Iambic Sending

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Since I am doing this in the comfort of my own computer at home and I have no earthly idea where you are in your sending career allow me to start from ground zero. OK?

This is for Iambic Paddles only and hopefully you will agree with me it is the best way to go. Single lever paddles take more mechanical motion to send the same characters. I'll try to dig up my numbers from an article I did for QRPp last year on just how many that is and a comparison to the number of movements for Iambic mode keying using Mode B.

For sending Morse at speeds greater than 20 to 30 wpm you will need something other than a straight key or you will get very tired and frustrated early in the game. Some people can do it all day and all night and not get tired. I'm not one of those individuals. I'm basically lazy or want to use tools that make the job easy.
I compare it to digging a ditch with a spoon or a shovel. I'll take the shovel anyday of the week over a spoon. A powered ditch digger would be nicer, but more expensive if I don't figure in a price for my time to use the shovel.

You either have experience sending Morse or you don't. If you don't then let me personally recommend you start with an Iambic Paddle and a keyer.
It's easier and it's where you want to wind up anyway.

Now if you are an old timer at this game and you started with a straight key then went to a bug and stopped there or went on from the bug (automatic paddle that mechanically send dits while holding down the paddle to one side) to a paddle you have a problem either way.

First let me take the bug people aside and talk to them. You know that it takes a certain force to hit the paddle and get the lever that sends the dits to move and stay moving long enough to get a few dits sent. You will have to kill off the tendancy that you have to "hit" the paddle with a lot of force.
Be gentle, please. The following steps will guide you and please don't skip anything and bear with me.
Let me know how you do, please.

Now for the people that use a paddle and keyer now and moved to it from the bug stage. You are doing it wrong. See below. Most likely you learned by yourself with no Elmer to look over your shoulders to help you along.]
From personal observations over the years at swapmeets, ham conventions, and field day events and other contests I have noted that I cringe when I see someone else use an Iambic Paddle. They "slap" the paddle around like it was a bug.
Just a touch is all it takes to do it correctly if you have it adjusted correctly.
If the paddle moves around the table while you are sending then you are using too much force.

And later on while sending or just after you have sent something look down at the paddle. If you are sending with one hand and holding the paddle in one place with the other then you are doing it wrong. It shouldn't be moving if you are using a gentle force on the paddles. The typical paddle weighs in at around 2 kg or so. Take it easy. It isn't going anywhere on its own.

So follow the patented K5FO (tm) technique and you will be on the road to becoming a high speed guru of the CW world knocking them back in awe when they hear you on the air going faster than the law allows. Feedback appreciated.

So let's begin. You will need the following items.

- Iambic Paddle
- Keyer
- Connecting cables
- Phone Book

Here are some pictures of a few items just to get you familiar with what they are so that if you are at a swapmeet and see one on the table you can astound your friends and enemies by pointing out what it is and what it is used for and know all there is to know. Be the first kid on your block to get one and use it.

Brown Brothers Paddle which is no longer manufactuered.
Bencher Paddle see latest QST for advertisement from Bencher.
Bencher Paddle with black base refurbished by K5FO. See latest QST for advertisement from Bencher.
Brace Racer Paddle see latest QST for advertisement from Vibroplex.

Let's first have a look at your paddle after you get one or if you have one already. Hopefully you can find one used on the market if you don't have and have a limited budget and get it at a good price. This is a touchy area.
I have gotten the Brown Brothers and Bencher paddles for less than $50 at swapmeets on the last day when everyone is in a dealing mood and doesn't want to pack up all that stuff left over to take back home. You know the story, they were told not to come back home with anything.....
The paddles didn't look pretty but I spent some elbow grease, paint remover, primer, and paint to get them looking like new again and working like a charm.
Looking for used equipment is like looking at used cars. Different owners have a different asking price and you can see a wide range here. Try to find out or know before hand the original price and judge accordingly. I'll try to help where I can here but unless I just happen to be at Dayton with you or where the deal is found I can't help. Education is expensive. Been there done that.

Of course, you can look in the latest mags and get a new paddle from Bencher, MFJ, or Vibroplex and I have shown each and listed
their going rate at the time of this writing during the second week of November of 1998. I could list my order of preference but that
serves as no useful purpose as far as I am concerned. As the saying goes, mileage may vary and even be dependent upon what I am
using the paddle for, contesting or casual rag chewing on the air.

Also, using a paddle is like using an ink pen. Different pens have different feel and different characteristics. Same with paddles, so don't think one paddle is that much different than any other. It is purely a matter of taste and experience and you may later want to invest in another paddle or paddles to find one you like better.
Or become a collector. I tend to disregard other peoples opinions on this except where I know the other individual has more experience that I do on a topic or piece of equipment.

Take a good look at the paddle and see how it fits all together.
Different paddles have different physical layouts but basic principles apply through all of them. The Iambic Paddle has two separate movements and sets of contacts which I will call the left side and the right side.
Note the adjustments for spacing on the contacts. Play with the adjustments and see if they are clean and operate in a smooth manner.
If you are mechanically inclined and working with a used paddle that needs some work then take it apart and clean it up and put it back together. Take notes before you take it apart, keep a small box to hold all the parts 'cuz Ace Hardware and others may not have a replacement part if you lose it or damage it in anyway.
Use common sense on chemicals etc. Also do this in
one sitting if possible so you don't forget and reassemble the device incorrectly.
Keep kids away from the parts unless you are showing them what a wizard you are or showing them how to do some mechanical work.

Also do not use a file or other abrasive material on the contacts. I use a sheet of paper slid between the contacts to clean them aperiodically.
They are silver or gold plated and you do not want to remove the material.
Hopefully this hasn't been messed up by previous owners if you working with a used paddle.

OK, now that we have a working paddle let's go and hook it up to the keyer. I will assume that you are right handed in order for me to simplify my discussion.
Just reverse things for left handed operation or if you want just keep everything the same so that when you go over to a right handed operators station you don't have to mess with anything.
I send and I write with the same hand. Others can send with one hand and write with the other. I may be a rocket scientist but I can't write and send at the same time and have never wanted to. It takes all the brain power that I can muster just to send without error, much less try to write and chew gum at the same time.

You need a cable that has two wires and a shield and use a small cable and use a length that is long enough to reach from where you will have the paddle on the operating desk and where you would like the keyer to be if it is outside the rig, i.e. external. If you are lucky to have the manual for the keyer then find out the connections needed to the paddle. The following are what I used for the AEA keyers shown in the pictures. Hook the left paddle contact to the ring connection of a stereo plug, the right paddle contact to the tip connection of the stereo plug, and the shield to the ground of the paddle and to the ground connection of the stereo plug.

This is the same connection used by the AEA keyers and all the other keyers that I have used over the years. If you happen to get one different,
just move the connections to the opposite paddle. You need shielded cable so that later when you connect this setup to a transmitter you will not have problems with RF getting into the keyer and cause it to malfunction.

Power up the keyer and see if touching the left paddle sends dits and the right paddle sends dahs. Congrats. You are on your way to a successful adventure. Historically the reason for the dits on the left paddle and the dahs on the right paddle is due to the semi-automatic mechanic paddle, a.k.a. bug, first being built in the configuration that gave dits with the left paddle, etc. A number of people do it the opposite way and that is fine. Just be prepared to be unable to walk up to any operating position and use their setup unless they have a keyer that will switch to the opposite paddles for dits and dahs.

OK, now first adjustments. Make sure that all the alignment adjustments are straight and ready to be adjusted. With the keyer powered on I take the adjustment on the dit contact closure and move it to narrow the spacing until contact is made and the keyer starts sending a continuous string of dits. Then I back off the adjustment until the dits stop. This is just a small part of a turn on the typical adjustment, say 20 degrees or so. Don't make the spacing too wide as I will explain in a minute. I find that a sheet of 20 pound typing paper just barely fits and there is a slight amount of friction.
That's how close it is. Now some people are going to come along and say use a wider spacing. I don't think so. If the paddle will hold the adjustment and stop sending when you release pressure on the paddle then it is fine.

Now do the same thing on the opposite side for the dah paddle and you are just about done. There may be a tension adjustment for either a spring or springs or magnets. Adjust this for the minimum tension you can get and still have the contacts stay open.

OK, let me give you a physical analogy to what I am striving for and the justification for narrow spacing and a light touch.
OK, let's say you play basketball and I'm your coach. I want you to do an exercise and you have a choice of either of the two exercises in the following paragraphs.

The first choice. Stand at the free throw line and face the basket. I want you to run to the end of the court, turn around and run back to the free throw line. Got it? OK, do this 100 times and I'll time you. Don't have a heart attack on me. :-) Don't go out and do this. It's just a mental exercise.

The second choice. Stand at mid court and face the basket. I don't care which one! :-) Now run to the end of the court under the basket and back. Got it? Now do this 100 times and I'll time you with a stop watch.

Quiz time. Which exercise is going to have the fastest time? Which one takes the least energy? I hope you chose the freethrow line
otherwise you need some serious talking to. :-) Just kidding.

That is the reasoning for the close spacing. Time is speed.

OK, now another exercise. Let's have two boxes. One weighs 4 kg and the other weighs 20 kg. I want you push each box over a concrete floor for 50 meters. I'll time you. Which is faster to push? I hope you said 4 kg. This is the reason for the light touch on the paddles.

We want speed and we use the laws of physics to get us there.

So with the light touch and the narrow spacing let's get down to some real exercises. Sit down at the desk you will be using and place your entire arm from the elbow to the wrist on the table in a comfortable position.
Some of you may want it parallel to the edge of the desk and some at an small angle. I don't think straight into the desk is a good idea. You want to be able to do this for hours on end later in your CW career. Now point your pointing finger straight along the same direction as the rest of the arm. This is the direction I want your paddle to line up with the paddles towards your hand. Extend your thumb straight out and place the paddle with the left paddle just touching it. The thumb should be relaxed and you may want it bent just a little. It's up to you.
The index finger (pointing one) should just touch the opposite paddle and I use the tip of the finger and the finger is curved. I find my wrist is turned just to the left a little, not much and the wrist and arm are resting on the table.

OK, with both the thumb and index finger touching both paddles and no dits or dahs being sent and with you in a comfortable position I want you to hold this position for five minutes. Don't take your fingers off the paddles and don't push on them either. Not a word and not a sound for five minutes. Think about what you are doing and if there is something that doesn't feel right.
Adjust your posture, arm position, etc. until you feel comfortable. I don't really need 5 minutes from you but you get the picture. If you can’t do this for 5 minutes then how are you going to do it for longer periods of time while talking to someone on the air?

OK, take a break and come back. We aren't through yet.

Glad to have you back. Sit down and get ready to send. I assume that you know all the characters and numbers and if not, then pick the ones you do know. If you have the manual on the keyer, look and make sure that it is in what is called the Mode B sending state.
Set the keyer speed to 15 wpm and no lower. Hold down the left paddle and you should hear a string of dits the entire time you have it depressed. With the right paddle you hear a string of dahs. Now here is the neat part with Iambic Keying. Hold down both paddles at the same time.
This requires a 'squeezing' motion on the part of both fingers thus the term 'squeeze keying' in some literature and advertising. The sound pattern will alternate continuously between dits and dahs.
With both paddles closed lightly let the pressure offof one of the paddles, but DON'T remove the finger from the paddle. Always touching is the motto. Now bring pressure back on with the finger you let off and get the alternating pattern going again.

Now let off with the other paddle, again keeping the finger or thumb touching and get a continuous pattern of dits or dahs. Bring the finger or thumb back. Do this until you get the feel of it. Neato.

Remember when you learned to write? What did your parent(s) or teacher(s) or whoever have you do? The gave you some paper, most likely a Big Chief writing tablet, and a pencil and a picture of the alphabet. A sample of the alphabet was usually on the inside cover of the Big Chief pad. (Do they still make those?)
You started with the letter A and I don't remember whether it was lower case first or capital. Probably caps first 'cuz you could do those with straight lines. Then you did one or more complete lines of all A's, then B's, etc. Well welcome back kid, we're gonna do the same thing all over.

First do a letter A. This is done with a di-dah sound combination. I'm going to adopt the following notation for the finger pushes. A lower case 'r' means the right paddle and only long enought for one element, the dah. An upper case 'R' means the right paddle for at least two or more elements. Of course you can figure out what a 'l' and 'L' are.

So an A looks like the combo of

lr

with little to almost no time between the first and the second depression. Try it. You have to gently tap or push the left paddle and immediately tap the right paddle with a gentle pressure, never letting your finger or thumb come off the paddle if possible. Also make sure you are not sending ET as we aren't trying to phone home just yet. :-)
I just couldn't resist. But it is important to not leave a gap larger than the time of a single dit between the dit and the dah. The neat thing about a keyer is that it will always put at least the smallest allowed spacing and you have to react fast enough on the next element so that it doesn't leave too much space. Some keyers will automatically space for a word if you go just a fraction of a dit too long.

OK, just like pre-school or kindergarten or the first grade. Time to print a line of A's. Get a watch or clock with a second hand and send an A every two seconds. Not any faster. Do this for 15 seconds to 20 seconds. And repeat until you can do this without a SINGLE error. Remember how you used to complain and say to your parents? "Oh mom, oh dad, this is so easy and so boring.
Can't I do something more interesting?" No. Do your homework and no desert until you finish.....

Now here is the time to tell you something. Did you notice that if you didn't let up on the left paddle very quickly you'd get the letter R? This has to do with an internal memory of the keyer. Here is the way the Mode B works. If the left paddle is still depressed at the half-way point of the dah, the keyer will do an automatic 'lock' into memory this fact and after the dah is finished the keyer will go ahead and send an additional dit EVEN if you have released pressure on the left paddle!! This is gonna make the letter R and some other stuff easier to send as we will see later. (Please excuse the torture of the English language with gonna for going. It's just a West Texas thing.) The keyer will do the same thing for the opposite combination.

OK, now the letter B. The finger combination will be 'rL' where we will hold the left paddle down in order to get the string of dits. I don't any other way to do this but don't you dare count. Counting is bad. Just remember the sound of the letter B and do just what it sounds like. If you start counting dits you are dead meat. You'll never get to high speeds, so break the habit now and work on it until you do.
Go back to the beginning CDs if you have to.

Repeat the same exercise we did for the letter A. Send a letter B every two seconds for 15 seconds until you get a perfect sequence.
Then go to 30 seconds until you get it perfect.

Now the letter C. The letter C is the first neat one that you get to demo the power of IAMBIC KEYING. Watch someone who was a bug user. The will do this combination 'rlrl' for the letter C. You try it. Now this is a waste of time and energy. You just took four strokes to get one letter. Now try this combo to get C - 'RL'. Hold the right paddle down and then immediately depress the left. Hold the right until after the first dit is half finished or complete and release and immediately release the left paddle at the mid point of the second dah. Work on this until you see the combo.

OK, we did a C with only TWO strokes instead of four. This is the beauty of Iambic Keying and a little help from Mode B. Mode A can do the same thing but requires a longer timing on some stuff and I don't care for it at all. In fact, we can send all the letters and numbers with TWO strokes except for the letters X and P. That's a fact Jack.

Now practice on the letter C until you can send one every two seconds for 30 or more seconds without a single error. Practice makes perfect. I find that people who are accomplished musicians make the best students. Know why? They learned very early in life that sticking to something and patience will allow you to do most anything. I don't think it is so much music but the love of something that makes them better at a lot of things.

OK, here is the combo for each of the letters using the patented K5FO (tm) notation for Mode B Iambic Keying. :-) I'll check this every day and make sure I didn't make a typo. You let me know if I did and I'll correct it. Just double check before you go sending me
email..... :-)

So take each letter and learn the combo by doing it, then send the letter for thirty seconds without error and go on to the next one.
Afterwards, forget the chart. Just concentrate on the sounds and the feel of sending each character.

A - lr
B - rL
C - RL
D - rL
E - l
F - Lr note: hold L down and tap r during the second dit

G - Rl
H - L don't count
I - L don't count
J - lR don't count, not ever.....
K - Rl
L - Lr
M - R
N - rl
O - R don't count :-)
P - lRl OK, this took three strokes
Q - Rl
R - Lr
S - L
T - r
U - Lr
V - Lr
X - rLr The other letter that requires three strokes to send.
Y - Rl
Z - RL Here there is no overlap on the two pressures.

Now note that this notation isn't perfect. It relies on you to know the letters and to figure out the physical timing. I could go off and do
state diagrams and some timing charts but this would kill off a lot of CW operators and they would start visualizing something that outta just be pure sound and nothing else. So I'm going to leave it there.

For the numbers

1 - lR Don't count
2 - LR Don't count
3 - LR Don't count
4 - LR Don't count
5 - L Don't count
6 - rL Don't count
7 - RL Don't count
8 - RL Don't count
9 - RL Don't count
0 - R Don't count

Now I doubt that the numbers can be done one every two seconds. Those puppies take a long time to send at 15 to 20 words per minute. Makes 'em easy if you memorize them by sound and not count the elements.
This is the biggest killer of CW operators and the worst habit to obtain and the most difficult to undo. So get to work if you have the bad habit of counting for any letter or number.
Think sound sound sound....

I'll leave it as an exercise for the student to figure out the punctuation symbols , . ? and the / (slant symbol). For an error I just send

III, three I's. I don't and would never count the dits so I just use something that most people immediately recognize as an abbreviation or shorthand for the error symbol and I'd start resending the word in error.

Here are the number of strokes it takes to send each letter using a straight key, a.k.a. hand key.

One Stroke --- E and T
Two Strokes --- A, I, N, and M
Three Strokes --- K, O, S, U, W, R, D, and G
Four Strokes --- B, C, F, H, J, L, P, Q, V, X, Y, and Z
Five Strokes ---- 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0

So if I asked you to send the entire alphabet and all the numerals you would have to work the key a total of 2 + 8 + 24 + 48 + 50
which is 132 key closures. No wonder you get tired after sending a long session with a straight key and you aren't in shape.

Now let's graduate to the old 'bug'. Historically the bug was invented before we had a lot of digital designers around who weren't
making the big bucks in computers. The bug was invented to speed up sending.

One Stroke --- E, I, S, H, 5, T
Two Strokes --- A, B, D, M, N, 6, U, V, 4, 6
Three Strokes --- F, G, K, L, O, R, W, X, Z, 3, 7
Four Strokes --- C, J, P, Q, Y, 2, 8
Five Strokes --- 9, 0

Again, totaling up the number of strokes we get 6 + 20 + 33 + 28 + 10 giving us the winning number of 87 motions. This is quite a savings over 132 strokes required for the straight key. Timing-wise it gave the operator considerable more accurate timing on the dits.
There is still a limit of human capabilities to send by hand each long element.

Then came along the first electronic keyer. Historically someone with more time and energy can research this one. My first keyer was the Hallicrafters TO keyer, some time ago for you young critters in the audience. No memory or fancy internal storage, just a plain two tube keyer that timed the dit and the dah well.

Now let's again go through our counting exercise but this time using only a single lever paddle used with an electronic keyer. Some of the better CW ops that I know still only use a single lever paddle. I can see that it closely approximates a bug in operation and it would be a much simpler transition to the new technology with a rapid learning curve. Here is the count that I get.

One Stroke --- E, H, I, M, O, S, T, 0, and 5
Two Strokes --- A, B, D, G, J, N, U, V, W, Z, 1, 2, 3, 4, 6, 7, 8 and 9
Three Strokes --- F, K, L, P, Q, R, X, Y

Wow!! That saved a lot. Totaling up the damages we get 9 + 36 + 24 for a total of 69 which again is a reduction from the previous two
methods that involved 132 and 87 strokes for their respective totals.

And then came the dual Iambic paddles and more sophisticated keyers. Often referred to as 'squeeze' keying since the physical motion of the fingers is like squeezing the two paddles together in sending a some of the characters. It matters not a hill of beans whether you are using mode A or mode B for the keyer.

One Stroke --- E, H, I, M, O, S, T, 0, and 5
Two Strokes --- A, B, D, F, G, J, K, L, N, Q, R, U,
V, W, Y, Z, 1, 2, 3, 4, 6, 7, 8 and 9
Three Strokes --- P and X

Now we have 9 + 48 + 6 for a total of 63 strokes with again a savings in strokes, but only about a 10 percent gain. It is enough, and we'll take all the help we can get.

So look at the totals again 132, 87, 69, and 63 for each of the methods of sending Morse. With the Iambic Keying you can save over 50 per cent of the work of using a straight key. Something to think about and wow your friends and neighbors with.

OK, now it's time to start practicing. Here I'm leaving you on your very own to do the work. Now I asked you to get a phone directory.
The reason? I want you to randomly open it to a page (oh, and use the residential pages and not the yellow pages (tm) if you have two or more as in the larger cities) and starting with the first name, address, and phone number of the page start sending line by line.
If you make a mistake, you have to start over with that line. Do this for about 15 minutes at a time and take a break. Do this for at least 30 minutes a day for a week. I know it's hard work but when you get to the point that you can do this in your sleep then you will forever be able to get on the air and sent flawless CW day in and day out without breaking into a sweat.

Maybe after a week of using the phone book then graduate to the newspaper each day. Just skip to a page and fire away on a random article. And for the real difficult text go to the sports section and do the stats. That'll help you memorize some of them if you are into that sort of thing. I am in awe of the human mind that keeps that stuff on hand.

OK, graduation time. If you have followed the above instructions and practiced dutifully then you are ready to get on the air daily. Of course, read the ARRL Operators Manual and review all on air procedures that you need.

All the best,

Chuck Adams, K5FO