

Bacon Bits

Flying Pigs QRP Club International, W8PIG
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FPQRP [membership](#) is open to all licensed QRP operators who reside within 12,000 nautical miles of Cincinnati, Ohio.

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NETS:

DAY	TIME	FREQ
Sat	1400Z	14062
Sun	1300Z	7044
Sun	1400Z	14062
Thurs	0200Z	7044

CLUB FREQS.

1,814 kHz	3,564 kHz
7,044 kHz	10,110 kHz
14,062 kHz	18,100 kHz
21,064 kHz	24,910 kHz
28,064 kHz	

ALL FPqrp frequencies are UP 4 kHz
from the standard qrp frequencies
except for 20 meters.

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Number 1 was a hit!

By Dan, N8IE

Hello, and welcome to the second issue of the Bacon Bits newsletter. I want to take this time to thank all the wonderful people who sent in articles, and wrote us letters last month. Your response to the first issue is greatly appreciated, and we hope we can build on this.

This month we have a real treat, Diz, W8DIZ starts his series on the MiniPig, and the MultiPig radios. This will be of interest to all since it covers a lot of theory, and Manhattan style construction. Also we have a nice article on a 40M vertical by Gary, N8SO, plus a lot more goodies! Enjoy.

Website Spotlight.

This month's spotlight deals with basic electronics. If you're new to Ham Radio or you've been around since before there were call signs, basic electronics is the foundation which Ham Radio is built upon. Without it, we would still be on hill tops pounding sticks together to send messages. ☺ So with out further adieu, let's surf!

The first site on our tour is <http://www.basicelectronics.com> Here you will find a nicely done interface covering electronic principles, this includes Ohm's Law, Circuit Theory, etc.

One of our very own, Ian Purdie, VK2TIP (Fp#-91) has a wonderful sight, <http://www.electronics-tutorials.com/> Offering comprehensive basic electronics tutorials in amplifiers, ham radio, filters, oscillators, power supply, receivers, transmitters, radio design, and electronics design.

The Electronics Workshop at <http://library.thinkquest.org/10784/> Is an introduction to electronics, with tutorials giving important physics and chemistry concepts related to the field of electronics.

Graham Knott has a very nice site at http://ourworld.compuserve.com/homepages/g_knott/ It offers electronics for beginners and intermediate level as well.

Iguana Labs at <http://www.proaxis.com/~iguanalabs/maintut.htm> has a nice site that offers tutorials and kits for the beginner to advanced levels.

I hope these sites will be of use to you all, now get out there and melt solder!

73, oo
Dan, N8IE

From Zepplins to FET's

Dr. Julius Edgar Lilienfeld was a German scientist who worked at the University of Leipzig before immigrating to the U.S. in the 1920's. Lilienfeld operated the first large-scale hydrogen liquefaction facility in Germany. The liquid product was used to fill Zeppelins and for cryogenic research. He obtained a U.S. patent on the cryogenic separation of gases in 1915. Lilienfeld developed and patented several X-ray tubes around 1920, which placed him in direct conflict with Coolidge at G.E. (an excellent piece on the X-ray tube development has been published by Prof. Robert G. Arns, University of Vermont in Burlington)

During 1925-1928, Lilienfeld developed and patented several devices that would now be referred to as field effect or point junction transistors. Shockly's original field effect transistor patent was completely thrown out and Bardeen's point junction patent transistor patent had over half the claims dismissed due to Lilienfeld's prior work. Some of the constructions shown in the patents have been reproduced by Prof. Arns and a grad student, Bret Crawford, at U.Vermont, Burlington, and by Prof. Joel Ross, St. Michael's College, Vermont. While the devices did not perform to today's standards, signal amplification was detected. The exact construction employed and performance obtained by Lilienfeld remain unknown.

A 40 Meter Vertical

By Gary, NS8O

Ham radio is such a great hobby, you just never stop learning and enjoying the fascination that comes with it. Sometimes the learning comes with a lot of trips up the ol' antenna tower...

Take my latest antenna adventure for example. I wanted to get on 40 meters with a better 'tenna for this fall/winter contest season. I have used dipoles, slopers, etc. but they just weren't as effective as I wanted. They had to hang well below my HF tribander, which I'm sure doesn't help. I don't have room for any kind of beam or phased arrays, but I do have space to go up. A quarterwave 40-meter vertical on the top of my 50' tower (with HF beam) should do wonders... So I TIG welded some aluminum tubing together to make a 33' high self-standing 40 meter vertical. I actually made it into 2 sections so it was easy to work with. Diameter starts from 1 1/8" at the bottom, to the top 6 feet, which is a very lightweight TV antenna element.

I mounted the antenna in a bracket that insulates it, so I can feed it direct with coax. I couldn't get it to the top of the mast, because of the 6-meter beam I have there, so I mounted it a few feet from the top.

The coax RG 8/U feeds it directly and is grounded at the bracket with the SO-239 connector.

NOW it is education time...

I hooked up some test gear expecting the thing to be right on resonance at 7.1 MHz or so. The resonant frequency of the 33-foot antenna went to 7.5 MHz! I couldn't figure out what had happened; I had double-checked every measurement.

To make a long story short, the mast/antenna relationship had become a transmission line, a balanced one consisting of the antenna element and the mast, being in such close proximity of each other; within 3 inches. So the length parallel to the mast was not radiating! The effective height of the antenna was what was above the mast; approximately 31.2 feet.

To test this theory, I moved the antenna up as high on the mast as I could and then checked the resonance frequency; it had gone down to 7.4 MHz. My theory seemed to be true. The only solution was to take the antenna down, add two more feet to it and then see what happens.

Sure enough, after adding two feet to the top, remounting the antenna the resonance freq. went down! (Imagine me at the top of the tower, lifting up a 35' antenna into the bracket, which uses two U bolts to attach it to the mast. Then imagine the fun when one of the U-bolts broke... but that is another story. The moment of truth had arrived... what is the resonance freq. and SWR? Freq. is 7.15 and the SWR is less than 1.2 to 1 across the band, 1:1 at 7.15 MHz.

So lesson learned? A vertical antenna mounted close to a mast actually becomes a balanced transmission line, effectively making the antenna only as long as what is above the mast. So remember this if you are going make a vertical and save yourself a few trips up the tower!

Antenna works great, worked UU4, F6 on 40meters with no problems. I also feed it on other bands via a tuner. Checked into the WQ1RP 80 meter net last night with 5 watts and got a 579. (I feed the coax braid on 80 and 160; a gamma match type arrangement to feed the entire tower/antenna)



Close view of the mounting bracket for the antenna. The bracket is grounded to the mast but the antenna is insulated from the bracket.



In this view you can see the bracket that supports the 40-meter vertical. It is held on the mast by 2 U-bolts. Loosening these bolts up allowed me to slide the 40-meter vertical up and down the mast. It is about as far up as I can get it now.



In the whole antenna view, you can see the 35' element on top of the mast. Just below it is the 6-meter beam and below that is the HF tribander.

72 de NS8O

Capacitive Switch Paddles
AKA KP Kit
 By Rick, WB6JBM

The KapacitivePaddles project started as a desire to consolidate 'boxes' by Diz, W8DIZ after building his K2. The design is loosely based on a capacitive touch switch from an out of production Programmable Drum Set. The origin of the circuit can be traced to <http://paia.com/touchsw.htm>

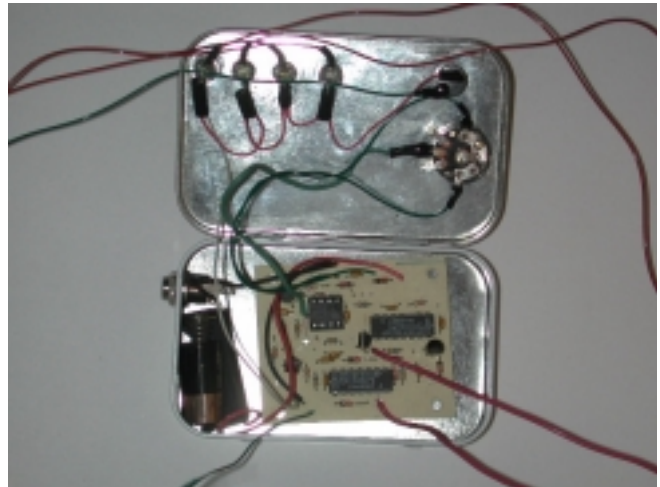
Modifications to the circuit included switching to a 4011, quad-dual input NAND gate, some capacitor value mods to speed the response time, and elimination of the latch circuit.

Addition of support for the K10 keyer was based directly on circuits listed by K1EL <http://members.aol.com/k1el/>

This is intended as a homebrew style of kit NOT a professional, marketable kind of kit. Therefore there is no intention on using professionally made circuit boards of the highest quality. (Ok, I made the boards in my basement, using stock purchased from Mendehlsons!)



This view shows the board installed into an Altoids tin. The red wires on the left side (top/bottom) attach to scrap pieces of PCB to act as the paddles.



This one was built by Mike, KB8UW, FP #-75. The pot is for speed control and the four push button switches are for the function, and memory selection.

For more information, and how you can get the PCB used in this project, surf to <http://paddles.homepage.com/> Or by Email to <mailto:w8diz@cinci.rr.com>

72 Rick, WB6JBM

A different approach to placing wire antennas in trees.

Bob K8YS

Seeing a need to hang wires in tree, over tall building or where ever that is some times difficult to reach, I investigated the "wrist rocket" type launcher. Well, I like things that are propelled by controlled explosion. So I made a launcher that is made from common parts found at any Sears, Home Depot, or most well stocked workshops... especially if you are like me and hate to throw anything away.

The K8YS Long wire Launcher is a "spud gun" and a Zebco 202 fishing reel.

As a kid, I had toys that used calcium carbide and then the infamous tennis ball cannon. When was the last time you saw a beer can that needed to be opened with a can opener? 1967??

Well, finding the cans was out, so I heard about the "spud gun" or "taterzooka" (or as a smaller caliber, a "squirrel-zooka" for them pesky tree rats). Then I was struck with "HEY what an idea!", I'll build a spud gun and launch a plug with a string attached to retrieve the wire, so the K8YS Long wire Launcher was born.

The launcher:

The launcher is made from Schedule 80 PVC plumbing pipe, simple to find stuff, and held together with PVC cement. The construction is straightforward. You will need the following:

- 1 piece 2 inch PVC 36 inches long - forms the barrel.
- 1 piece 4 inch PVC 16 inches long - forms the combustion chamber.
- 1 reducing adapter 2in to 4in.
- 1 4 inch clean out plug
- PVC cleaner
- PVC cement
- Igniter
- Fishing reel. I used a Zebco 202 that has been laying around the garage for 20 or more years.
- 2 pipe clamps to hold the fishing reel to the launcher.



The igniter:

There are several different conventions here. I used a Coleman Lantern igniter. The igniter is just a good old fashion flint and steel striker, like your Zippo Lighter but with a long shaft for getting to the gas mantels of the lantern. Another method is the gas grill igniter. The grill igniter is

piezo-electric, when you strike the crystal with the plunger, it produces a very high voltage that causes a spark at the spark gap.

The whole idea is to ignite the gas inside the combustion chamber. So, the method is really a personal choice. Some like the ability to use the gas grill igniter like a trigger and some just fell better giving the lantern igniter a quick twist. Unlike the old carbide cannon and lighter fluid tennis ball cannon, you really do not want to just use a match. I would guess that a musket cap and nipple with some sort of a hammer might be overkill.

Hey, be HIGH TECH, this is a high tech hobby!

The plug:

The plug has evolved from different items. The first try was a piece of scrap 4x4 lumber that I turned on the lathe and shaped into a conical ball (can you say "miniball" of the American Civil War fame - unless you are from the South, then it is the War of Northern Aggression, but I digress). This was OK, but it needed to be "patched" so it would have a tight fit in the barrel. I guess that it reminded me too much of black powder muzzle loading.

The second-generation plug is made from a big fuzzy paint roller. Fuzzier the better because with use, the fuzz will soon be gone. I use the long roller and cut it into thirds with the band saw. I then seal one end with silicon RTV sealant. While the silicon sealant is curing, I make a loop of steel wire and stick it into the sealant and have it sticking out of the open end. This will give me a connection point for the fishing line. More on that later. I then pour in a little weight. I have used ball bearings and also used sand. The idea is make the plug heavy enough to fall back to terra firma with the line attached. Then I fill the open end with more RTV. Since the new paint rollers have a plastic form, you need the nasty smelling RTV, the latex stuff won't stick to the plastic.



Fuel:

Fuel is simple stuff. The most common fuel is hair spray, the cheaper the better. White Rain brand is the favorite. I often wonder if women know what they are putting in their hair. NASTY STUFF. I have also tried ether based starter fluid, but it is slow burning. I have been told that the OLD WD-40 works very well, better than hair spray, but the new stuff uses CO2 for the propellant. There are web sites that have other plans for using butane and propane but the hair spray is easy, cheap, and you can find it at home. WD-40 won't gum up the combustion chamber.

**Construction:**

First thing to do is to bevel one end of the 2 inch PVC. The reason for this is that if for some reason, you have the uncontrolled urge to launch a potato, the beveled end makes insertion of the semi round potato easier into the round piece of PVC. The beveled end acts like a knife.

Clean the square end of the 2-inch pipe with PVC cleaner. Clean the 2-inch end of the adapter with the cleaner. After cleaner dries, test fit the two. No need to glue just yet. Clean both ends of the 4-inch piece as well as the clean out plug sleeve and the inside of the 4-inch end of the adapter. Again, test fit everything. Just be careful not to get cleaner or cement on the screw threads of the clean out plug. Cleaning does help the cement bond better. While this will not be under 100 pounds per square inch water pressure, it must contain the exploding gasses.

Depending on what igniter you use, mount the ignitor. I used the Coleman Lantern igniter. I then drilled a hole in the clean out plug cap and mounted the igniter with the striker on the inside and the twist knob on the outside.



If you like the gas grill type, you can mount it in the cap too, or on the side of the combustion chamber. Since I have not used the gas grill type, I would think that it would be a good idea to epoxy the thing in place.

Now would be a good time to glue everything together. Plumbers tell me that they apply the cement to the pieces then give them a twist until the cement is cured. I guess they do this to make sure that glue got all the way around the connection.

Testing and Use:

To test the launcher, I use a heavy rag, a couple shop rags wadded up or a old towel. Stuff the rag down the muzzle to the top of the combustion chamber. Remove the clean out plug, give the hair spray a squirt. Just a couple of seconds is all it takes, then QUICKLY screw the clean out plug back into place. Make sure the range is clear. Then aim the muzzle down range, hit the igniter and WHOOSH! The rag will fly about 20 feet.

To use the launcher, attach the fishing reel to the barrel with the pipe clamps. Attach the fishing line to the plug. Push the plug down the muzzle until it is just above the combustion chamber. Remove the clean out plug, give the hair spray a squirt, two seconds is good, five seconds is a bit too much... experiment. Push in the release on the fishing reel (or is you are using a spinning reel, release the catch thing), you do not want that plug coming back at you! Aim, hit the igniter and watch the line play out. When the plug lands, go to the far end, untie or disconnect the fishing line from the plug, tie to the long wire and reel it in with the fishing reel.



My reel has 100 yards of line. With a 4 to 5 second charge, I can send the plug out to the end of the line.

Refinements:

Paint:

Paint the long wire launcher a subdued color. Camouflage is my favorite. Flat black, dark green etc you get the idea.

Barrel:

There are web pages devoted to the spud gun. There are also those that manufacture a rifled barrel for the long range shooter.

The original plans that I found called for a longer barrel, but I have always like the "carbine" version of everything so my launcher has a shorter barrel. The combustion chamber is still 16 inches, but the barrel is only 24.

Caution:

This is NOT a toy. Think Safety Use Safely! You really do not want to size a potato, then freeze it. A frozen potato has been rumored to penetrate a piece of plywood. Common sense is your best tool.

Here are a couple URL's for the Spud Gun.

- <http://members.primary.net/~xavier/air.html>
- <http://members.primary.net/~xavier/potato.html>
- http://www.calisland.com/web_ring.htm
- <http://www.geocities.com/Hollywood/8357/>

If you must have more, follow the links on these pages. There is even a web ring devoted to spud guns. Some of these guys are really warped.

RAGE against the Potato.

Conclusion:

As I said before, I like controlled explosions, while a paint roller is not exactly copper jackets lead slugs, the basic principal is the same. It is also a little larger than my favorite .308 inch toys (big boy toys). Construction is easy and the whole thing costs a lot less then you can buy the slingshot device.

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Bob, K8YS

Multiple Bands, One antenna! Which feedline do I use?

By Rick, KC8AON

Below are some comparisons between a 135' long dipole fed with 50 ohm coax and 450 ohm ladder line at an average height of 40 feet high, and a feedline length of 50 feet on each and using an antenna tuner on all bands above the design frequency. Match at transmitter is near perfect due to tuner, but SWR values effects that between the tuner and antenna (this does not change when using a tuner). The efficiency figures will show you how much difference there is between the two feedlines.

135' dipole with 50' of RG8X 50 ohm coax @ 40'.

Freq. in MHz	SWR	Efficiency
3.5	1.4:1	72%
7.0	9:1	7.2%
10.1	5.5:1	22.7%
14	6.5:1	6.6%
18.1	3.1:1	42.7%
21.0	5.3:1	6.1%
24.9	1.9:1	54.8% not to bad
28.0	4.6:1	5.7%

135' dipole fed with 50' of 450 ohm ladder line @ 40'.

Freq. in MHz	SWR	Efficiency
3.5	64.5:1	83.5%
7.0	58.2:1	87.7%
10.1	7:1	89.6%
14.0	1.3:1	89% very good!
18.1	4.7:1	92.8%
21.0	34.8:1	89%
24.9	18.8:1	91.9%
28.0	67.4:1	87.9%

Notice that on the dipole fed with ladder line, that although the swr values were very high in some cases, the efficiency levels remained high, in fact, they are higher than the near perfect match of the 50 ohm fed version at 3.5 MHz! 83.5% versus 72% isn't too shabby considering that ladder line is cheaper than coax! Only got room for one antenna? These figures should help you figure out what to use. Best 73 & don't get on a power trip!
Rick, KC8AON

Basic Stamp Application to Control Your Homebrew Receiver, Part 1

By Mike, WB8ICN

I originally wrote a lengthy article for Communications Quarterly (now part of ARRL's QEX). That article was divided four sections; the first described what got me started on this interface project and what lead me to the Stamp. How I went about gathering information and then discovered a wealth of knowledge through an e-mail list for the Stamp. Second, I thought it wise to detail both the BASIC Stamp 1 and 2, the editors used to write, debug and program code for the Stamps, and how easy it is to get started with the Stamp. Third, my project - a replacement of analog controls (RF gain, Coarse and Fine Tuning, and Bandpass) on my Ten Tec SSB/CW receiver board with digital pots controlled by the Stamp. I explained both the hardware configuration and the code used to make it all work. Finally, the fourth section was a general wrap-up with some thoughts of my own on why we hams mess around with simple things like the Stamp, how homebrewing is still an art that many of us learn from, and some ideas for future enhancements of the interface project and some rather exciting ideas for uses of the Stamp and its actual processor, the PIC 16Cxx series chips. The following is excerpts from that article with some editing to make it more appropriate for the FP Newsletter.

Many articles have appeared featuring a new approach for homebrewers in the quest to digitally control their respective stations. This new approach is centered around Microchip's 16C56 and 57 series microcontroller chip (uC). These uC's are used in many applications including a rather unique mini-processor system on a chip called a Stamp, more precisely put the Basic Stamp 1 (BS1) and Basic Stamp 2 (BS2). Both chips are produced by Parallax, Inc. The BASIC Stamp is a registered trademark of Parallax, Inc. I first discovered these about six years ago in random search on the Internet for a simple, yet effective, interface controller. I had heard about the Stamp a few years back at the Dayton Hamvention, but someone told me that the Stamp was far too slow for any practical use in ham radio. Well, a very important lesson was learned here...always do your own research and form your own judgments! The Stamp may be too slow for applications such as a frequency counter in the RF range, but it holds it's own when it comes to a simple interface controller I had bought a Ten Tec CW-SSB Receiver kit, Model 1056, at the 1996 Hamvention. It had been many years since I have had the chance to build a fun kit and this looked like a good way to start again in hopes of getting back into the homebrew way of life. I built the kit and had many hours of fun using it to copy CW and SSB stations. The kit allows you the option of which band to wire the local oscillator for and I chose 40 meters. After awhile, the kit was pushed aside for room on the bench for other interests. When I decided that I needed some way to digitally control my Ten Tec receiver board so I could control it with my PC and do some fancy digital mode

operation such as packet, SSTV, etc., I had thought it would be a bright idea to order the more versatile of the two Stamps, i.e. the Stamp 2. But after playing with it for a few days, I discovered that most of the application notes for the Stamps, at least available at that time, were for the Stamp 1. The Stamp 2 was relatively new and just starting to catch on with more work and ideas were being brought forth and shared with others. Since I wanted to ensure the most applicable platform for as many users as possible - I had gained a lot of knowledge from so many Stampersters, I wanted to share something and this was my first real project to share - I decide it best to rewrite Beau's code and hardware design from the Stamp 2 (this is the Stamp he also chose for this type of application) to the Stamp 1. The reengineering of the hardware portion was rather easy (I did this sort of thing as a career), but the conversion of code was a challenge for me at the time. Now that I've went both ways with it, it seems rather simple and fun...sort of like a crossword puzzle.

The first project (using the Stamp 1) was completed in February 1998 and posted on my web page. Only one problem remained after the initial work was done, and the only real fix for it was a bandaide, which I detest using unless its the only solution. The Stamp 1 only has 8 I/O lines not enough for what I was trying to do. I did find a way to use only one I/O for the four function switches needed for the receiver board. The hardware used to determine which switch I had pushed was accomplished by using an RC network and a decision-making logic table in software. The problem was the RC network caused a clicking noise in the receiver that I couldn't easily mask out entirely. I did find a method of using a lot of capacitors to basically pull all the low frequency AF (RC time constant clicking noise) to ground but didn't really care for this approach, i.e. the bandaide saved the patient but what a mess to look at once it was done. Since I couldn't sell myself on this solution, which meant no one else would ever buy off on it, I then rewrote the code and redid the hardware for the receiver board using the Stamp 2. Since the Stamp 2 has twice the number of I/O lines available for use, I had plenty of I/O lines for switches and no RC network was needed to determine which switch had been pushed. Versatility provided the solution by having enough I/O lines so each of the four switches had their own access to the CPU of the Stamp processor.

The BASIC Stamp is nothing more than a small computer, actually a microprocessor that runs Parallax BASIC (PBASIC) programs. The PBASIC language is proprietary software developed by Parallax for use in the Stamp 1 (BS1) and Stamp 2 (BS2). It is burned into the 16C56 or 57's EPROM, depending on which Stamp your using. Each Stamp has fully programmable I/O pins that can be used to directly interface to TTL-level devices, such as buttons, LED's, speakers, potentiometers, and shift registers. By adding a few extra components, these I/O pins can be connected to non-TTL devices, such as solenoids, relays,

RS-232 networks, and other high current/voltage devices. Though they are available in various physical packages, all versions of BASIC Stamps have the same logical design, consisting of a 5-volt regulator, resonator (oscillator that serves as the system clock), serial EEPROM, and PBASIC interpreter. When programming a Stamp, the editor (free from Parallax - I downloaded mine before I got my first Stamp) tokenizes the PBASIC program and stores it in a non-volatile serial EEPROM, which then can be read from and written to by the interpreter chip. This interpreter chip fetches the instructions one at a time and performs the appropriate operation on the I/O pins or internal structures within the interpreter. Because the PBASIC program is stored in an EEPROM, it may be programmed and reprogrammed almost endlessly, without the need to first erase the memory. To program BASIC Stamps, you simply connect the Stamp to an IBM PC or compatible (I recently read that someone had finally developed an editor for LINUX users) and run the editor software to edit and download your program into the Stamps EEPROM.

The BS1 has 8 I/O pins, room for 256 bytes of data and program instructions in EEPROM (holds about 80 to 100 instructions) and executes an average of 2000 instructions/sec. There are seven word registers, all of which are byte addressable and two of them are bit addressable. The system clock is internal and runs at 4MHz. The I/O lines are TTL at speeds of 300 to 2400 baud. The PC to Stamp interface is via the PC parallel port.

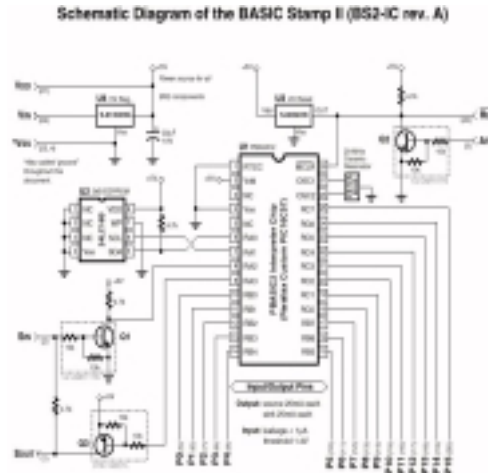
The BS2 has 16 I/O pins plus two synchronous serial pins, can hold about 500 instructions and executes an average of 4000 instructions/sec. There are 16 word registers, all of which are byte, nibble and bit addressable. The system clock runs at 20MHz. The I/O lines are TTL running at 300 to 50K baud, 0 to 19200 if your using flow control, and uses the serial port of the PC for programming interface. Current requirements are modest for both the BS1 and BS2, 2ma and 7ma respectfully. Cost seems to be the only real hang-up for folks like me. The BS1 runs about \$34.00 and the BS2 is at \$49.00 during the build up of this project. Considering the ease of programming, the simplicity and the number of times you can reprogram, and the support network in place, I would venture to say that its worth the price in my book. My idea was to develop applications using the Stamp and then burn the code into a PIC, once you convert it to assembly language this is. The new Parallax editor out (version 1.2) is supposed to allow you to burn BS1 code into a 16C58, but I haven't tried any of this out yet.

The instruction sets differ somewhat between the two Stamps, though many of the instructions are used for both. I hadn't planned to go into a lot of detail in this area, but would suggest you checkout the free, downloadable manuals for each Stamp. In these manuals, the instructions are covered in more detail than time or space will permit here.

Well that about wraps it up for a light introduction of the BS1 and BS2. So lets get into the meat of this adventure and take

a look at the hardware and code for the BS2 and how I interfaced it to my receiver board.

First, let's take a quick look at the BS2 chip itself. I used the BS2-IC, Rev. A for my project. This figure shows what makes up the BS2.

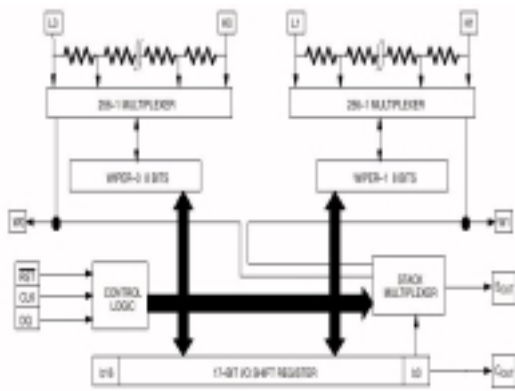


All of this actually fits on a small 24 DIP module, this module is shown in Figure B along with a table showing the pin names and a short description of what each pin is used for. If you will reference figure A, I will give you a quick rundown of the BS2. The CPU of the BS2 is a custom Microchip PIC 16C57 (labeled U1). U1 is permanently programmed with the PBASIC2 instruction set. When you write a program for the BS2, you do it with a text editor or the Parallax BS2 editor and then download it to the BS2 through your serial port on your PC. When you download your program to the BS2, your actually telling U1 to store your program in PBASIC symbols, called tokens, into the 2KB EEPROM (U2, which is a 24LC16B). When you run the program, U1 retrieves these tokens, interprets them as to what PBASIC instruction you wrote and then carries out that instruction. U1 executes internal instructions at about 5MIPS. However, it takes several internal instructions to make up one PBASIC2 instruction, therefore the real-time processing speed of the BS2 is around 3,000 to 4,000 instructions.

U1 has 20 I/O lines of which 16 are available to the user for BS2 I/O use, two are used for serial communications, and the remaining two are for interfacing with U2. The 16 BS2 I/O lines are 5-volt logic lines, usable from TTL to CMOS. About the same characteristics of the 74HCTxxx-series logic devices. For those lines that you direct to be an "input" I/O, they have little effect on any devices connected to them. Consider them to be like a tristate, high-impedance input connection. Bits P0 through P7 make up one port and P8 through P15 make up the second port; these pins should be considered as two eight bit pin ports and should never sink more than 50mA or source more than 40mA. Any

unused I/O pin should be made into an output pin and connected to +5v.

The only important considerations to remember about the EEPROM (U2) is that it takes several milliseconds to write data into it; and the limitation on the number of write cycles before it begins to fail is around 10 million times--you can do a lot of writes and downloads before you hit that number. U3 is used as the reset circuit and rather important during power-up. For those who wish an even more detailed description of the BS2, I recommend that you download the BS2 manual (BASIC Stamp Programming Manual 1.8) and read pages 207 through 212. But don't stop there...this can be your one-stop guide to using the BS2 including some application ideas. Once I had gone through these pages myself, I was left with an feeling of ease. After looking at figure A in this article, one might be scared off--don't be, this chip is quite "user-friendly." For now, the important parts are this, pins 1 through 4 are used to communicate with your PC for writing, debugging and downloading your BS2 programs. Pins 5 through 20 are the I/O pins that you use to communicate with the real world, in this case, the Ten Tec receiver board, and pins 21 through 24 are power, ground and system reset connections. You can power the Stamp with a 9 volt battery connected to pin 24 which will provide you with a 5 volt regulated power source at pin 21, or just connect a regulated 5 volt power supply to pin 21 and your all set. I used a 9 volt "transistor" battery connected to pin 24 because I didn't want care to have to build a 5 volt power supply for this project. By using the 9-volt battery, a 5-volt source is then automatically available to me through the Stamp itself. Rather clever of the folks at Parallax to provide this shortcut. The DS1267 (1267) is produced by Dallas Semiconductor. You can download the datasheet in PDF format from their web site. The 1267 consist of two digitally controlled solid-state potentiometers (pot). Take a look at figure E. Each pot consists of 256 resistive sections, each equaling about 39 Ohms. This figure shows the block diagram for the 1267.



When you transfer a data word from the BS2, you're actually sending two bytes (16 bits) of info that tells each pot to move up or down in resistive value. The word is sent, along with a dummy bit (the storage register in the 1267 is 17 bits long) to

17-bit I/O shift register in the 1267. The RST I/O line from the BS2 enables the correct 1267 to receive data and the data word is sent one bit at a time using the CLK (CLK I/O line) signal for timing synchronization. The data is sent on the DQ I/O line. Once in the shift register, the individual bytes are moved to their respective wiper controls through the stack multiplexer (controlled by the control logic). After the RST line goes low, the wiper position is changed according to the data byte sent from the BS2. Enough for the hardware theory.

Continued in the next issue.

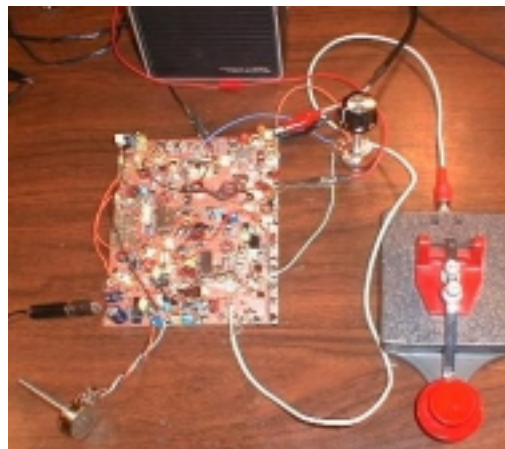
The miniPIG the multiPIG and the "UGLY"

By Diz, W8DIZ

Preface:

This project came about when Flying Pig Club member Rick, WB6JBM made the comment "we should have a club project to build". We talked about building a qrp radio that was a bit different from the normal small rig projects; something that could be used for competition in the field and at home. A ten-meter rig seemed to fit the bill as Rick had no 10-meter capabilities :-). I gave the idea a little thought. Doing a vfo rig on 10 is a bit ugly. So, I thought how about VXO. I looked around and found this odd crystal 8,064 kHz. I'm not sure where it is used, but it would mix very well with a 20 MHz crystal to cover the 10-meter QRP frequency. So I ordered ten 8.064 crystals from radioshack.com (actually manufactured by International Crystal). I built up a little mixer using a NE602 and bingo, we had coverage from 28,057 to 28,067 and the miniPIG-10 was born.

After building the prototype, miniPIG#2 was built into an aluminum enclosure.





Included are a K1EL keyer, capacitive touch paddles and a balanced antenna tuner. This rig has been to Key West and Tampa Florida, the Bahamas and to many field contests, logging mostly European DX with its one-watt power output. The first 3 qso's were with as follows on December 5th, 1999 with a measured output of 900 milliwatts.

Dave, FY/DJ0PJ rcvd-569 Kourou, French Guiana - dipole at 30 ft

Mike, WB4HUC rcvd-579 near Austin, TX - nice long qso
Art, GD3FXN rcvd-539 Douglas, England - went qsb
Needless to say, I was very happy with the operational results of the miniPIG-10.

The multiPIG uses the miniPIG-10 transceiver design, but incorporates a PLL to replace the miniPIG VXO. This would allow multiband operations. Also, all the band specific components are built on separate modules. Also included is a frequency counter with an IF offset to display the operating frequency.

Credit for the design of the miniPIG goes to all the great QRP and Ham tech manuals I've read over the years, mostly to W7ZOI Wes Hayward and W1FB Doug DeMaw for "Solid State Design for the Radio Amateur". Wes is a member of the Flying Pigs, and if Doug were with us today, I'm sure he would be an FP too. There were also circuits used from "The Radio Amateur Handbook" published by the ARRL. My only contribution to the design was to glue together all the various circuits with some slight tweaking and being lucky to find the 8.064 crystals.

multiPIG Design Criteria:

Receive from 0 kHz through 30 MHz.
Transmit on ALL HF bands 160 - 10 meters, CW only
Variable 4.9152 MHz band pass filter
Click-free audio derived AGC with S-meter
Radio "system" will utilize band modules like the TenTec Scout.
PLL MAIN TUNE will double as a Signal Generator
FREQ DISPLAY will double as a Frequency Counter
Main tuning via a VXO Reference Oscillator
Built-in K1EL memory keyer (K10 chip)

Built-in Capacitive Touch Paddles
5 watts out, fully adjustable
SWR indicator and BALANCED/UNBALANCED ANTENNA Tuner
Completely modular, designed with the experimenter in mind
The main radio design is taken from the miniPIG-10
You can check out more on the multiPIG now by going to:
<http://multipig.homepage.com/>

Continued in the next issue.

Changes for the e-mail reflector.

By Rick, WB6JBM

Fellow piggies.
The email list has been changed from being on egroups.com to being hosted by mpna.com (which also hosts fpqrp.com). This was a conscious decision based on a large disagreement with some of the service policies of egroups. The current setup is, fpqrp-l@mpna.com is our main email reflector. One of the recipients is to an archive system designed and hosted by Diz, W8DIZ. This archive is so that we still have a web based message retrieval system. The archive is reachable from the home page of <http://www.fpqrp.com> (just click on archive). Currently there is no daily digest mode available, but we are working on it. We will stop forwarding mail to egroups as of Oct 12, 2000. To subscribe to fpqrp-l just send a message to majordomo@mpna.com with subscribe fpqrp-l as the body of the message.

For those wanting to access the FPqrp ARCHIVE on our web page, be aware that the USER_ID is your email address. This address MUST already be in our database. If you have recently changed your email address, you will not be able to access the ARCHIVE database. In this case, just let me know and I'll update the ARCHIVE.

Once in the ARCHIVE, you can change ANY information about yourself, including your email address, password and MATRIX contacts. Also, in the near future, we'll add FP contest logging and W8PIG logging functions. The email archive is available for public reading without security.
72 & oo's
Rick, WB6JBM

Member Spotlight!

This month were spotlighting:
Brian Murrey, KB9BVN, FPqrp #-57



Licensed in 1988, first on HF in 1998 via Norcal 40a. Brian lives near Indianapolis and is active in numerous QRP organizations like FPqrp, SOC, QRP-ARCI, and QRP-L. Brian usually haunts 20m and 40m with his Ten Tec Scout or Norcal 40a. Earned WAS 40M QRP in December of 1999.

Brian is also famous for his attic dipole and very active in the Boy Scouts of America.

In the Next Issue:

We'll have part two of the "the miniPIG the multiPIG and the UGLY", also the conclusion of the "Basic Stamp Application" articles, plus a look at Quartz and crystals.

If you would have an article or story you would like to see in the Bacon Bits, pass them along to Dan, N8IE at n8ie@aol.com

Until next month,
72, oo

About the Flying Pigs QRP Club.

OUR MISSION:

- 1: Have Fun.
- 2: No rules.
- 3: Have a group of Friendly Hams who enjoy Amateur Radio, and sharing their skills with their fellow Hams.

CLUB EMAIL POLICY:

These are not rules, just common sense.

Club email is not moderated, as we are not a stuffy group. You can send off topic messages about most subjects, but please keep it clean and in good taste. We do like good-natured ribbing and joking with each other, but we will not tolerate flaming other members or spamming the group. We will remove offenders who abuse our open policy.

CLUB WEB PAGE:

The club web page is our forum for sharing projects, and information about us. You are encouraged to submit your ideas and projects to be added to the web page.

PROBLEM REPORTING:

If you are having problems with email, the web page, or a fellow club member, please report this to either Diz, W8DIZ at w8diz@cinci.rr.com Rick, WB6JBM at ripowell@mpna.com or Dan, N8IE at shepherd@aol.com We welcome all to join the Flying Pigs QRP Club, and we hope you have fun!