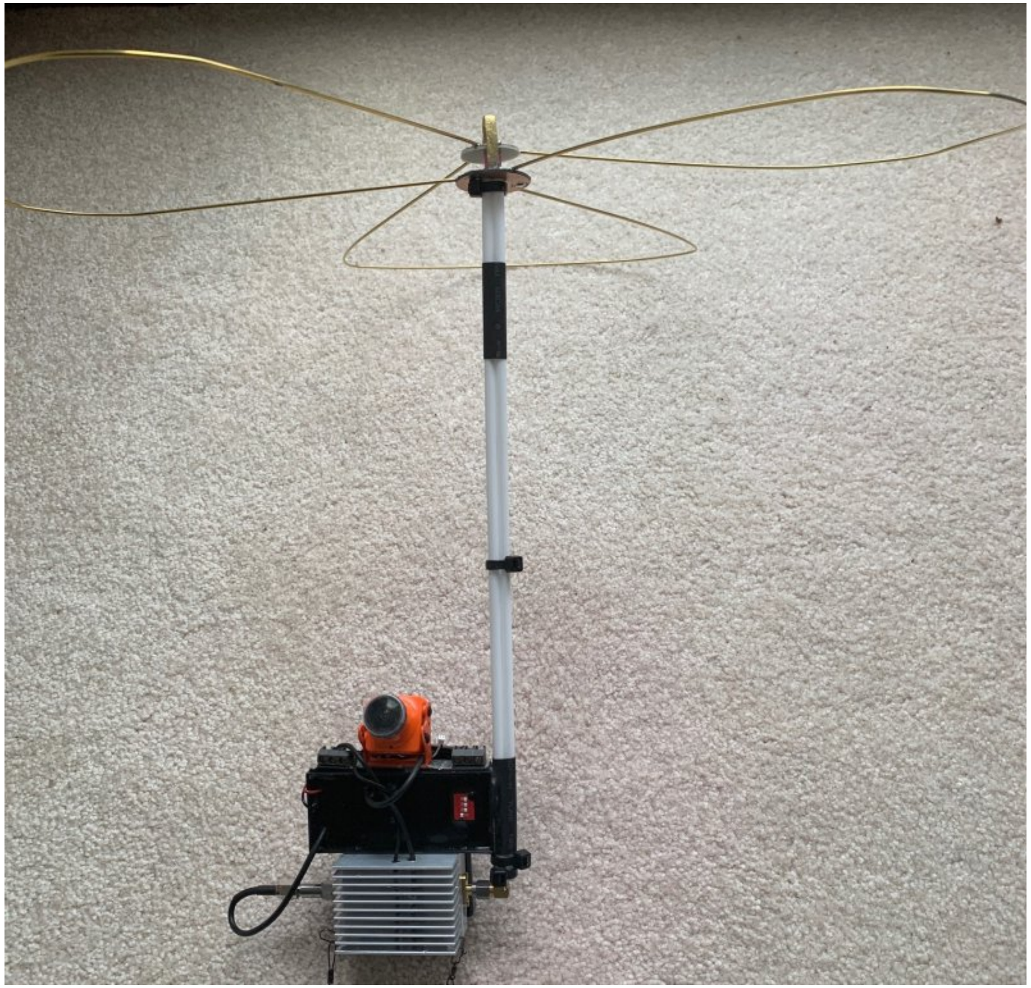
Drone used for this project is the DJI Mavic Air-2

Most of the ATV DX activity in the Midwest is primarily accomplished with analog video, although most of the ATVers here also have digital capabilities. Consequently, using A5 for this event would allow for the maximum number of ATV participants willing to look for a weak drone ATV link at low altitude.

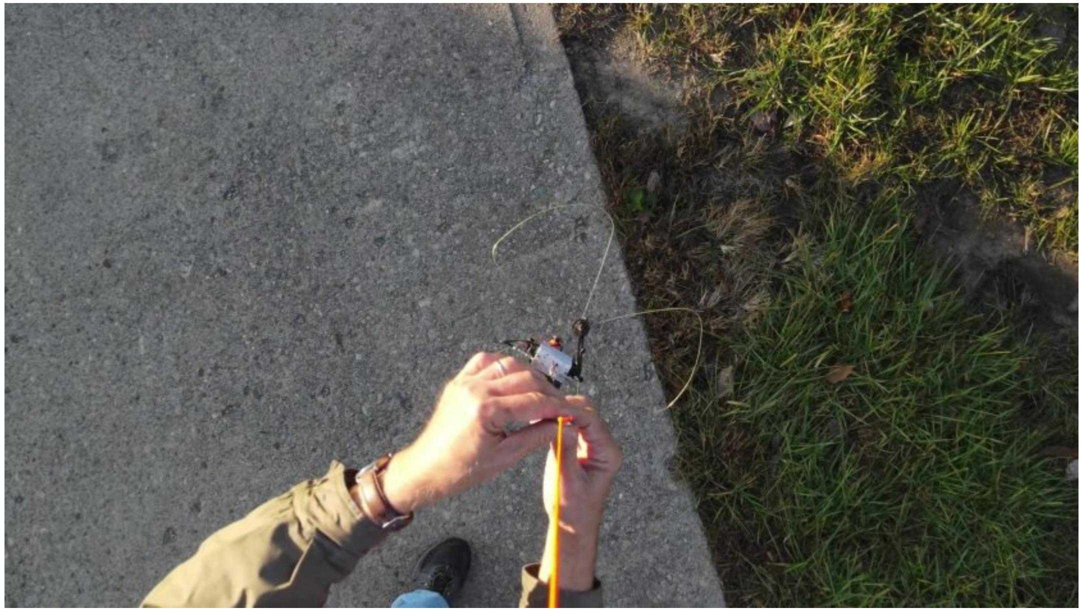
My primary goal for this drone project was to simply try to see if I could fly an ATV transmitter, but the payload weight limitations for the type of drone I was using was not necessarily designed to carry items not much heavier than a GO-PRO camera or a drop device. This restrictive weight limitation had to be factored into coming up with a workable ATV payload.

Completed ATV payload prior to its first flight on 7 November

I settled on components that ended up weighing 15 ounces. Several drone hobbyists have flown the DJI MAVIC Air-2 in a lift-test of up to 1.5 pounds, and such a weight is certainly not recommended. By keeping the payload to under one pound, the drone's performance factor allowed for the appropriate lift performance requirement for this simple "up and down" ATV signal propagation test. Even with this weight, when the drone was connected to the payload, the drone's props sounded like a thousand angry bees!



Payload and little wheel antenna. The three 18650 batteries were mounted in a plastic three battery holder mounted behind the transmitter/amplifier



Connection of the Payload to the Drone tether as seen through the drone's camera

Hooking up the payload with the drone hovering

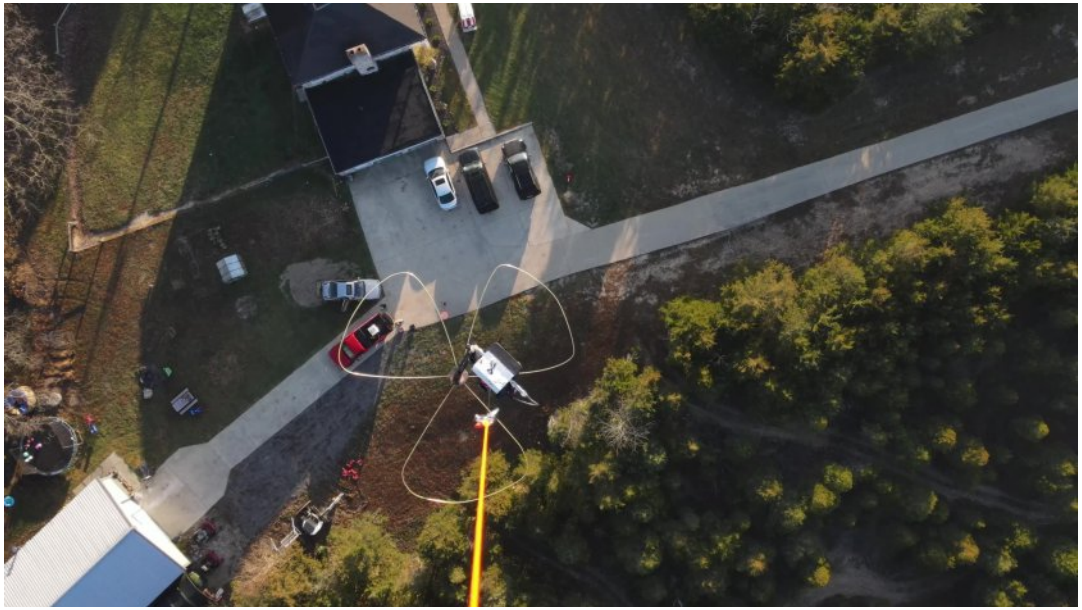
Because I live in a restricted flight area, and since safety is paramount at all times, especially whenever flying attached payloads, I opted to fly the drone at a location due South of Dayton, Ohio. The first flight on 7 November was launched at the top of a hill on private property in Germantown, and once at altitude, the 70cm ATV signal was received 22 miles away (P3 Signal) by the Dayton Amateur Radio Repeater. Additionally, Al Vinegar, W8KHP received the ATV signal at his home QTH in Hebron, Kentucky. Charles Beener, WB8LGA (Columbus, Ohio) received the ATV signal on his SDR @ 30dB above the noise floor.

Normally, the DJI Mavic Air 2 can remain airborne up to 35 minutes, but the extra weight being carried by the drone cut flight time in half. Three separate flights were conducted to exchange expended drone batteries.

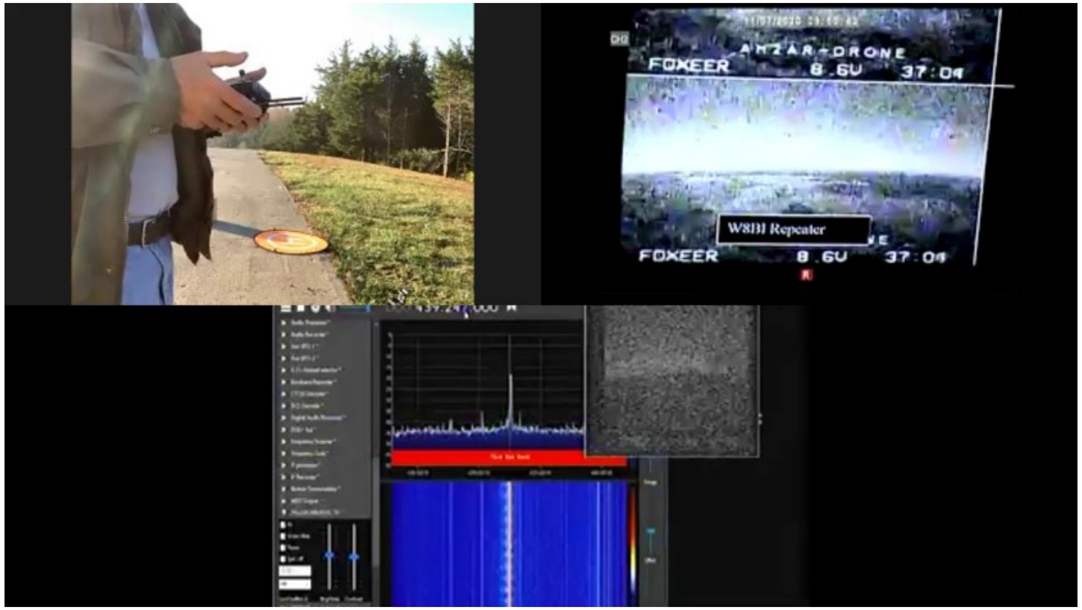
The transmitter payload was tethered below the drone (see photo). The payload included a home-brew little wheel antenna, three 4 Ampere Hour 18650 Lithium batteries, a videoLynx 70cm transmitter on 439.250 MHz, and a Chinese amplifier that produced a measured RF output of 2 watts (average). A "Foxteer" quadcopter standard definition video camera was used that also provided the on-screen display (OSD) with call letters. The camera and supporting OSD circuitry weighs less than an ounce.

The event was streamed live via ZOOM. Also, the Dayton Amateur Radio Association’s ATV repeater was live-streamed on ZOOM in order to see whether the QRP video could be received at the ATV repeater in Huber Heights, Ohio.

Keeping in mind that low-gain omni-directional horizontally polarized antennas were used on both ends of the path, the two watt ATV signal triggered the ATV repeater’s video squelch at P1, with ATV signals eventually reaching P3. "Curvature of the Earth" distortion was due to the FOXTEER’ camera’s extreme wide-angle lens.



Drone's camera-eye view at approximately 130 ft AGL prior to reaching the working altitude



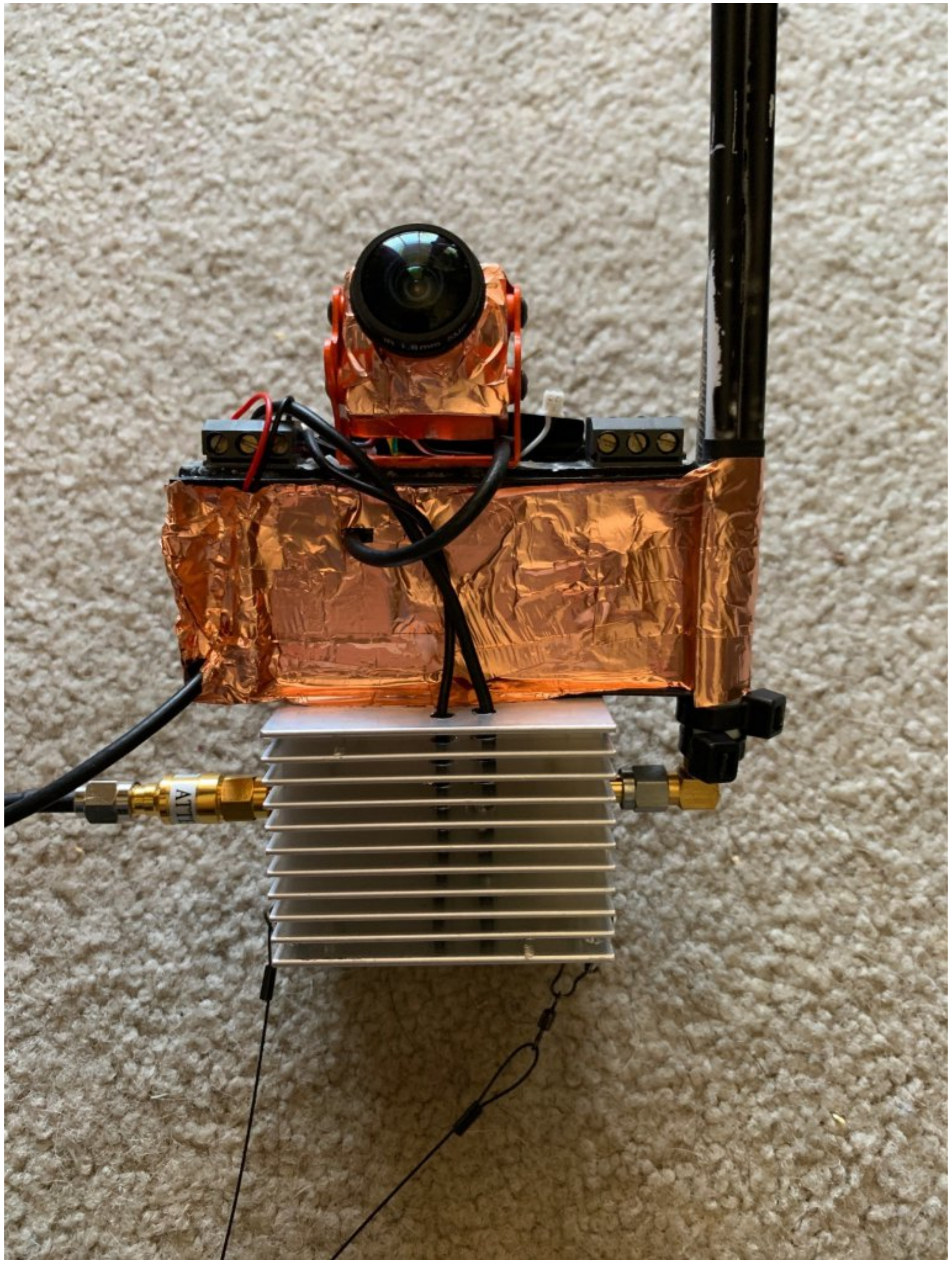
ZOOM Screen Capture showing live activity at the launch site (upper left frame), the SDR signal at W8KHP's Hebron Kentucky QTH (center), and the payload's video signal of the horizon as received by the Dayton W8BI repeater at 22 miles (upper right frame)

At the time of writing this article, another flight is planned on Saturday, November 14 if the weather cooperates.

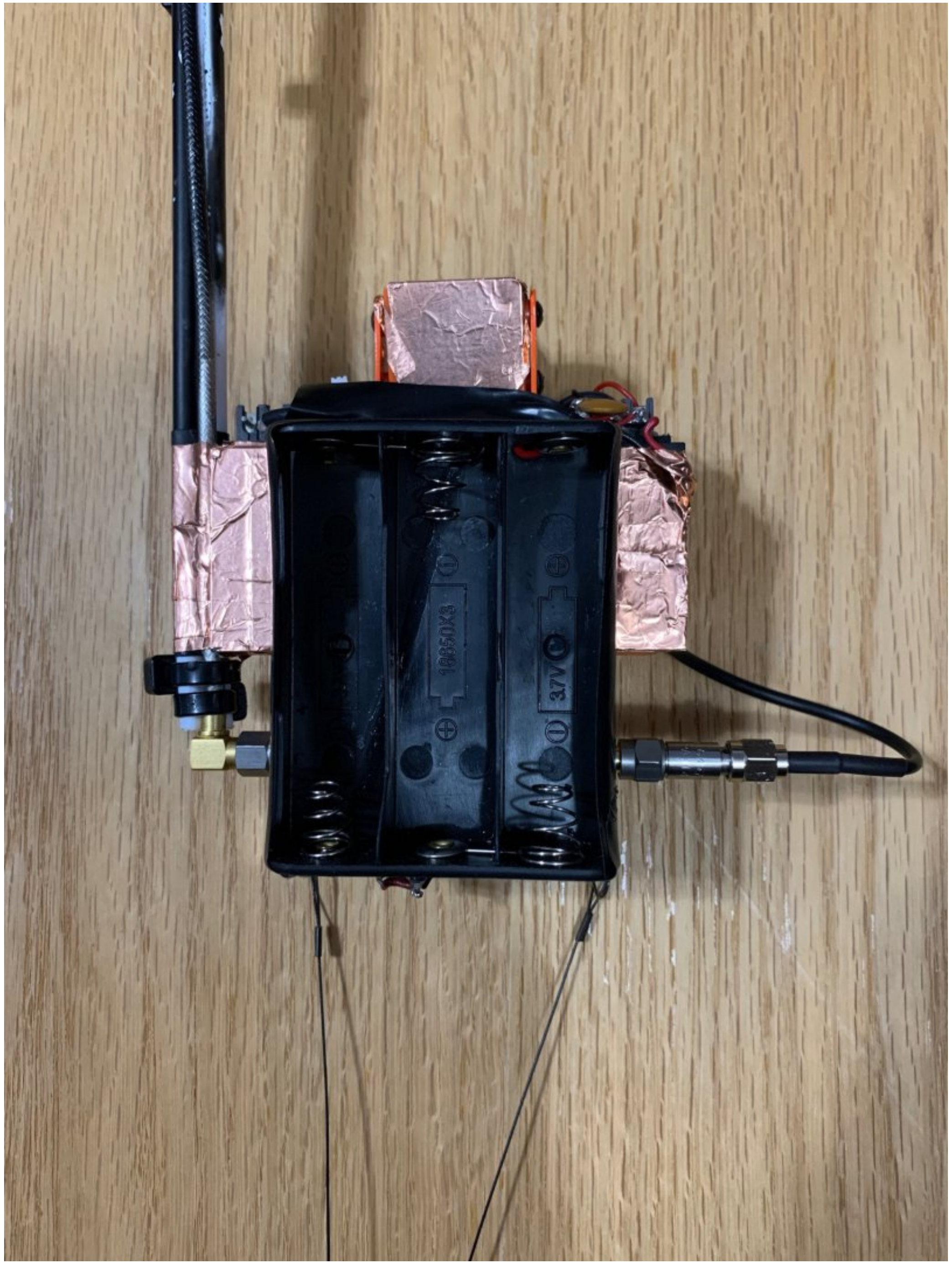
Please note if you want to watch the flight, it will also be streamed on ZOOM and preparations will start at 0700 Dayton Time. Flight time should occur around 0800-0815. (We will be using the Standard Midwest ATV DX Group/DARA NET/ATCO NET ZOOM number and passcode).

It may be worth watching, as the dangling cord could always get caught in the props! (Thanks to N3BFZ and WB8LGA for providing recorded video on ZOOM)

Continued next page...



For the second flight, copper foil shielding has been added to eliminate some herringbone interference caused by the close proximity of the antenna that was encroaching into the ATV transmitter circuitry



Flip side of the payload for placement of three 18650 Batteries

Second ATV Drone Flight

The second ATV drone flight ended up starting a little earlier in the morning, on a somewhat cloudier day, and it sure was quite a bit colder outside at 26 degrees. Yes, there was definitely frost on the pumpkin! Once airborne, the ATV signal from the 2 watt 70cm ATV payload was received at no better than P3 through the Dayton ATV repeater.

WB8LGA (Charles) in Morrow County Ohio was able to detect sync throughout the flight, and was able to receive the signal on his SDR. W8URI, (Bill) in Mt Giliad Ohio was experiencing interference issues from a local DMR repeater and was unable to receive any video on his ATV equipment but was able to detect the ATV carrier on his IC-9100. W8KHP (Al) in Hebron, Kentucky received the ATV signal at P1. KE8DOC (Doc) in the Dayton area maintained a P-3 view through the DARA ATV repeater. Everything was much like the first flight in many ways, K3BFZ and WB8LGA again provided the Zoom recording.

These were very marginal ATV signals at best, as we were limited by the FAA altitude rules… however, we will look to possibly re-energize this effort by increasing RF power by 8 dB, as it is definitely doable.

Flying at a much cooler outside temperature will allow us to use a heatsink with a smaller mass and by using a different amplifier (such as a Mitsubishi RF module) this alternate approach will further lighten the payload weight.

The Lithium batteries should provide plenty of flight time, as long as the DC power to the batteries is removed between each of the three flights.

A Cloudy Morning and Frost at the Launch Site

Drone’s Eye View from the Drone Camera for Flight #2

Lower Right: Vic N3BFZ at "Mission Control",

Upper Left- Live Drone Camera View at the Launch Site, Middle-Drone View at the DARA Repeater, Upper Right - Raster (no signal at W8KHP at the moment), below left- Vince N3BFZ at Mission Control, and KE8DOC showing the DARA ATV Repeater view

Senior Parachute Club

Yesterday my daughter e-mailed me, again, asking why I didn't do something useful with my time. "Like sitting around the pool, drinking wine isn't a good thing?" I asked.

Talking about my "doing something useful" seems to be her favourite topic of conversation.

She is "only thinking of me," she said, and suggested, I go down to the Senior Centre and hang out with the fellas. So, I did and when I got home, decided to play a prank on her.

I sent her an e-mail saying that I had joined the Senior Parachute Club. She replied, "Are you nuts? You're 86-years-old and now you're going to start jumping out of airplanes?"

I told her that I even had a Membership Card and e-mailed a copy to her.

Immediately, she telephoned me and yelled, "Good grief, Dad, where are your glasses?! This is a membership to a Prostitute Club, not a Parachute Club."

"Oh man, am I in trouble," I said, "I signed up for five jumps a week!"

The line went dead.

Life as a Senior Citizen isn't getting any easier, but sometimes it can be fun!

Ernie & Bert Board

Written by Maarten Janssen (DhrBaksteen)

The Ernie & Bert Board is my first try at generating a video signal using a PIC 16F84A microcontroller. It is based on ideas about generating video signals using a PIC by *Rickard Gunee*.

Unlike Rickard's video game system this project displays a single hi-res monochrome image of 512x256 pixels on a PAL TV. Since the PIC is too slow and has too little memory to generate the image by itself the board holds a 16K EPROM chip that contains the bitmap image of Ernie & Bert and additional components to generate the video signal.

How it works

The PIC is in charge of running the whole operation. It generates the horizontal and vertical sync pulses and controls the rest of the chips on the board. When a video frame is generated the vertical counter is reset and vertical sync pulses are generated. After a number of blank scan lines the image data will be sent. For each scan line the PIC sends the horizontal sync signal, resets the horizontal counter and gives the vertical counter a clock pulse. Now the video output VENABLE is enabled. This will enable the video clock VCLK as well as the 74165 shift register to send its serial data to the video output.

The video clock is a simple AND of the system clock and the video enable signal. The PIC now waits for 52µs until the end of the current scan line. Then the video output is disabled and the next scan line will start. After 256 lines the PIC outputs some blank lines to get to a total of 304 scan lines and the process will repeat.

We have 52us of visible video signal on each scan line, which is 520 clock pulses thanks to the 10MHz clock. Hence the choice for a horizontal resolution of 512 pixels. The PIC requires 4 clock cycles per instruction so this leaves just 2 instructions before we need to start the next horizontal sync. Two instructions is not enough to prepare for the next line of video, so while the video signal is held at sync level the PIC sends a clock pulse to the vertical counter, resets the horizontal counter and keeps track of the number of lines left in the image.

The board has two counters; the vertical line counter and the horizontal pixel counter. When video output is enabled (VENABLE) the horizontal counter is clocked using the video clock VCLK. The horizontal and vertical counters both drive the address bus of the video ROM.

Horizontal counter Q3 - Q8 map to A0 - A5 and Vertical counter Q0 - Q6 map to A6 - A12. The lowest 3 bits of the horizontal counter are used to detect the start of a new group of 8 pixels and are what drives the latch pin of the 74165 shift register. When Q0, Q1 and Q2 of the horizontal counter are 0 a new byte is available on the data bus and is latched in the shift register.

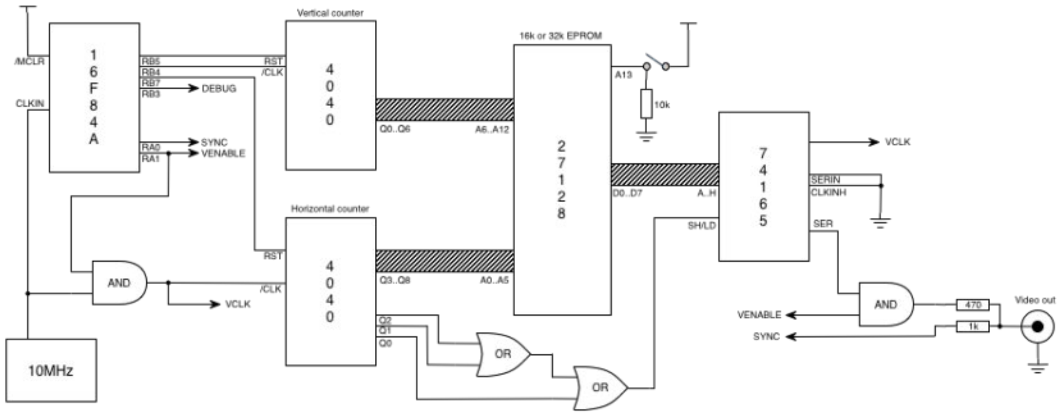
A shift register is used to convert the 8-bit parallel image data coming from the EPROM into individual pixels. The data in the shift register is shifted using the VCLK signal that also drives the horizontal counter. The serial video data that it outputs is run through an AND gate with the VENABLE signal from the PIC and forms the final video signal. I use an AND gate to switch the video signal off at the end of a line so that I don't have to worry about any residual picture data left on the serial output when we need to go to sync level.

An additional debug video signal is generated directly by the PIC. This signal shows an alternating pattern of horizontal lines which was used to test the PIC during development. Optionally a 32K EPROM chip can be used in stead of a 16kb one. The 32kb ROM can contain two images. Using a jumper on the board either the first or the second image can be selected.

Available files

- *ernie_bert.bin - Binary of the bitmap image without BMP headers to be loaded on the EPROM*
- *ernie_bert.bmp - Editable bitmap*
- *video.asm - Souurce code for the PIC 16F84A*
- *video.hex - Binary loaded on the PIC*

These files are available in a single zip file from the cq-datv download area *https://cq-datv.mobi/downloads.php*.



Ernie & Bert Board
Maarten Janssen 2015

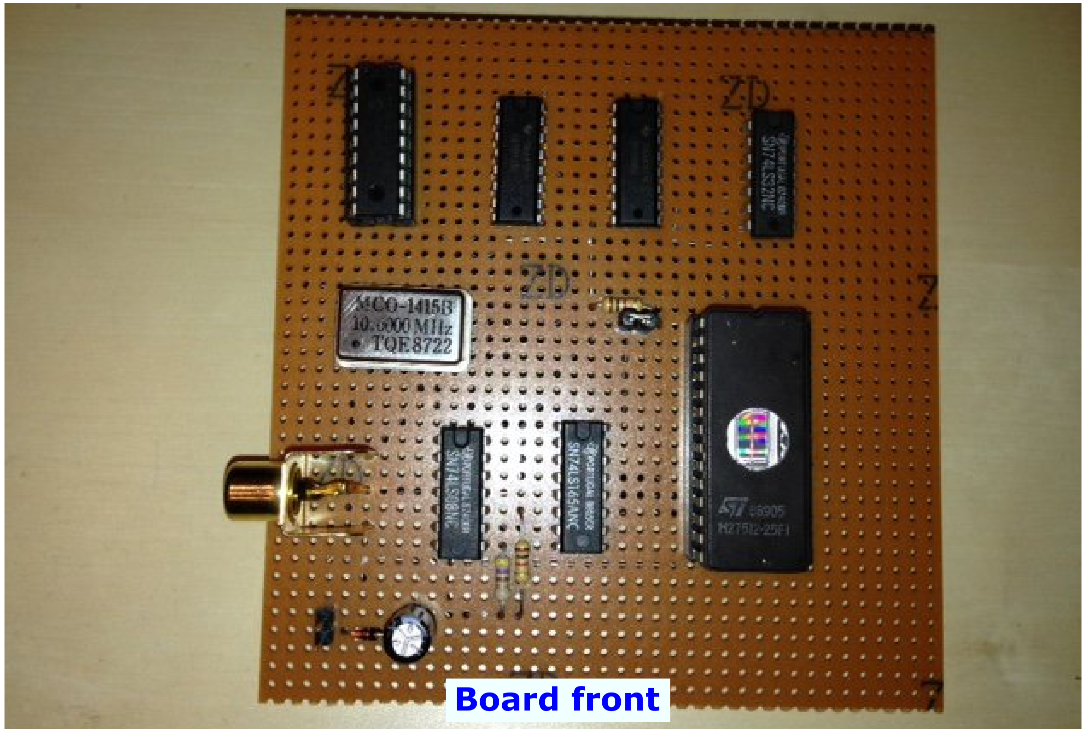
Possible improvements

- ~~*The VCLK clock input to the shift register and horizontal counter should be negated. In the current hardware this is not the case and it causes visible glitches in the image when a new byte is latched into the shift register.*~~
- ~~*There are glitches in the form of vertical bars at regular intervals where the image seems to have shifted down a number of lines. This is probably an issue on the address bus due to sloppy soldering :)*~~
- *The video signal seems to loose sync briefly every few seconds. Maybe due to an improper reset signal to the PIC?*

The glitches in the picture seem to have been caused by noisy signals coming from the horizontal counter's Q0 .. Q2 outputs.

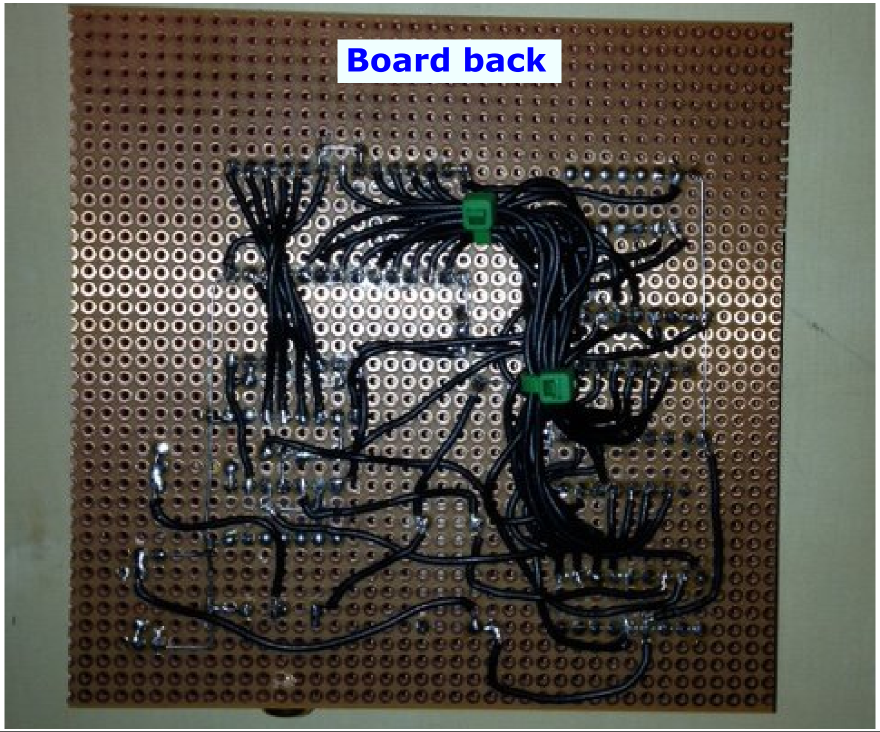
This caused the 74165 to latch new bitmap data at 'random' times. A couple of 0.1nF capacitors between Vcc and the OR-gate inputs fixed the issue giving a perfectly stable picture.


Before adding caps



Board front

After adding caps


Board back

Programming for ATV the GT Media V7+, DVB-T, Receiver

Written by Jim Andrews, KH6HTV
Reprinted from Boulder Amateur Television Club TV Repeater's REPEATER November, 2020

We have recently discovered a new, low cost, combo DVB-S & DVB-T set-top box receiver which will also tune the amateur 70cm & 33cm bands for DVB-T. It is the GT Media V7+. It is available in stock in the USA from Amazon Prime and sells for $42.

The receiver is specified to cover from 950 to 2150 MHz for DVB-S and 50 to 868 MHz for DVB-T. However, I have tested it and found that it could be programmed as low as 50 MHz, but also to receive higher than specified to include the amateur 33cm band (902 - 928 MHz). It provides simultaneous digital and analog A/V outputs. They are 1080P HDMI and 480i composite video plus stereo audio. The receiver also includes a digital video recorder (DVR) function. To use this, a USB memory stick needs to be plugged into the USB port on the rear panel. The video is recorded as a .TS file, the same as used for DVDs. The receiver operates on +12Vdc. It draws 0.4 Amps at +13.8Vdc

I also measured the sensitivity of the receiver. On the 70cm band it was -96dBm. On the 33cm band it was -95dBm. This was measured using "normal" parameters of 1080P, QPSK, 5/8 FEC, etc. I then added a low noise, 70cm preamp and it improved the 70cm sensitivity from -96dBm to -99dBm. The preamp I used was my own KH6HTV model 70-LNA-1 with 21dB gain and 0.5dB noise figure.

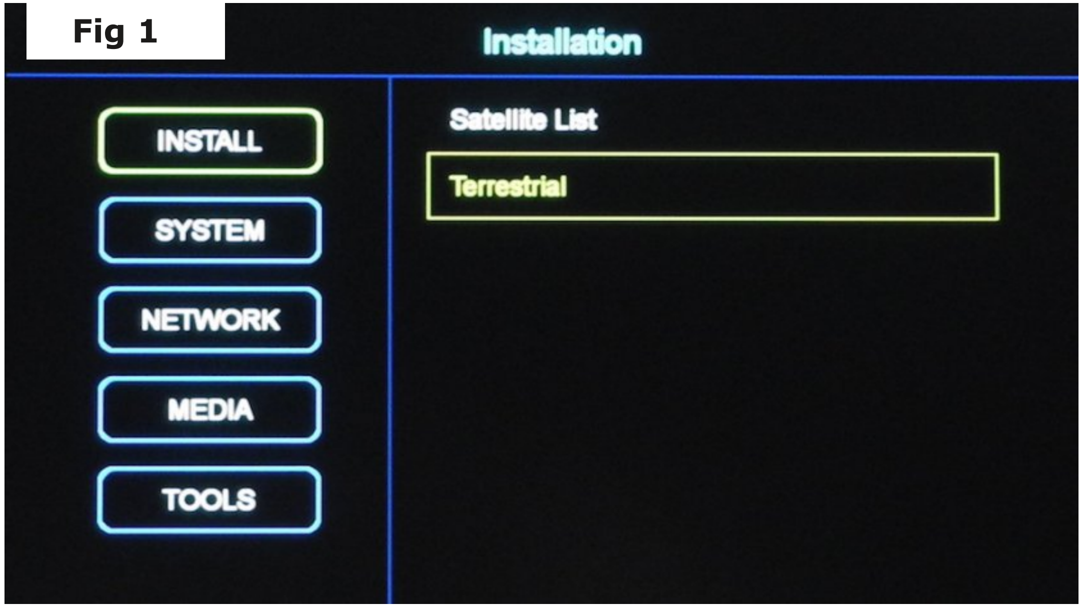
The instruction manual supplied with the receiver is very skimpy and essentially useless. There are some You-Tube videos on the internet where users have tried to explain how to set up the receiver, mainly for DVB-S satellite reception.

Channel Programming:

Like all other modern, digital TV receivers, such as you might buy at Wal-Mart, Best-Buy, etc. they come from the factory "dumb". They have to be auto-scanned (i.e. programmed) to receive the available TV signals. To do this, they must be exposed to valid DATV signals in the auto-scan process.
The first requirement to program the receiver for ATV use is to have available an RF signal source with the correct frequency and bandwidth. The ideal situation is to hard wire a direct connection from a DVB-T modulator to the antenna input on the receiver. Suitable modulators are the Hi-Des model HV-100EH or model HV-320E as your signal source. Either set the internal modulator attenuator to -20dB or greater, or use an external coaxial attenuator of at least 20dB. This will prevent the high rf level from the modulator from overdriving the receiver. Before proceeding with the following channel programming instructions, connect the modulator directly to the receiver and set the modulator to the desired frequency and bandwidth. It is helpful to also have "live" video playing into the modulator, such as a DVD player.

Programming of the receiver is done using the supplied Remote Control.

Fig 1



Step 1 - On the remote control, push the "Menu" key

Step 2 - Use the up/down buttons to select "INSTALL", click OK.

Step 3 - Use up/down buttons to select "Terrestrial", click OK. The Channel Search sub-menu then appears (Fig 1).

Step 4 - Use up/down buttons to select "Manual Search", click OK. The Manual Search sub-menu then appears (Fig 2).

Step 5 - Use up/down buttons to select Bandwidth. Use right/left buttons to set bandwidth to 6 MHz (Fig 3).

Step 6 - Use up button to select Frequency

Step 7 - Use the numeric keys on the remote control to enter the desired frequency. For example, for the W0BTV, ATV repeater, enter 423000. As you enter each number, an underscore will appear in the Frequency box indicating that digit is entered (Fig 4).

Fig 2

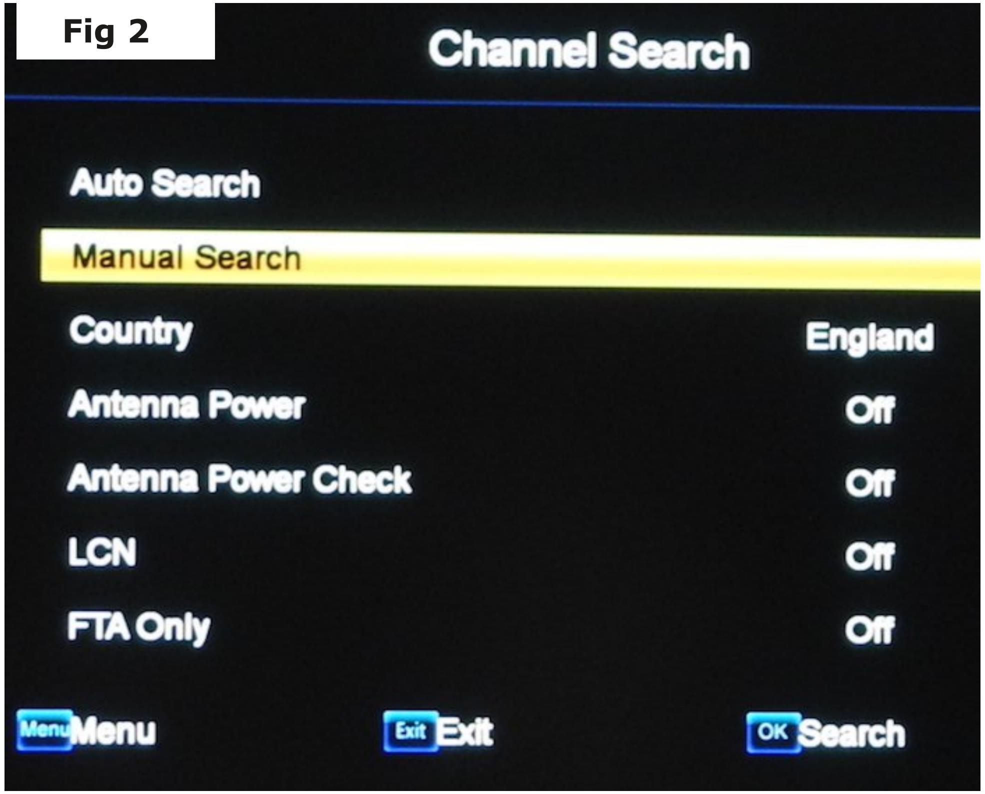


Fig 3

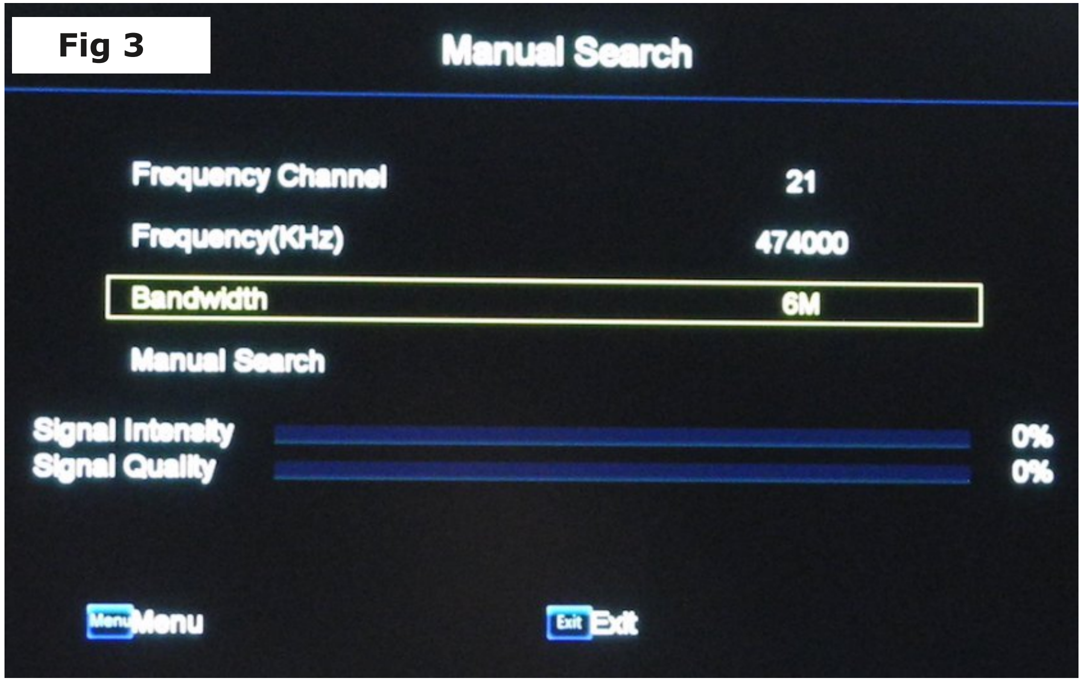
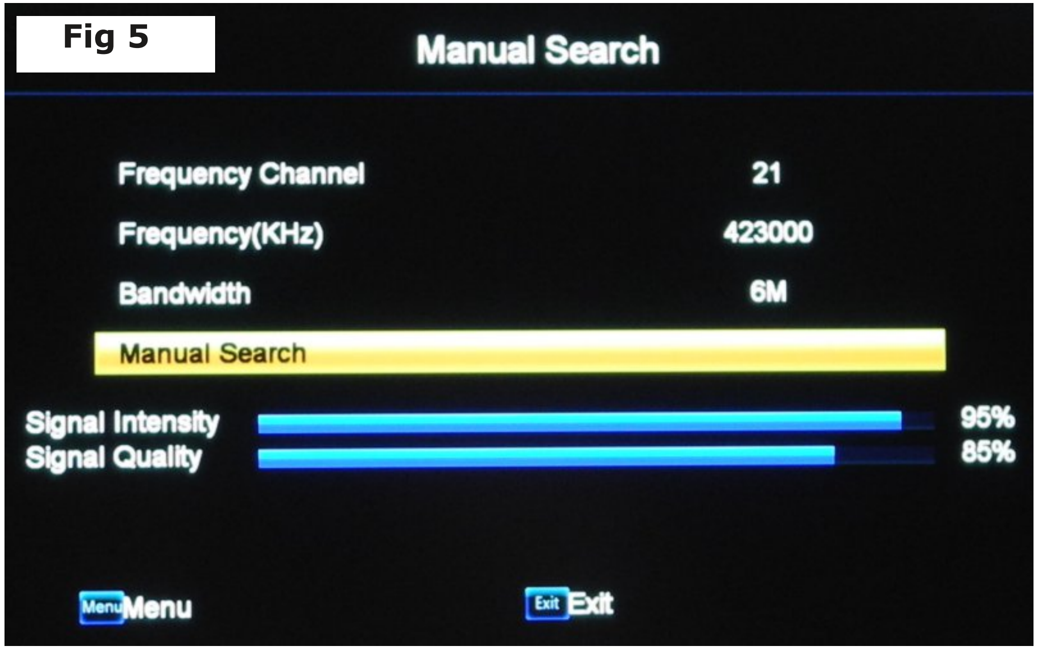


Fig 4

Step 8 - Use the down button to select "Manual Search" - do not push OK yet (Fig 5).

Fig 5



Step 9 - Wait until the receiver finds the rf input signal.

This happens when the Signal Intensity and Signal Quality bar graphs turn blue and the % values no longer read 0%. Now press the OK button.

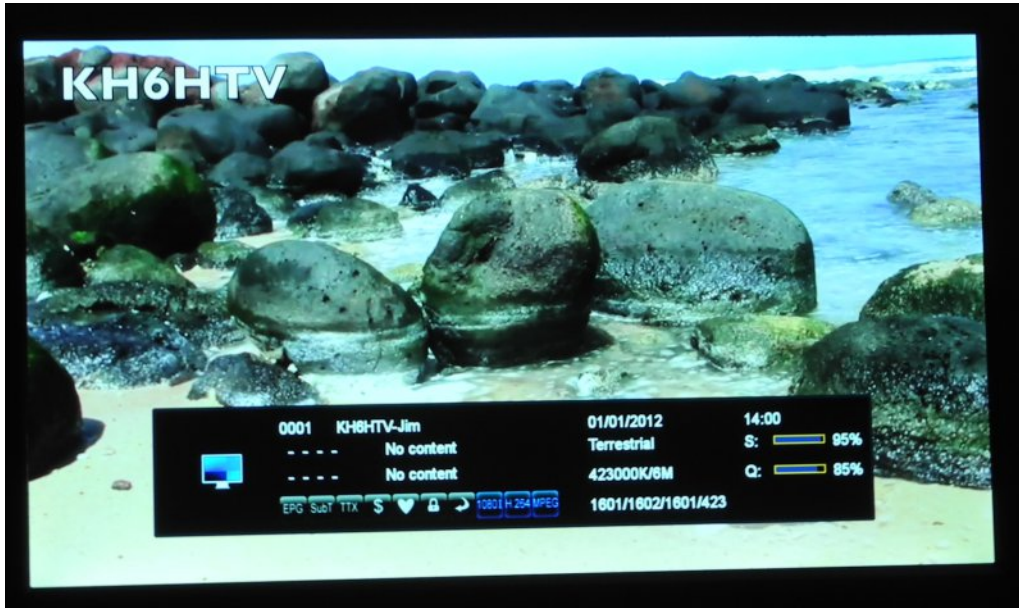
Step 10 - If successful, the above message will be displayed.. Press the OK button. You will now see displayed on the video monitor the live TV image with audio (See pic next page).

Step 11 - Congratulations ! You have now programmed the receiver to receive a DATV signal.

Firmware:

The unit tested had the following versions of hardware and firmware: Hardware V2.10 Firmware V4.2.81.46.414 Other versions of firmware may - or may not tune the amateur bands.

The receiver has two USB slots on the rear panel. The "Menu" in the "Tools" section allows for firmware backup and upgrade.



This is done by plugging into the USB port, a USB memory stick. It is highly recommended that one do a backup of the firmware by copying it onto a memory stick for storage elsewhere, in the event the receiver's firmware ever becomes corrupted. The firmware is a big 4.2GB file.

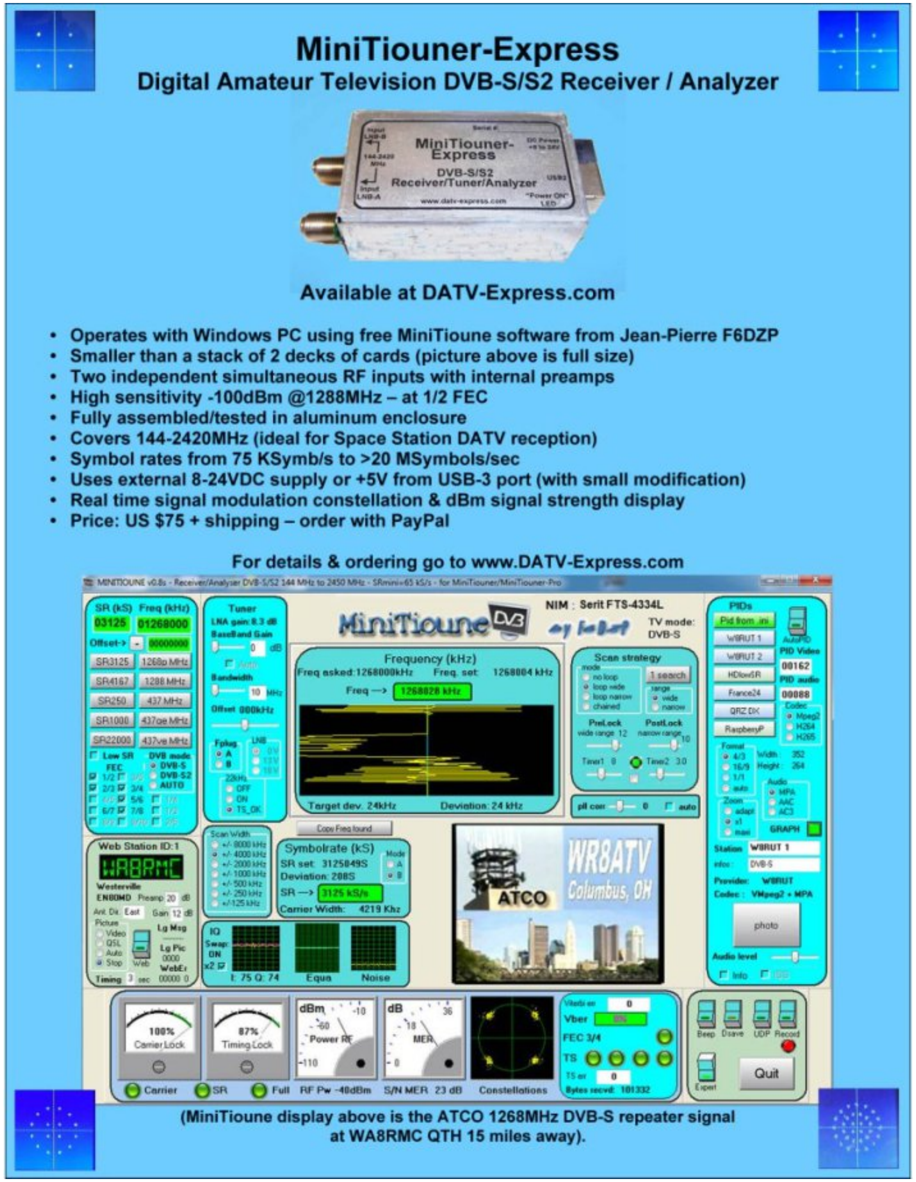
Update!

Since writing the above article, Jim has the following update. Well we have had several hams here in Colorado already take us up on the offer to buy and program them.
BUT — typical, damm, on-line shopping from Amazon, E-Bay, etc. — for sale offers appear and then disappeared in a microsecond or less.

The Amazon Prime supplier I used originally at $42 has since disappeared. Tried ordering for a ham at an E-bay site. They took my $$ couple days ago. Then today they cancelled the order.

At this point, all I am finding is suppliers in China with really long delivery times.
The typical " SLOW BOAT FROM CHINA". Plus prices are ranging all over the place.
Also, there are several other GT Media models. Most of them only do DVB-S. So readers need to take care when ordering.

73 de Jim, KH6HTV



Blackmagicdesign ATEM Mini Pro HDMI Switcher

Cobbled together by Ian Pawson
Web site *https://tinyurl.com/wx35lqv*

Description

ATEM Mini Pro is fast to set up and easy to use. It includes 4 standards converted HDMI inputs, USB webcam out, HDMI out, Fairlight audio mixer with EQ and dynamics, DVE for picture in picture, transition effects, green screen chroma key, 20 stills media pool for titles and free ATEM Software Control. ATEM Mini Pro also includes direct recording to USB flash disks in H.264 and direct streaming via Ethernet to YouTube Live and more. There's also a multiview with 4 cameras, media, preview and program plus status of recording, streaming and audio.

Self Contained Broadcast Quality Switcher

ATEM Mini's compact all in one design includes both a control panel as well as connections. The front panel includes easy to use buttons for selecting sources, video effects and

transitions. The source buttons are large so it's possible to use it by feel, letting the presenter do the switching! You even get buttons for audio mixing! On the ATEM Mini Pro model you also get buttons for record and streaming control as well as output selection buttons that let you change the video output between cameras, program and multiview. On the rear panel there are HDMI connections for cameras or computers, extra microphone inputs, USB for webcam out plus an HDMI "aux" output for program video.

A practical application

Reproduced from Boulder Amateur Television Club TV Repeater's REPEATER November, 2020

Recently, I purchased a Blackmagicdesign ATEM Mini Pro HDMI switcher. It has 4 HDMI input ports with "instant" live switching between ports.

In configuring this Mini Pro into my station, I connected my old and "slow to sync" HDMI switch to Port 4 on the Mini Pro. After making this connection, the switching latency between all ports went from up to 5 seconds to less than a second. This is great! I now have a port "extension" of my Mini in my old HDMI switch.

I did try two different model HDMI switches with the Mini. One made by Kinivo (3 port) and Monoprice (4 port) with similar results.

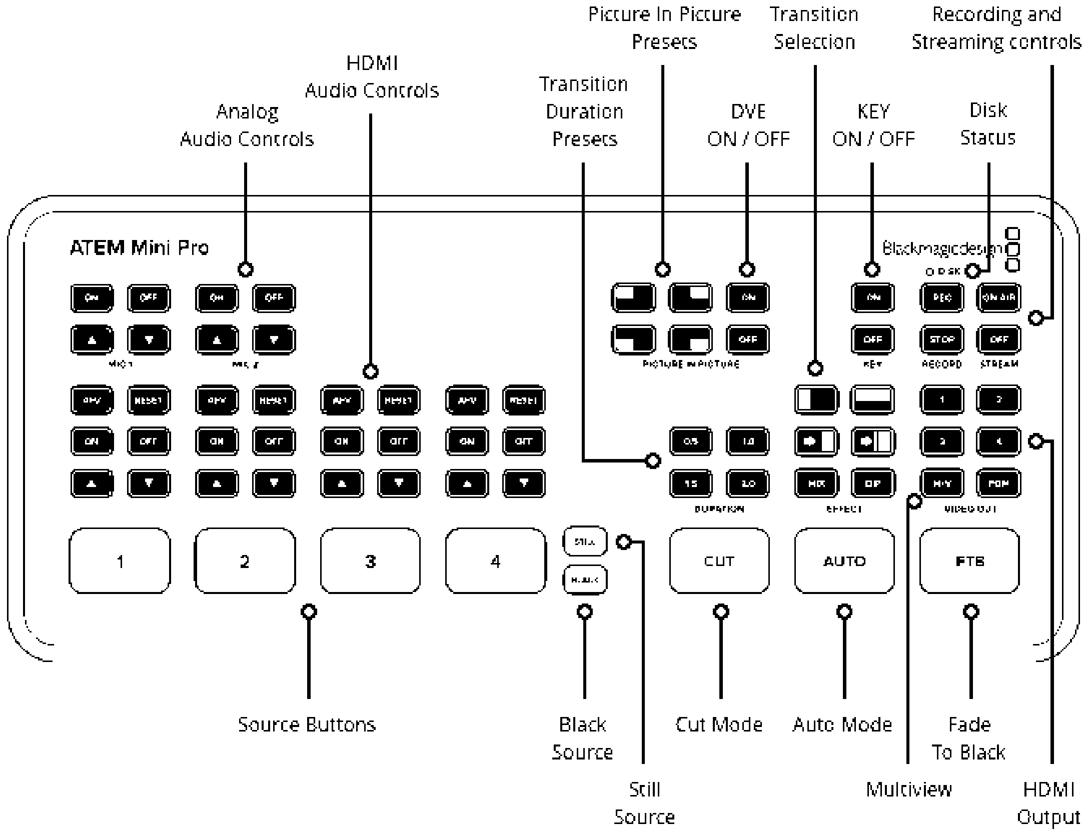
The Mini may be controlled remotely with IP so it could be used at a repeater site which I believe Mike WA6SVT is planning to do. The Mini Pro's single HDMI output may be connected to a splitter for input to both the DATV modulator/transmitter and Mini's display monitor. Other applications of the Mini Pro may be found in G4NRT, Gary's BATC Oct 24 presentation available on You-Tube.

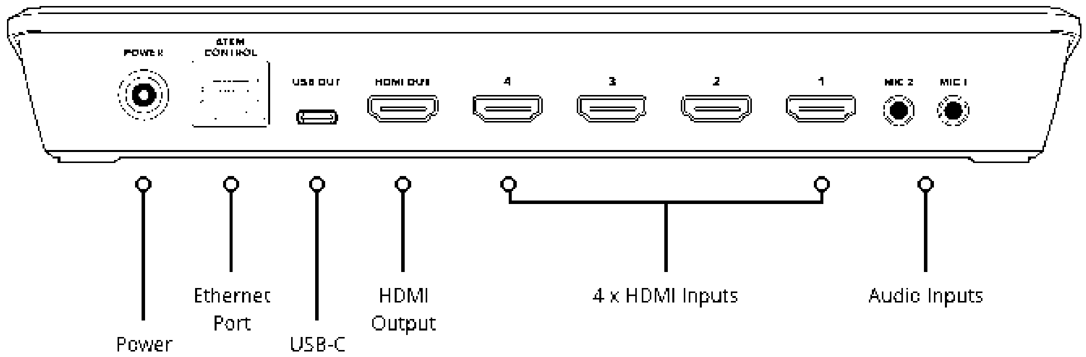
The Mini Pro is much more than just an HDMI port switcher. It is like a TV show production controller. The learning curve for anyone short of being a "Producer" may find it a bit steep if all of the features are to be realized. Tutorials on You-Tube are helpful but be prepared to hit the pause and replay button. I first learned about the "Mini" from Bob Heil, K9EID over a year ago. And recently Gary, W6KVC bought his to my shack to show me. Sorry now I waited so long to get one. But sure glad I finally did. Thanks Bob and Gary!

The photo shows I have assigned the Mini Pro's ports to the shack's main camera, PC, DVR and the old HDMI Switch. Sound can be from any embedded HDMI source or two analog Mic inputs. Sound from any source can follow to what ever HDMI port is selected. Size/location for PIP can be adjusted. Live streaming is available at the "push of a button" – No PC required. A SS Disk is on the right for recording and playback.

Chroma keying (green screen) for layering video images can be done using the Mini's control software. …and yes, I have both ends of all those cables identified !

73 de Mel, K0PFX





Broadcast Engineering Conservation Group

Line-Up B E C G **The BECG Newsletter**
Broadcast Engineering Conservation Group

Line-Up, the Newsletter of BECG (Broadcast Engineering Conservation Group) landed on the editorial desk this week. For those of you not familiar with their work at conserving and renovating broadcast TV equipment can I point you at CQ-DATV issue 85. There is a copy in the CQ-DATV library *https://www.cq-datv.mobi/ebooks.php*

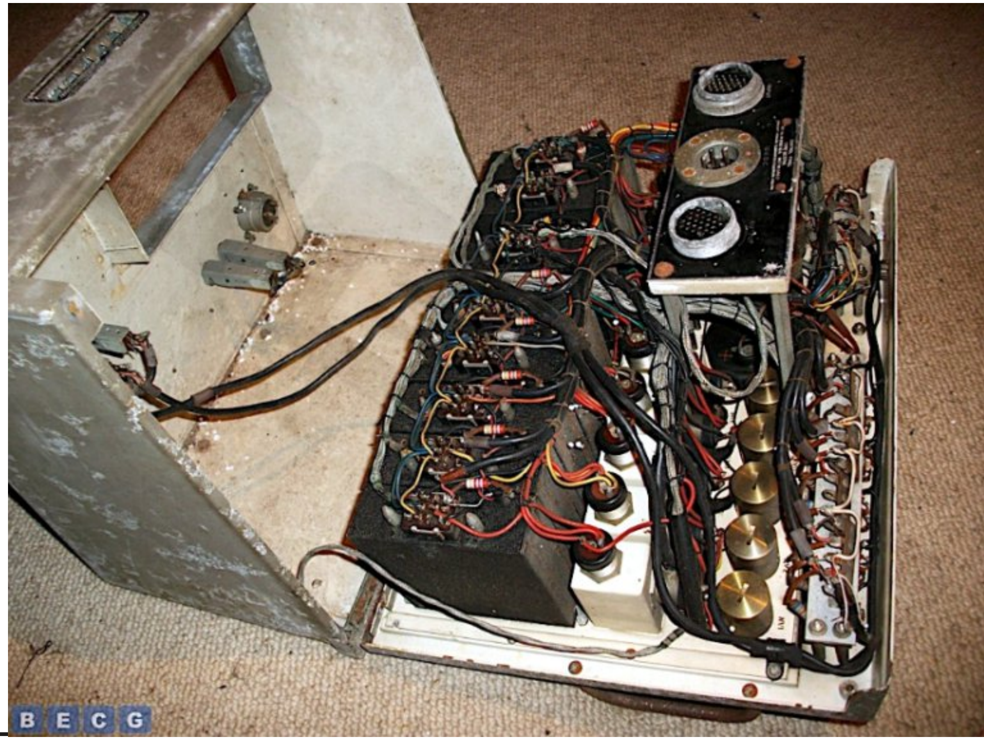
This is the groups second Newsletter, a lot of the equipment and projects in CQ-DATV 85 have been progressed starting with Project Vivat.

The vision mixer system is now almost complete, termination panels have been wired (but not yet installed) and numerous other small jobs done. Then there's the purchase of the correct sound mixer for the truck, which we never thought we would see an example of.

We don't have the electronics crate, but we can improvise one with modern parts as it won't be on view. Until now we've used a panel from the correct period but that was intended for portable applications. Here's the BD579A Sound Control panel in all its glory (right).

There's a new vehicle too – well, a rather old one – in the form of the BBC's P5 generator truck.

The generator will be an excellent complement to BECG's Project Vivat, our reconstruction of a 1950s outside broadcast unit, which uses Marconi Mk III cameras and associated equipment.



However, it's not just about Vivat, because the generator is powerful enough to run any of our other trucks.

The BBC only ever owned 10 power vehicles, designated P1 to P10. This one is P5, which operated from Manchester for most of its time in service. The vehicle is a Bedford type ML, with a petrol engine, which was built as a cab chassis in 1952, then fitted with a custom box body and a generator unit before entering service in 1953.

We think it holds the record for the longest serving OB vehicle: 1953 to 1987 or possibly later.

The generator set has a Perkins 6-cylinder diesel engine, directly connected to an alternator, running at 1500rpm, and producing about 27kVA of power at 240V single phase. A magnetic amplifier stabiliser is fitted, which gives control over both voltage and frequency.

Fiona Bruce with one of our Marconi Mk III cameras for the filming of Antiques Road Show at Lincoln Cathedral in 2009 Photo: Steve Hill Services, Lincolnshire

There is a lot more in the full newsletter and you can find out more by visiting the BECG website

https://tinyurl.com/y5yagg8w

or Facebook.

https://tinyurl.com/y2g858op

WELL READ THE WORLD OVER
CQ-DATV

PICOSD - Configuration program for the ATV keyer designed by F1CJN

Written by Pierre Col, F8EGQ

Usually in "One from the Vault" here we look back on a previous CQ-DATV circuit or article, but we thought we would ring in the changes and look back on an something we all remember and that had a lots of changes, additions, improvements, through the ages, but the basic idea was called "PIC Dream". No it did not appear in CQ-DATV in any of its incarnations but that's only because we have not been going long enough, still being the new kids on the block. This version of Pic Dream from Pierre F8EGQ......

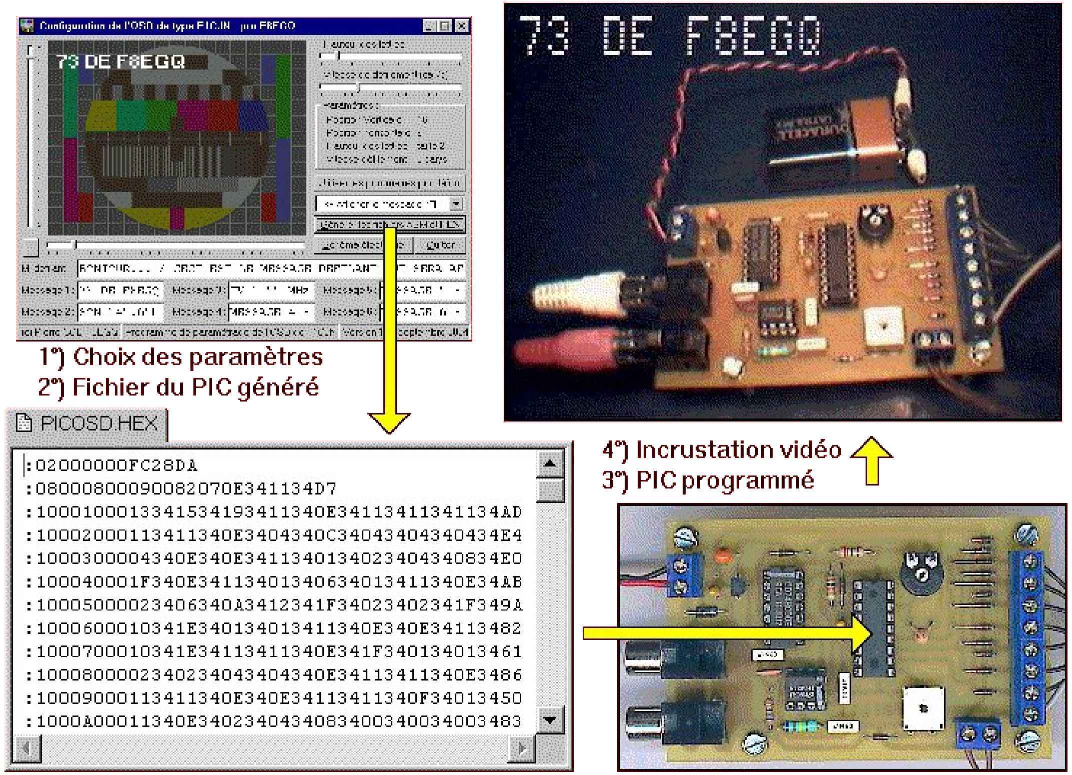
ATV, amateur television

Among the various transmission modes used by radio amateurs, ATV holds an important place; it opens up a vast field of experimentation: construction or modifications of existing equipment, in transmission or in reception (tuners, satellite demodulators, preamps, power amplifiers, antennas, microcontroller control boards, etc.); in addition, the bandwidth of the 'video' signals requires the use of very high frequency ranges (UHF and beyond), as well as fairly specific equipment: modulators, demodulators for video and sub-carriers, test patterns, inlayers, etc.

The video keyer

A video overlay system is a device which allows a predefined text (or logo) to be superimposed on a video image; it is sometimes also referred to by its acronym "OSD" (O n S creen D isplay = Display on the screen). The regulations require us to transmit at short intervals our amateur radio call sign; it is of course possible to switch it to voice, or to switch to a test pattern containing the callsign, but the use of an inlay constitutes, it seems to me, the most elegant solution. We can then take the opportunity to broadcast additional information: locator, frequency, etc. Thanks to a rather brilliant little assembly, designed by Alain FORT, F1CJN, the realization of a simple video keyer is now accessible to all. This is based on the use of a PIC16F84.
Purpose of this article

As I have just pointed out, I am not the author of this assembly, and the credit goes entirely to Alain F1CJN. I simply set myself the task of trying to take and improve if possible the original source file of the PIC, and especially to add a program intended to easily configure the messages to be displayed, from a PC running Windows; this program is called PICOSD .

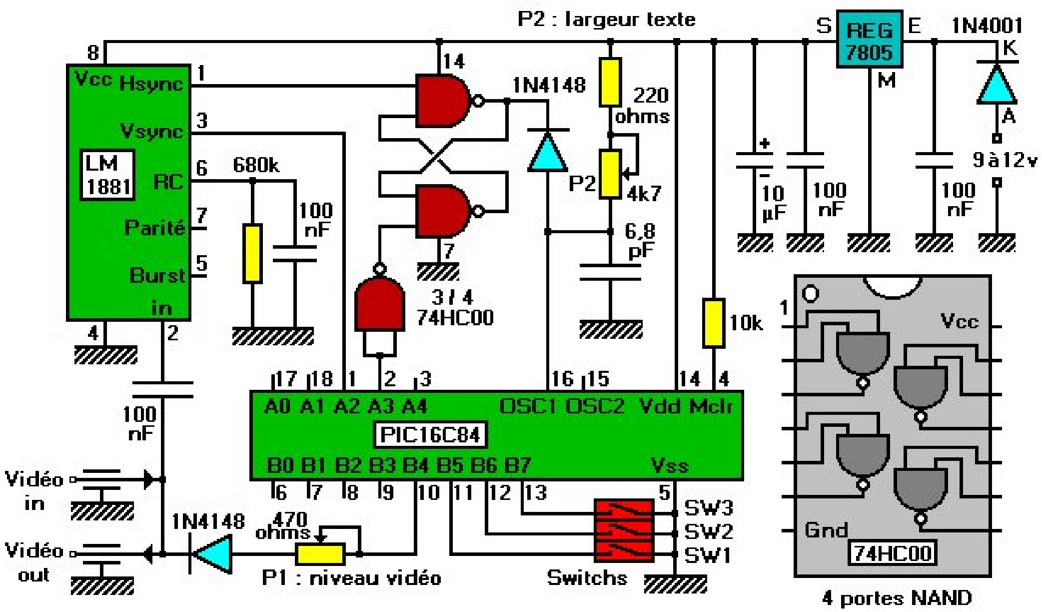


Parameter modification cycle

Very concretely, it will suffice for the OM to launch PICOSD, to modify the messages in the input zones, to choose the height of the letters, the scrolling speed of the scrolling message, and, to a certain extent, the position of the text on screen, then the program will automatically generate the files PICOSD.ASM (the source file) and PICOSD.HEX (the hex file to be programmed in the PIC), which correspond to these parameters. Once the PIC has been programmed and reinserted on the keyer, the new configuration is immediately functional.

The interested Internet user will therefore find in this article, on the one hand all the information for a detailed construction of the assembly, and on the other hand the PICOSD program which makes it possible to easily modify the various messages to be displayed.

Study of the circuit diagram

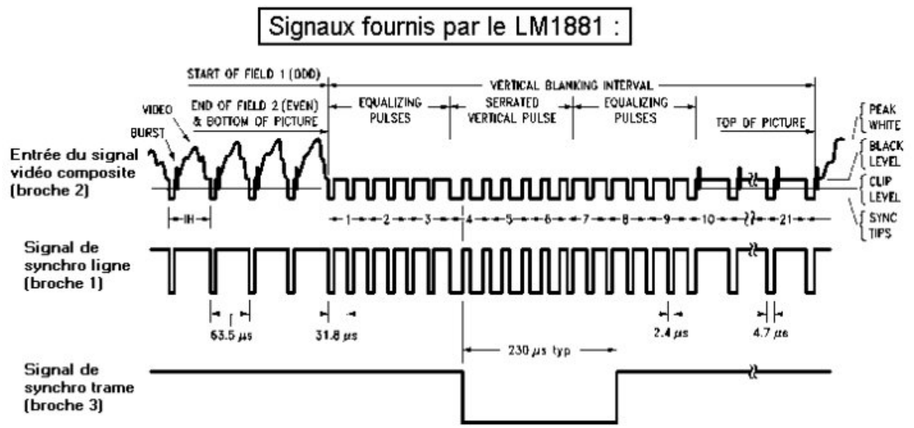


The Original circuit diagram

The diagram above corresponds to the one provided by F1CJN; it breaks down into three functional blocks focused around the following components:

- *The LM1881, which allows you to extract the 'lines' and 'fields' synchronization signals from the video signal. These tops will give rhythm to the operation of the PIC, allowing it to perform its work in perfect synchronization with the video signal.*
- *An 'RS' flip-flop (made up of the two top NAND gates, in red) which authorize or not the operation of the internal clock of the PIC, which allows it to go to sleep while waiting for the occurrence of a specific event: the start of the display of the next line.*
- *The PIC constitutes the brain of the device: it is capable, thanks to the indications provided to it, of detecting the start of an image (in fact, of a frame, therefore 'a half-image'); it will then wait for a certain number of lines, then will display a message of 11 characters; each character is made up of a 5 x 7 'matrix', ie 7 superimposed lines, and each composed of 5 pixels arranged horizontally.*

From the video signal supplied on pin 2 (via a link capacitor), it will extract the tops of 'line sync' (output pin 1), and of 'frame sync' (output pin 3), as shown below.



LM1881 signals diagram

Download the PDF documentation for LM1881. (173 kb)
https://tinyurl.com/y5ppte6g

NB : the documentation being American, the times indicated correspond to a sector (or frame) frequency of 60 Hz, for images of 525 lines, i.e. a line frequency of (60/2) x 525 = 15 750 Hz. One line then lasts: 1/15750 = 63.5 µs, against 64 µs for us, our old Europe having adopted F (frame) = 50 Hz, F (line) = 15625 Hz for 625 lines per frame. The order of magnitude does not change; let us simply remember that a frame sync signal lasts about 230 µs, and a line synchro signal a little less than 5 µs (except at the time of the frame change). The tops are active on a logic level "0".

The RS flip-flop and the clock lock

The rocker is made up of two NAND gates combined according to a conventional assembly: each output is looped back to the input of the opposite gate; the states of the outputs will therefore depend not only on the states of the inputs at a given instant, but also on the state of the outputs at the instant preceding the switching of the inputs ('sequential' logic, as opposed to 'combinatorial' logic). The truth table of the NAND gate is recalled for the record.

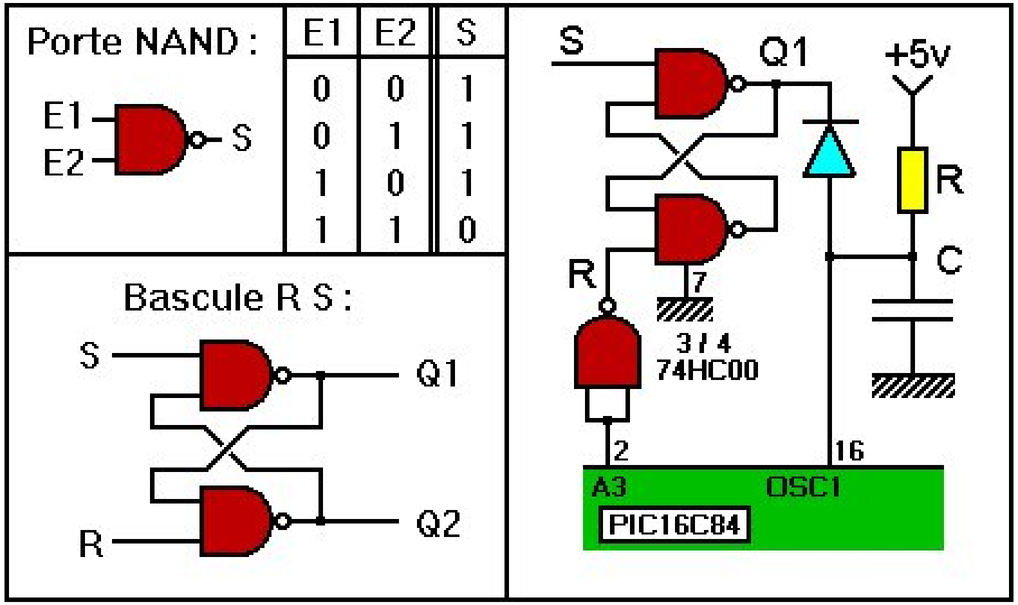
Let's look at the RS flip-flop operation together

Step 1 - Suppose R = 0 and S = 1. R = 0 implies Q2 = 1. S = 1 and Q2 = 1 imply Q1 = 0. The system is stable.

Step 2 - R changes to 1: Q1 is equal to 0, therefore Q2 remains at 1. S and Q2 are at 1, therefore Q1 remains stable at 0.

Step 3 - S changes to 0: Q1 switches to 1. R and Q1 being at 1, Q2 switches to 0. Q2 being equal to 0, Q1 remains stable at 1.

Step 4 - S goes back to 1: Q2 being equal to 0, Q1 remains at 1. Q1 and R being at 1, Q2 remains stable at 0.



RS flip-flop / NAND gate truth table

Step 5 - Last case likely to occur: if we force R and S to 0 simultaneously, the two gates each having an input at 0, the two outputs Q1 and Q2 are forced to 1 and remain in this stable state as long as R and S remain at 0. When the output Q1 is at 1, the potential of the cathode of the diode is close to 5V, and therefore greater than or equal to that of the anode; the diode is blocked, and the clock of the PIC can oscillate freely.

When Q1 goes to 0, the diode is conductive (polarized by R), and the potential of the input OSC1 of the PIC is fixed at about 0.7v blocking the oscillation and therefore the operation of the clock: the PIC is switched on pending, no more instructions are executed.

Let's try to summarize the operation simply:

- *If R is at 1, and S goes to 0, even fleetingly (occurrence of a line sync signal), Q1 switches to 1 (or remains at 1 if it was already there); the clock is active; the PIC is in 'working' mode.*

- *If S is at 1, and R even briefly goes to 0, Q1 switches to 0 (or remains at 0 if it was already there); the clock is stuck. The PIC is at rest: in fact, it is itself which goes into 'rest' mode by setting its output A3 to 1.*
- *If S and R are simultaneously at 1, the rocker remains stable, and the clock keeps its previous state (active or blocked); this therefore depends on the previous state of S and R.*
- *If S and R are simultaneously at 0, Q1 is at 1, therefore the clock is active. NBBack to top (back) : the RS flip-flop is always characterized by a stable state, depending on the last order R or S received, R and S being active on a level 0. The notations R and S correspond respectively to R eset (= setting to 0 of the output Q1) and S and (= setting of output Q1).*

When the R and S inputs of the RS flip-flop are at 1, the state of the Q1 output (and therefore the operation of the PIC clock) depends only on the previous states of R and S:

- *If R is the last having been at 0, output Q1 is at 0 and the clock is blocked.*
- *If S is the last to have been at 0, output Q1 is at 1 and the clock is active.*
- *If R and S were equal to 1 at power-up, Q1 is indeterminate, and we cannot predict whether the PIC clock is active as long as there is no change on R or S; same remark if R and S go simultaneously from 0 to 1.*

But in this assembly, the regular occurrence of the line synchro signal guarantees against any blocking of the system due to an uncertainty of the initial state.

The behaviour of the PIC

This part is quite complex, and I refer the interested Internet user to consult the ASM source file of the PIC program, also generated by PICOSD, and supported by numerous comments.

The following few lines aim to summarize things by trying to get to the point.

Organization of the PIC memory

The PIC16F84 can store up to 1024 instructions, the memory space therefore extends from the address $ 000 to the address $ 3FF (ie 0 to 1023, but in hexadecimal notation). Based on its content, we can divide it into three areas:
Zone 1 ($ 005 to $ 0FB), the character definition tables:
Each letter should be defined as a table of 7 rows and 5 columns, to indicate which pixels will be on and which will be off. Concretely, this amounts to defining a table of 7 bytes, one per row, knowing that only the last 5 bits B4 to B0 will be used (bits B5, B6 and B7 will be ignored). Here is the example for the letter [A]:

A	Caractère [A] :							
	B7	B6	B5	B4	B3	B2	B1	B0
Rangée 1 :	0	0	0	0	1	1	1	0
Rangée 2 :	0	0	0	1	0	0	0	1
Rangée 3 :	0	0	0	1	0	0	0	1
Rangée 4 :	0	0	0	1	1	1	1	1
Rangée 5 :	0	0	0	1	0	0	0	1
Rangée 6 :	0	0	0	1	0	0	0	1
Rangée 7 :	0	0	0	1	0	0	0	1

Example of constitution of the letter A

At the level of the assembly program, this will result in a table of 7 bytes for each of the characters likely to be used:

```
CarA RETLW B'00001110 '; .... ***.
     RETLW B'00010001 '; ... * ... *
     RETLW B'00010001 '; ... * ... *
     RETLW B'00011111 '; ... *****
     RETLW B'00010001 '; ... * ... *
     RETLW B'00010001 '; ... * ... *
     RETLW B'00010001 '; ... * ... *
```

"RETLW" is the instruction used to constitute a table. When the program 'jumps' to a RETLW instruction, the latter returns it to its starting point, but having previously loaded the associated constant (for example: B'00001110') in the working register W of the PIC. It is a bit like going to the pantry to help yourself.

"CarA" is the pointer of the 'A' table: the address of the memory where the definition table of A begins. The values of the 7 bytes are indicated in binary (notation B'00001110 ') to facilitate any modification manual of the table.

The 42 characters thus defined are:

- *The alphabet in upper case: ABCDEFGHIJKLMNOPQRSTUVWXYZ.*
- *The ten digits: Ø123456789.*
- *Some additional signs: the apostrophe, space, period, fraction bar, lowercase Z (for MHz!), And a head (in PICOSD, use the star character [*]).*

NB : The definition table should occupy 42 x 7 = 294 bytes, but the syntax of the assembler (RETLW instruction) requires tables not to leave a segment of 256 bytes (for example in our case, the area address $ 000 to $ 0FF). A little trick makes it possible to achieve this condition, it consists in overlapping the definition zones of certain characters, for example the bottom of A and the top of H, the bottom of H and the top of U, etc. Well done to the program designer!

Zone 2 ($ 0FC to $ 24A), the program part strictly speaking: It groups together all the routines for sequencing operations (analysis of synchro ticks), for choosing the message, and the management of its display. They will be discussed later in the part detailing the operational flowchart.

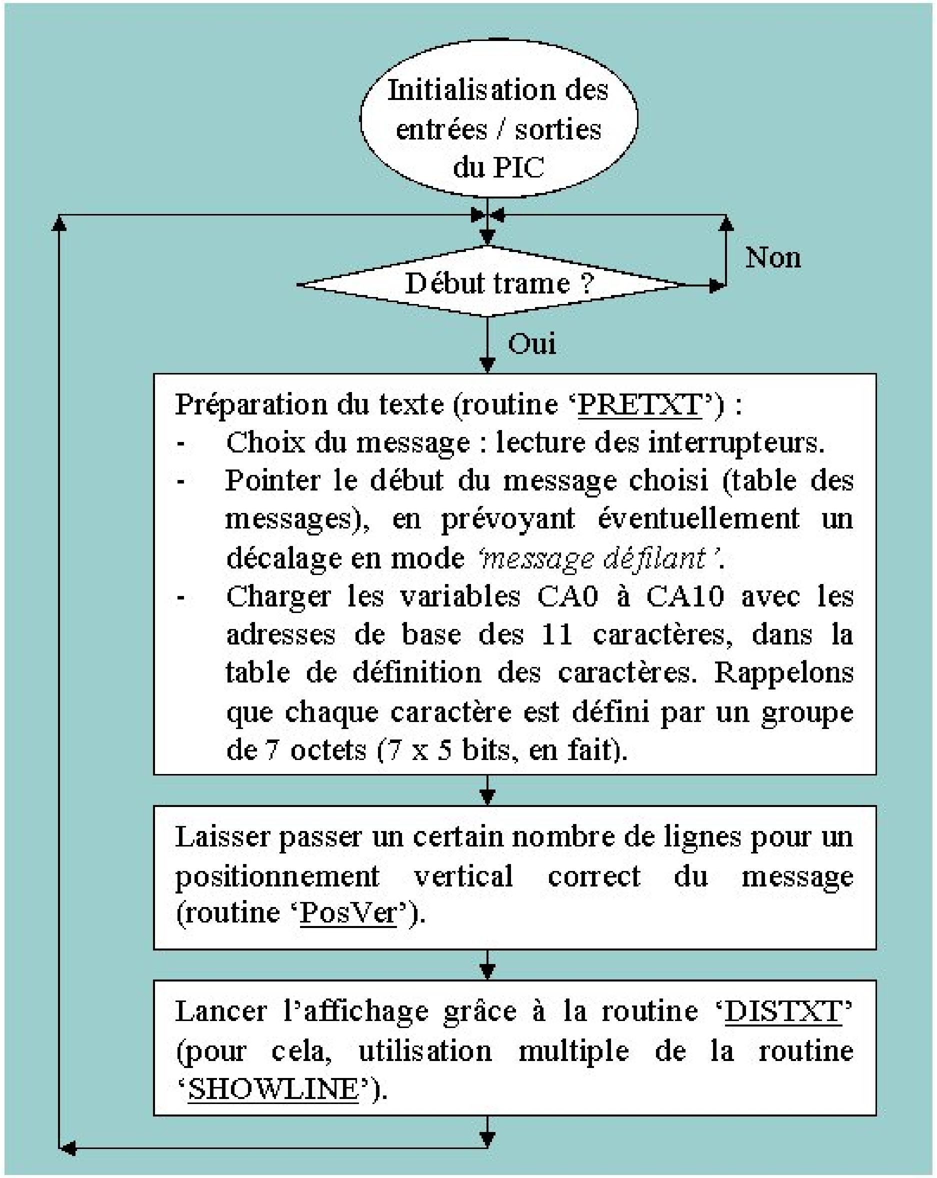
Zone 3 ($ 300 to $ 3F8), the message table:
It is made up of all the messages, ie the scrolling message (up to 160 characters followed and preceded by 11 spaces), and 6 fixed messages of 11 characters. Usually, the text strings written in a computer or a microcontroller represent the succession of ASCII values of the different characters; this solution could be used for example to control a standard LCD display module, but this is not the case here: the ASCII code does not represent anything for the PIC, nor for the system intended to exploit the modified video signal (transmitter ATV, TV or video monitor).

In fact, we have seen that each character definition table is associated with a pointer ("CarA", in the example), to which we have given an evocative name (CarA , CarB, CarC, etc.), but this virtual variable only represents the starting physical address of the table of the corresponding character, in the memory space of the PIC. A message of N characters will therefore quite simply be a table of N of these famous pointers. Here is for example for message n°1:

```
Mess1 RETLW Car7; pointer to the definition table of 7
      RETLW Car3; pointer to the table of 3
      RETLW SP; pointer to space table
      RETLW CarD; pointer to the D table
      RETLW CarE; etc ...
      RETLW SP;
      RETLW CarF;
      RETLW Car8;
      RETLW CarE;
      RETLW CarG;
      RETLW CarQ;
```

The restrictions mentioned above also apply; the need to stay in the $ 300 to $ 3FF segment therefore limits the number of fixed messages, as well as the maximum length of the scrolling message.

General organization chart



General organization chart of the operation of the PIC.

• *Suppose the clock is active. The PIC monitors the frame sync signal on its A2 input; it will decide to wait for the start of a new frame, and for this purpose scans the end of the synchro signal (rising edge on A2).*

• *Then it will then read the status of the PB5 / PB6 / PB7 bits; these are the inputs allowing the user to indicate the choice of the current message, either by three switches (DIL or others), or by a 7 or 8 position switch associated with a diode matrix, as we do. will see later.*

Choice of display

Comm	PB7	PB6	PB5	Selected message
K7	0	0	0	scrolling message
K6	0	0	1	message n°1
K5	0	1	0	message n°2
K4	0	1	1	message n°3
K3	1	0	0	message n°4
K2	1	0	1	message n°5
K1	1	1	0	message n°6
I.Off	1	1	1	no display

Originally, the program gave the choice between a scrolling message (up to 55 characters) or three fixed messages of 11 characters; as you can see in the table above, the number of fixed messages has been increased to six; the scrolling message can be up to 160 characters long.

It will then let a certain number of lines pass, because the display never starts at the top of the screen. To do this, it will execute the following couple of instructions as many times as necessary:
Setting A3 (= R to 0) blocks the operation of the clock; this only restarts when the line synchro signal occurs (S set to 0 by the LM1881), which indicates the start of a new line. The first action carried out by the PIC must then be to reset output A3 to 0, so that the clock remains activated beyond the end of the line synchro signal. The PIC waits a few more µs to be sure that the line sync signal is finished.

The operation, carried out N times, allows N lines to pass, and thus to obtain the desired vertical positioning.
Note : The N offset lines in the frame correspond to (2 x N) lines in the image, because an image consists of two interlaced fields.

The display part of the message: Whether the message is fixed or scrolling, the program will always display 11 characters, using the "DISTXT" routine.

The " DISTXT "routine

Each of the 11 characters is composed of 7 superimposed rows of 5 bits; bits at "1" will be displayed in white on the screen; here are for example the three characters "EGQ" (one can easily extrapolate for eleven characters):

EGQ	Caractère n°1 :					Caractère n°2 :					Caractère n°3 :				
	B4	B3	B2	B1	B0	B4	B3	B2	B1	B0	B4	B3	B2	B1	B0
Rangée 1 :	1	1	1	1	1	0	1	1	1	0	0	1	1	1	0
Rangée 2 :	1	0	0	0	0	1	0	0	0	1	1	0	0	0	1
Rangée 3 :	1	0	0	0	0	1	0	0	0	0	1	0	0	0	1
Rangée 4 :	1	1	1	0	0	1	0	0	1	1	1	0	0	0	1
Rangée 5 :	1	0	0	0	0	1	0	0	0	1	1	0	1	0	1
Rangée 6 :	1	0	0	0	0	1	0	0	0	1	1	0	0	1	0
Rangée 7 :	1	1	1	1	1	0	1	1	1	0	0	1	1	0	1

Constitution of letters: 7 lines x 5 columns

Each of the 7 rows will be displayed T times (T being the height of the letters, T going from 1 to 10), thanks to the "SHOWLINE" routine: row n°1 (of 11 characters!), Then row 2, then row 3, etc. up to row n°7.

The " INCLINE "routine

Just before the display of row N, the program must fetch the 11 bytes corresponding to the N-th position, in the definition tables of the 11 characters; they are stored internally in the program variables Ta0 to Ta10 ; this takes a certain time (approximately the duration of a screen line), which explains the appearance of a black line between two successive rows, which is not very troublesome in terms of the appearance of the letters.

The " SHOWLINE "routine

The 11 variables "Ta0" to "Ta10" each contain the 5 bits constituting the row to be displayed, for each of the 11 characters. Let's see how the display of the 5 pixels for a character takes place, for example the first (bits contained in "Ta0"):

"Ta0" is a variable defined on 8 bits (one byte), but only the 5 least significant bits are significant and will be displayed, in order of appearance: B4, B3, B2, B1, then B0.

The program sends the content of the "Ta0" byte to port B, the output of which PB4 is connected to the video input / output by a diode; this makes it possible to send information on the video signal only when the output PB4 is at "1"; the adjustable 470 Ω is used to adjust the current injection so that the level of the video signal reaches, but without exceeding it too much, the level of white. We therefore have a white pixel if bit B4 is at 1. the program will then perform a "logical shift to the left" of port B 4 times ("RLF PortB" instruction), which means that bits B3, then B2 , then B1, then finally B0, will be present successively on the output PB4, and thus reflected in time in the video signal, and therefore on the monitor screen;PB4 is then reset to "0" to prevent the last of the 5 pixels from stretching in length if it was white (= if B0 was 1).

The same is done for the 10 remaining characters, with the variables "Ta1" to "Ta10".

Some comments

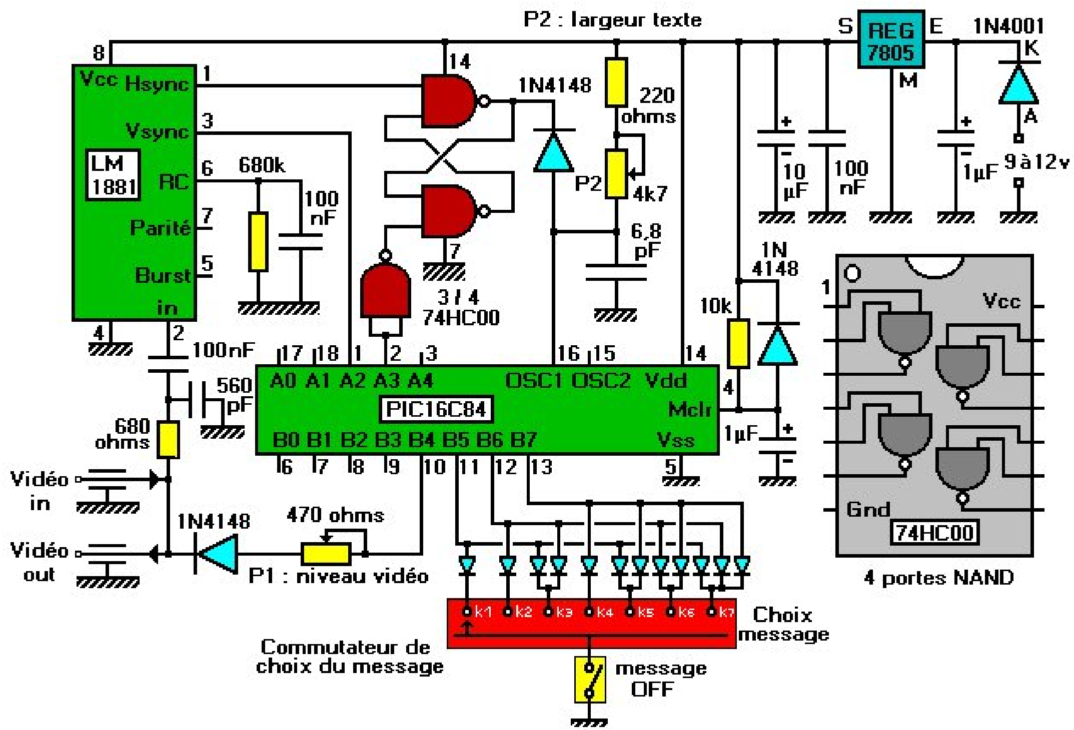
- *The use of the RLF instruction may seem trivial, in fact it is very clever, because it is the only possibility to fix an output of port B in a single machine cycle, essential condition for a fairly fast display with a PIC16F84-04. Failure to comply with this condition would result in disproportionately large letters.*
- *Pins PB5-PB6-PB7 are configured as inputs, so they are not influenced by the RLF instruction.*
- *Pins PB0-PB1-PB2-PB3, although apparently not used, must imperatively be left free, and configured as outputs, since it is on these outputs that bits B3-B2-B1-B0 will scroll before d 'arrive on PB4.*

Modifications to the circuit diagram

The circuit diagram presented at the top of this article is a resumption of the original diagram supplied with the first version of the program by F1CJN; the final diagram used for the production of the prototype is as follows:

It has some minor changes:

- *The addition of an RC circuit (680 Ω / 560 pF) on the input stage of the LM1881: This constitutes a low pass filter with a cutoff frequency at -3dB equal to 1 / (2.π .RC), i.e. 418 kHz; this makes it possible to significantly reduce the "chrominance" and "sound" sub-carriers; we thus prevent them from being superimposed on the conventional B&W video composite signal, and disturbing the detection of the synchro thresholds. The use of this RC circuit is recommended in the LM1881 documentation; I simply replaced the recommended values (620 Ω / 510 pF) with generally more available values; they are not critical.*

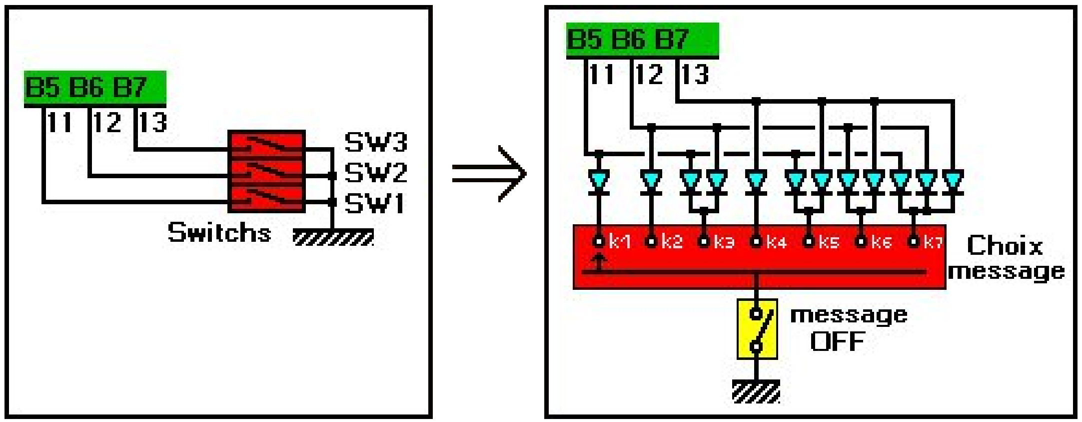


The Modified circuit diagram

- *Adding a 1 µF capacitor and a diode on the PIC reset input (pin 4) : The 10 kΩ resistor initially present was of little use, the current absorbed by the input being negligible. Associated with the capacitor, it makes it possible to maintain the RAZ input at the low logic level for a fraction of a second (approximately 10 ms) at the time of power-up: the PIC is then inhibited until the supply voltage is established. stably. The diode allows rapid discharge of the capacitor in the event of a voltage drop on the power supply, and therefore resetting occurs well, including on a very pulse voltage drop, which could partially affect the data in the PIC registers (without necessarily being sufficient to reset it).*
- *Using a PIC 16F84 or 16C84 in 4 MHz version : The designer originally planned to use a PIC in the "10 MHz" version, which is becoming difficult to find; moreover, PICs in the "20 MHz" version are more expensive.*

Although the execution speed is quite critical, nothing prevents us from running a PIC, which is intended to be clocked at 4 MHz, at a slightly faster speed, and that's what we did in this assembly, with the oscillator in RC mode. It is enough simply to be reasonable, and to avoid operations with critical timing for the PIC, the writing in EEPROM in particular. Since the capacitance of the oscillator RC circuit is low, the system may be slightly sensitive to the hand effect, so it is best to leave a clear space of one or two centimeters under the circuit board.

- *Message selection switch: As explained in 2-3-2-2), the status of inputs PB5-PB6-PB7 allows you to indicate to the PIC which of the messages will be displayed. Note that the + 5v pulling resistors internal to the PIC have been activated by software, it is therefore sufficient to put the desired inputs to the ground or to leave them in the air; the combination "111" (with the three entries in the air) corresponds to the absence of displayed message. Originally, the designer planned three switches, and I myself used DIL switches for my first prototype. In the new version, I suggest you replace the three switches with a diode matrix associated with a seven-position switch, and to a switch.*



Switching the displayed message

The switch makes it possible to switch at any time to "no message" mode (inter open = the three inputs put in the air), which makes it possible to switch between two extreme messages without going through the intermediate messages; and the use of a switch seems to me a more elegant solution, especially as the number of available messages is greater than in the original version. The switch is a very classic "1 circuit / 12 positions" whose number of positions can be limited by means of a washer fitted with a lug, which is located under the fixing nut.

Note : the circuit exists in three different versions.

The first version corresponds to the original version, equipped with a triple inter DIL, without the 10k resistor on the reset input of the PIC (a prototype produced). The second keeps the triple inter DIL, but includes the RC circuit on the input of the LM1881, as well as the improved reset circuit (no proto made, but the circuit drawing is available). The third version uses the diode matrix and the switch, it is the one so the description will be offered in the following lines.

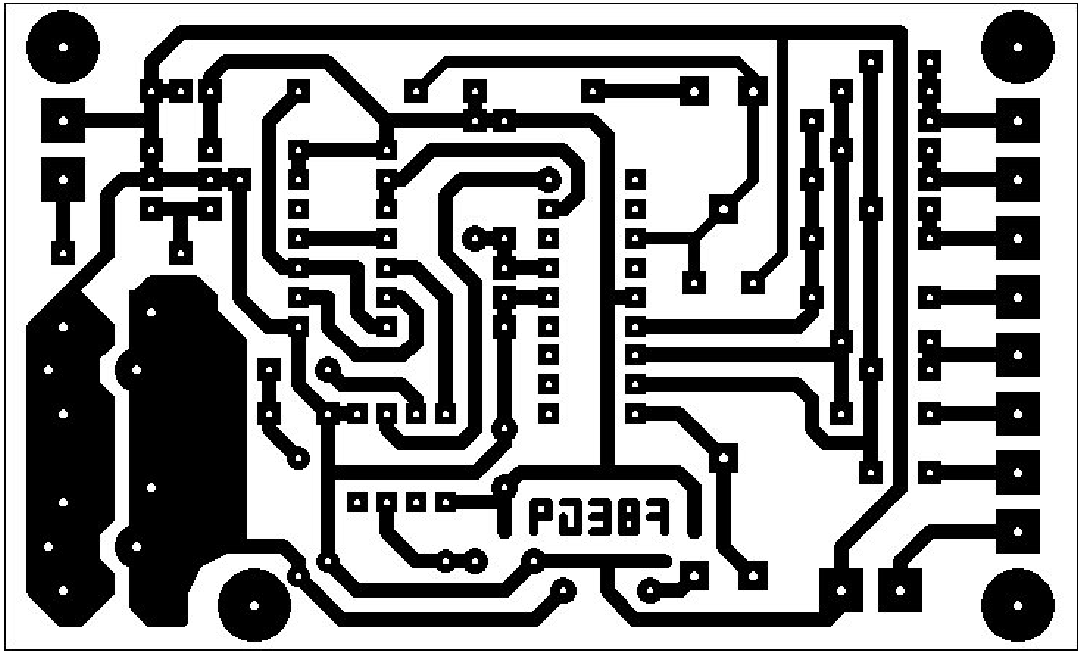
Whatever version you choose to build, be aware that it can accommodate either the original version of the program, or the one modified by me and generated by the PICOSD program. I still recommend that you do the third version.

Detailed information of the assembly (version 3)

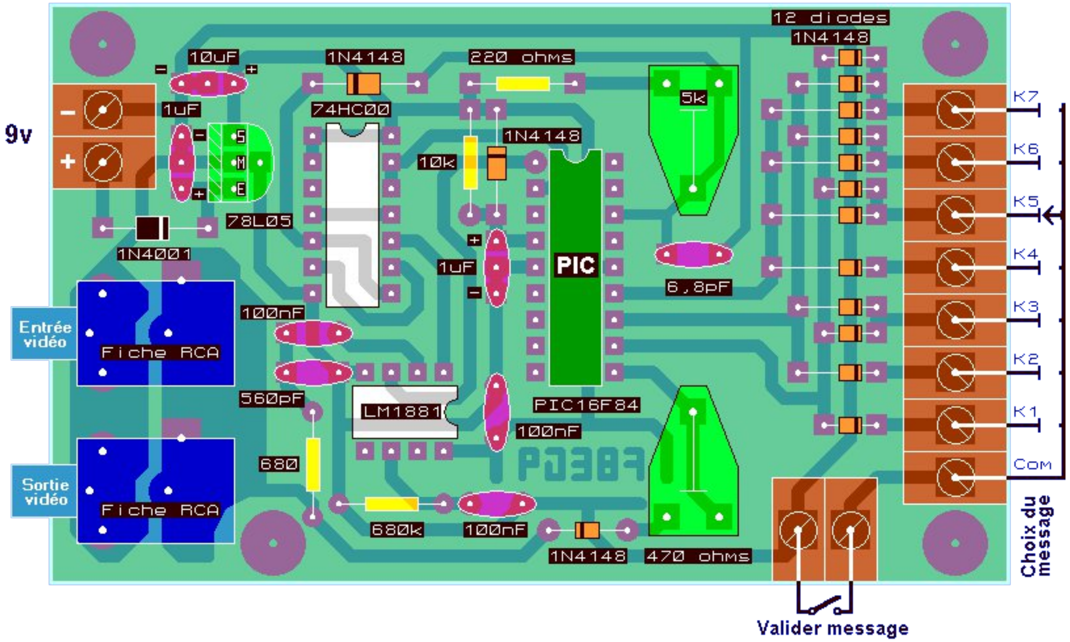
Drawing of the artwork

The drawing of the printed circuit was created using the ARES software, from the PROTEUS 5.2 suite; it comes directly from the electrical diagram presented above.

It is seen on the component side in low resolution (200 DPI).



Printed circuit - version 3 in low resolution



Layout of components (for version 3)

You will have to print the graphic file imperatively respecting the dimensions, to obtain a scale 1 artwork. This is supplied with a resolution of 600 DPI (600 dots per inch), and it measures 2190 pixels x 1320 pixels, its dimensions are therefore: - in inches: 3.65 x 2.20 - in mm: 92.7 x 55.9 (Reminder: 1 inch = 25.4 mm)

Creation of the printed circuit

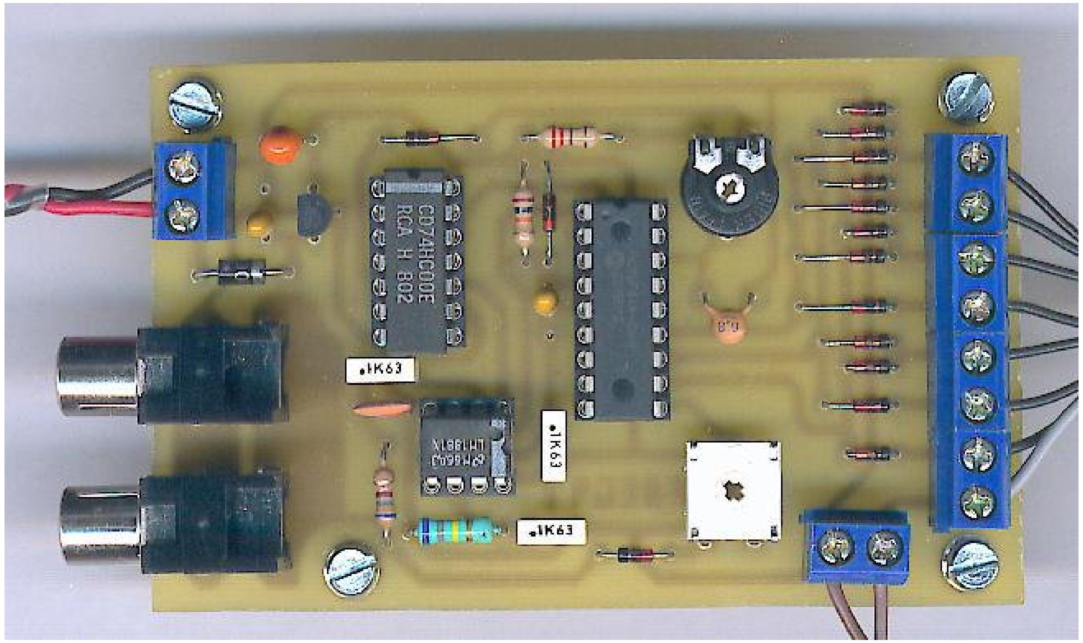
Warning! The drawing of the printed circuit is seen on the component side: once the drawing has been photocopied or printed on a transparency, it will therefore be necessary to press the inked side of the transparency against the copper.

Cut a piece of pre-sensitized plate approximately 6 cm by 9.5 cm. You can then isolate, reveal, then burn and drill the circuit. The callsign must be read right side up on the copper side. Before drilling, all the same check the dimensions of the pins of the RCA "video" plugs, to adapt if necessary the position of the holes, because there may be differences according to the models.

List of components:

- 1 resistance of 220 Ω.
- 1 resistance of 680 Ω.
- 1 resistance of 10 kΩ.
- 1 resistor of 680 kΩ.
- 1 adjustable small horizontal format 470 Ω.
- 1 adjustable small horizontal format 5 kΩ.
- 3 100 nF capacitors.
- 1 6.8 pF ceramic capacitor.
- 1 560 pF ceramic capacitor.
- 2 capacitors 1 µF tantalum (operating voltage 25v min).
- 1 10 µF tantalum capacitor (operating voltage 6v min).
- 15 diodes 1N4148 (or 1N914).
- 1 diode 1N4001 (or 4004, or 4007).
- 1 PIC16F84 at 4 MHz.
- 1 74HC00.

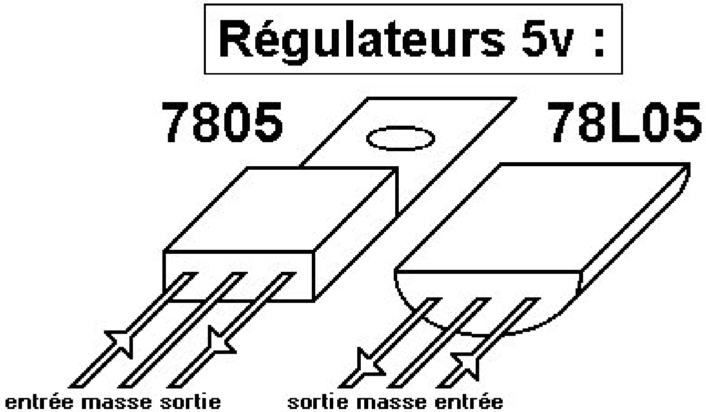
1 LM1881.
1 5v regulator "78L05" (or failing that, a 7805).
1 switch 1 circuit - 12 positions (limited to 7 positions thanks to the lug washer located under the fixing nut).
1 switch.
1 2 x 9-pin "tulip" support (18-pin, for the PIC16F84).
1 "tulip" support 2 x 7 pins (14 pins, for the 74HC00).
1 2 x 4-pin "tulip" support (8-pin, for the LM1881).
2 female RCA plugs, to be soldered on the circuit.
2 "2-pin" screw terminal blocks, to be soldered.
1 "8-pin" screw terminal block, to be soldered (or 4 "2-pin" terminal blocks coupled together).
1 9v battery clip and a 9v battery, or a clean 9 to 15v power supply .
Miscellaneous: wicks, solder, perchlo, developer, printed circuit, wire, etc.



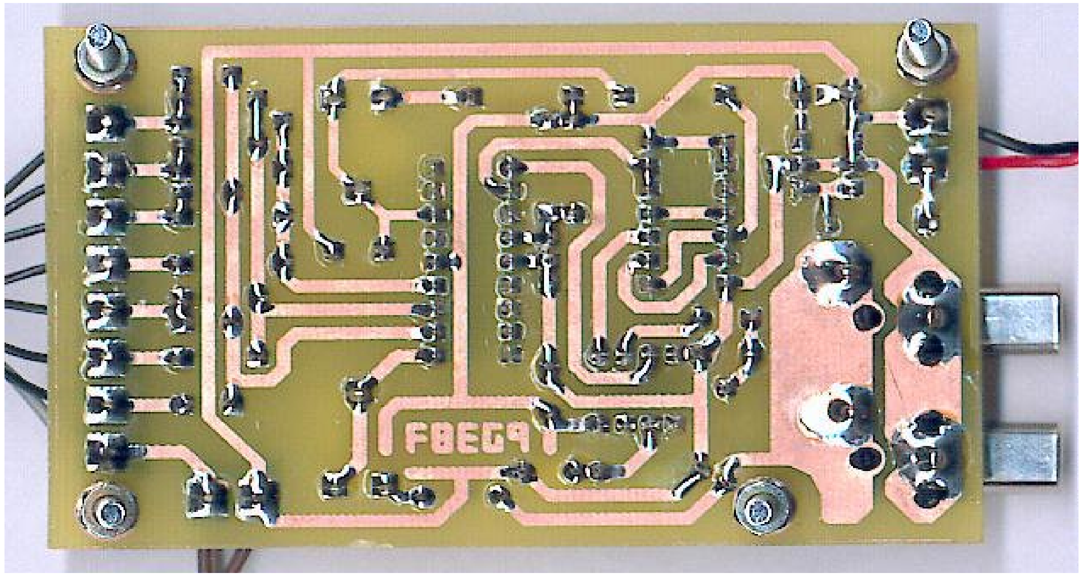
Keyer version 3, component side

Layout of components

Solder the components in order of size, respecting the direction of those which are polarized: first the diodes 1N4148, then the resistors and the 1N4007, then the supports of the integrated circuits, the adjustable resistors, then the capacitors and the regulator, the terminal blocks, and finally the RCA plugs.



Attention, the 7805 and the 78L05 have reversed pinouts!



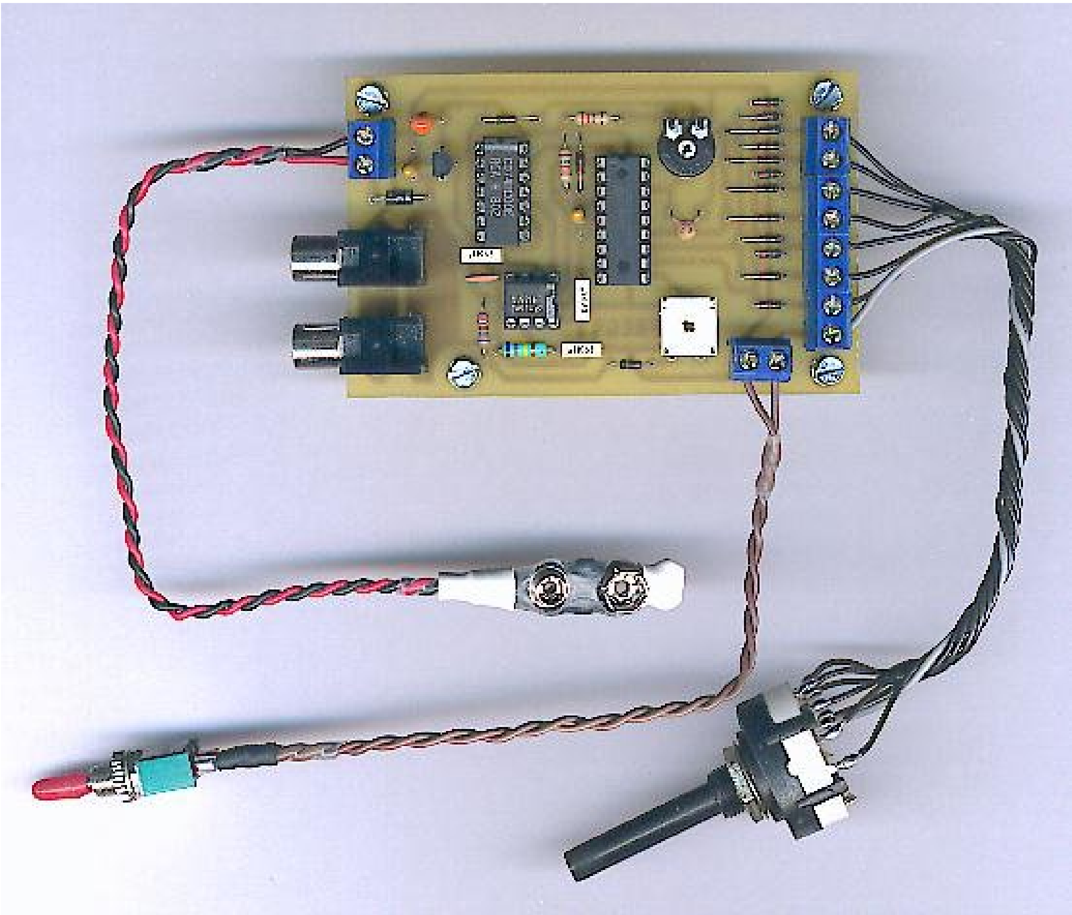
Prototype version 3, copper side

You must use a support for the PIC, and preferably a "tulip" support so that it can withstand multiple dismantling during reprogramming (message changes).

The 5v regulator can be a 7805 (metallic rear), or a 78L05 whose pinout is reversed :

In both cases, pay attention to its direction of implantation. The 78L05 is more than sufficient given the very low consumption of the assembly (around 11 mA, on my prototype); the flat face with the marking will then be oriented towards the power terminal block. On the other hand, if you mount a 7805, then the metal back will be oriented towards this same terminal block.

To the right of the photo, is the eight-pin terminal block to which the eight wires of the message choice switch are connected; the gray wire is the common one; the seven black wires are respectively (from top to bottom):



Overview of the prototype (version 3)

Switch Selected message:
K7 scrolling message
K6 message n°1
K5 message n°2
K4 message n°3
K3 message n°4
K2 message n°5
K1 message n°6

The switch is clamped in seven positions by means of the washer fitted with a lug which is located under the fixing nut. When the switch is open (= non-conducting), no message is displayed; the same applies if the switch is outside one of the seven positions provided (we can therefore leave an eighth for this purpose).

Verification of assembly

1) Before connecting the assembly, start by making a general control of the assembly: - Check the values of each component, their direction of connection for those which are polarized (integrated circuits, tantalum capacitors, diodes, regulator). - Check the absence of micro-cuts on the tracks of the card. - Check that all the welds have been made, that none overflows onto another track, patch or weld, that there are no "dry" welds.

2) Download the "BinPIC.ZIP" file by clicking on the left icon; you will then extract the "BinPIC.HEX" test file which contains the messages, the size and the default position. You can program it in the PIC, this will allow you to check the operation of the assembly. Thereafter, the HEX file of the PIC will be supplied to you automatically by the PICOSD program, which will have integrated your personalized parameters.

For now, replace the programmed PIC on the assembly (in the right direction!).

3) You can now connect the system; put the adjusters halfway, connect the video source (camera) and the monitor; In this regard, you will have noticed a curiosity by consulting the electrical diagram: the video input and output are interchangeable. Then connect the power supply, and close the message validation switch (= switch). The selected message appears in white in the upper left corner of the screen.

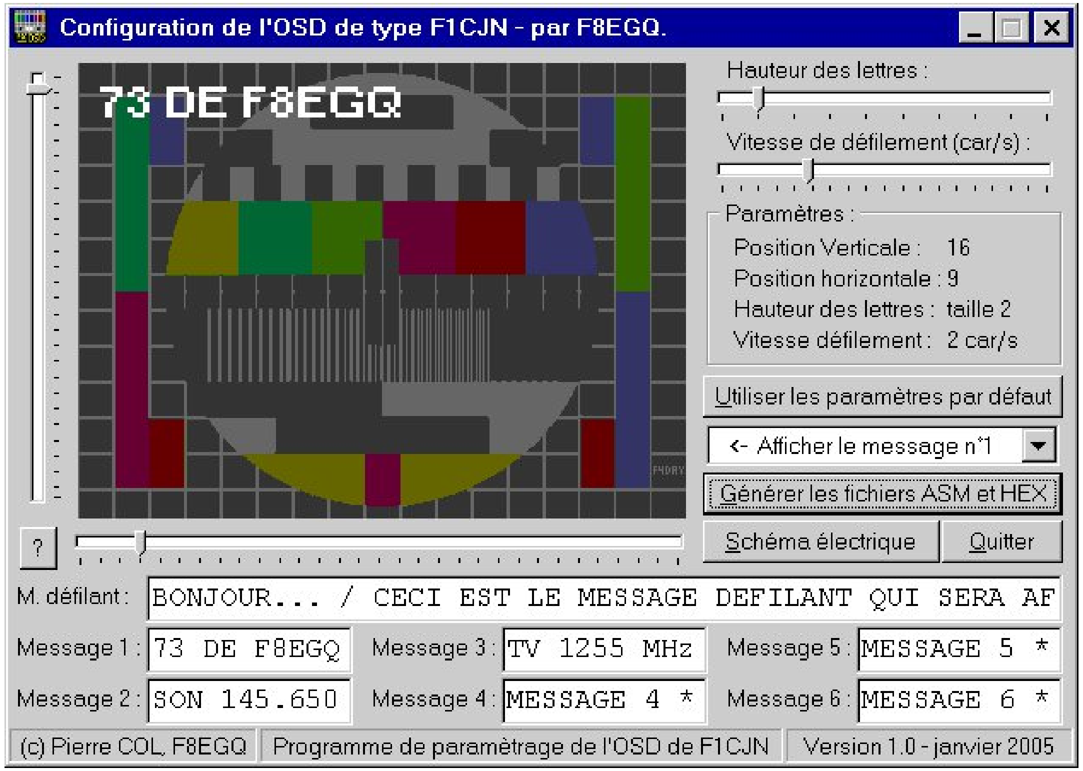
4) Settings: Adjust the adjustable 5 kΩ (black, on the photo of the prototype) to modify the clock of the PIC, and therefore the width of the letters. Below a certain value (minimum letter size), the oscillator picks up and the message disappears. By turning in the other direction, the letters widen, until the width of the message exceeds the size of the screen, the display becomes anarchic, and the video signal may be disturbed. The best compromise seems to me to be to be slightly above the minimum width, so that the PIC does not stall.

The adjustable 470 Ω (the white on the photo of the proto) allows to measure the level of white reinjected to constitute the letters. Choose a value that allows sufficient readability, without saturating too much so as not to distort the video signal and that it remains within its limits at the amplitude level. This will limit the echo phenomenon, which results in a small black area just after a letter that is too white.

Check the correct operation of messages 1 to 6, as well as the scrolling message. In principle, the assembly must work as soon as the power is turned on, after a possible retouching of the adjustable ones. If there is no message, make sure that when clamping the switch to positions 1 to 7, the cursor is not stuck between positions 8 to 12. The PIC is used beyond its frequency nominal (approximately around 8 MHz), so we cannot exclude that in very rare cases it refuses to oscillate; then try with another PIC16F84 at 4 MHz, or with a PIC designed to operate at 10 or 20 MHz to clear the rest of the assembly.

The PICOSD program

The PICOSD program works under Windows 95/98 / NT / 2K / XP; it allows the user to choose the content of the messages, their position on the screen, the height of the letters, the speed of the scrolling message. From the indications provided, it will automatically generate the "PICOSD.HEX" file to program in the PIC.



PICOSD v1.0 program graphical interface

Added 03/06/2016: in this second version (PICOSD32), the 16-bit assembler "MPASM.EXE" has been replaced by "MPASMWIN.exe" (the 32-bit version supplied by microchip), which allows ''use on versions of Windows XP and later, with 64-bit processors (tested with Windows 8); the BAT file has been adapted, but "PicOsd.exe" remains the same.

By unzipping the ZIP archive, you create a PICOSD directory that contains the following four files:

"PicOsd.exe": this is the executable file of the program; from Explorer, double-click on it to launch it.

"PICOSD.HLP : this is the help file that accompanies PICOSD; it can be accessed from the program by pressing the [F1] key; the format does not seem to be supported anymore from Windows 8.

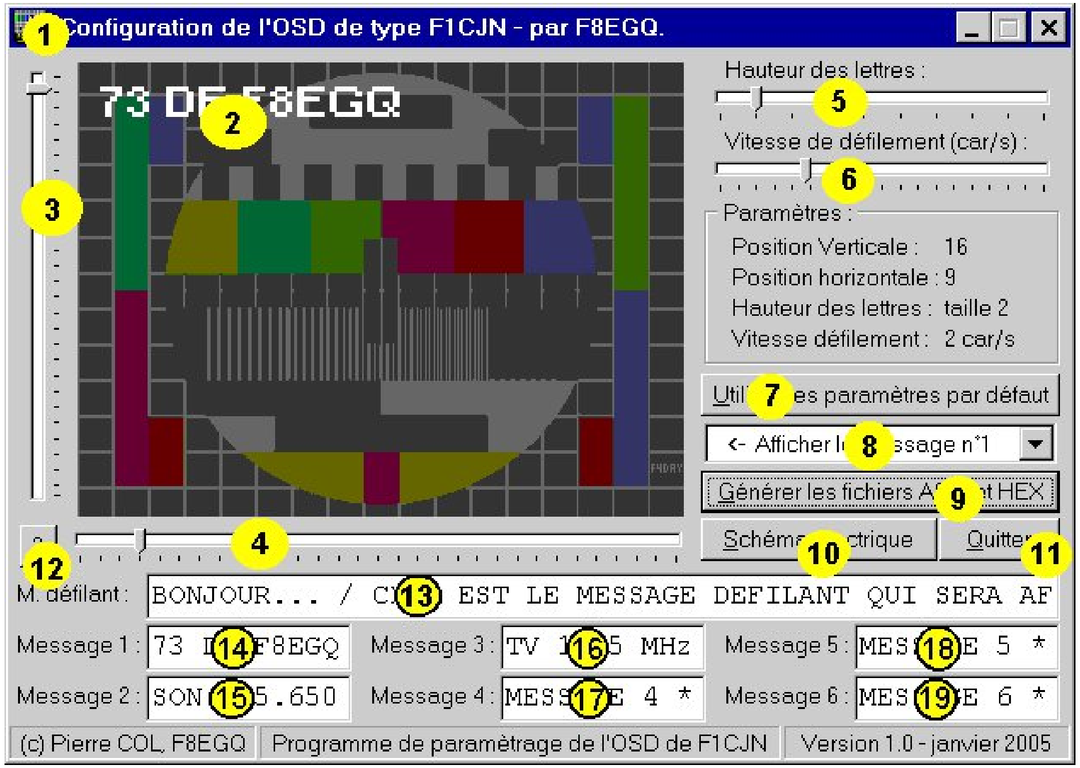
"MPASM.EXE"/"MPASMWIN.exe": this program is the PIC assembler provided by Microchip; in fact, PICOSD generates the PICOSD.ASM file (in "assembly" language); then it converts it into a binary file in hexadecimal format using MPASM (WIN) .EXE; we then obtain PICOSD.HEX, to be programmed in the PIC.

"asm.bat": to create the HEX file, PICOSD does not directly call MPASM, but goes through the DOS command file "asm.bat"; the informed user can then possibly edit the BAT file, in order to modify the compilation options.

The assembly program generated by PICOSD for the PIC ("PICOSD.ASM") is obviously very similar to the initial program designed by Alain Fort F1CJN; here are the main modifications made:

- *support for 6 messages instead of 3,*
- *optimization of the length of the scrolling message,*
- *addition, or aesthetic modifications of certain characters,*
- *definition of the configuration of the PIC (avoids the WatchDogTimer bug),*
- *modifications allowing parameter setting by variables,*
- *addition of numerous explanatory comments.*

Of course, I cannot guarantee that there are no new bugs; in case of concerns or doubts, I refer you to the reference version, namely the original program (21 kb); you will then lose the advantages of the new version; in this case, remember to manually deactivate the WatchDogTimer in the PIC programming utility ("IC-Prog", or other), otherwise the program will freeze after one or two seconds.



Let's look next at the different commands of the PICOSD program

PICOSD program commands

1 = System menu icon : This contains in particular the command " Purge register and exit ". When the user quits the program, the latter automatically saves all the current parameters (messages, position, etc.) in the Windows registry for the next use. With this command, you can then delete this information. If you restart the program afterwards, it will be like resetting the settings to the default values.

2 = Display zone : It allows to simulate (more or less faithfully) the result obtained on the monitor for displaying and positioning the message. Attention, the real width of the characters depends only on the setting of the clock frequency of the PIC, with the adjustable of 5 KΩ.

3 = Vertical message positioning slider : It allows you to shift the message downwards, but be careful, you must set the cursor high enough so that the letters are fully displayed in the display area; if the letters protrude from the bottom, it may disturb the video signal; this recommendation is particularly valid when the user has chosen large letters (tall, in fact).

4 = Horizontal message positioning slider : It allows you to shift the message to the right, but be careful, as indicated above, the actual width of the text, like that of the offset , depends on the setting of the adjustable 5 KΩ. You must ensure that the end of the message does not extend beyond the right side of the screen, as this may disturb the video signal. It's up to you to find the best compromise between the horizontal offset and the width of the letters, depending on the choice of their height.

5 = Letter height adjustment slider : It allows you to choose the height of the letters (from 1 to 10), you can then adapt their width thanks to the adjustable 5 kΩ. In practice, the ideal value is often between 2 and 5, depending on the desired effect. In all cases, the text must be configured so as not to exit the screen.

6 = Scrolling speed adjustment slider : It is used to adjust the scrolling speed (in characters per second), when the message displayed is the scrolling message; the value indicated is valid for a vertical frequency of 50 frames per second; at 60 frames per second (standards in the USA, Canada, etc.), the actual speed will therefore be 20% faster than that advertised. I do not recommend a too fast speed, which is painful to watch (we perceive a little the interlacing of the frames in the composition of the letters).

7 = Default parameters reset button : Positions the message at the top left of the screen, with a letter height of 2, and a scrolling speed of 2 characters per second, which corresponds to "reasonable" settings ; however, the content of the messages is not modified; for a full reset, see the description of command 1 , above.

8 = Display message selection scroll box : It allows you to choose which message will be used in the display area to simulate the effect produced: message n ° 1 to 6, scrolling, or the text "0123456789 /".

9 = Generate ASM and HEX files button : When this button is pressed, the program will create a PICOSD.ASM file in assembly language, which will include all the parameters defined by the user; it will then automatically call the Microchip MPASM program, which will convert this ASM file into a PICOSD.HEX file (in machine language), which can then be directly programmed in the PIC16F84. A file of the assembly listing is also created: PICOSD.LST; you can consult it with any text editor to see the detail of the assembly operations, and check at the end that there are no errors.

10 = Electrical diagram button : It launches the opening of an electrical diagram display window, which can then optionally be copied to the clipboard for saving or subsequent printing. The diagram is also accessible in the help file.

11 = Exit button : It is used to exit the program; all the parameters (messages, position, etc.) are then saved in the Windows registry, and will be reloaded the next time the program is started.

12 = ? Button : It loads the program help, which is also accessible by pressing the [F1] key.

13 to 19 = Message entry zones :

- 13 : Text of the scrolling message.
- 14 : Text of message n°1.
- 15 : Text of message n°2.
- 16 : Text of message n°3.
- 17 : Text of message n°4.
- 18 : Text of message n°5.
- 19 : Text of message n°6.

The characters authorized for the messages are:

- *the 26 letters of the alphabet in upper case: ABCDEFGHIJKLMNOPQRSTU VWXYZ*
- *the 10 digits: Ø 1 2 3 4 5 6 7 8 9*
- *the period (.), The apostrophe ('), the lowercase Z (z), the fraction bar (/),*
- *the star (*) which replaces the custom character and is displayed as a head (Head),*
- *the space. Miscellaneous remarks*

The lower case Z allows you to write "MHz", which is prettier than "MHZ"; the fraction bar is useful for callsigns on a laptop, mobile or abroad, in particular.

Characters not listed above are displayed as spaces. Attention, the length of the messages is automatically limited: 11 characters, or 160 for the scrolling message; however the text cursor is in "insert" mode, and not in "replace" mode, so if you have the impression of not being able to modify the messages, start by deleting letters.

Attention, I insist on the fact that the settings of the text must be such that this one must not "go out of the screen" under penalty of disturbing the video signal; the first times, it will undoubtedly be necessary to carry out several successive tests, possibly retouching the 5 kΩ potentiometer (PIC clock). If your messages are aligned to the right of the screen and if they are less than 11 characters long, complete them with spaces placed at the beginning of the message (otherwise the spaces are added at the end of the message, and although they are invisible, they can also disturb the sync).

Pictures of the different text sizes are available at this link *https://tinyurl.com/y4zbrmdp*

By way of conclusion ...

Thus ends this description, which is undoubtedly a little too long; I hope that the PICOSD program will make it easier for you to use this keyer, or that the few explanations developed on this page will convince you to do it if you haven't already. It is a small inexpensive device and very useful for radio amateurs practicing ATV, and then it is our vocation to build and to experiment. Good hacks! Pierre, F8EGQ.

Last update 06/03/2016

All the programs mentioned can be downloaded from the authors website at: *https://tinyurl.com/yyc2rwth*

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