SEMI-AUTOMATIC KEY ADJUSTMENT
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Although the use of electronic keyers is increasing, many C.W. operators would prefer to keep their "bugs", especially if they could make them perform as well as, or better than, keyers. The performance one gets with a bug depends greatly on the adjustment, and no amount of skill can make up for a poorly adjusted bug. It has been my experience that there is a tremendous lack of understanding among amateurs over the maze of adjustments found on most bugs. There is also the belief that the adjustments are solely for one's individuality, and we therefore hear a lot of signals with choppy dots, poor ratio of dot length to dash length, and poorly timed spacing between dot groups and dashes (e.g. "• • ———" for the number 'two').

The following will describe some techniques to use in adjusting your own bug, together with some hints on good character formation and better, error free sending.

GENERAL

Although different manufacturers have a few more or a few less adjustments on their bugs, most have the ones shown in the diagram in **Fig. 1**, together with various types of spring tension controls. Admittedly, some of these adjustments have to be made by trial and error according to instinctive feel, but we will outline the general objectives:

1.) To make dots of correct length with correct ratio of dot to space length.
2.) To prevent high frequency vibrations of the moving dot contact **F** with resultant scratchy dots.
3.) To prevent any other undue motion (unwanted bouncing) of the dot contact (**F**).
4.) To keep the time between dot groups and dashes down to its proper level (the length of one dot).
5.) Proper mating of contacts.

PROCEDURE

The first adjustments to play with are **C**, **D**, and **G** on the diagram. The damper arm, **G**, may be non-adjustable on some Vibroplex® bugs, in which case **D** should be adjusted as follows: clear **D**, **C**, and **E** away so that the arm comes completely to rest against the damper arm **G**. Then advance **D** so that it slightly pushes away the lever, but not enough to clear the arm away from the damper arm. The result is correct if, when the arm springs to rest against the damper arm **G** and **D**, there is absolutely no visible bounce. This is to ensure that when another group of dots is started, the arm is not still vibrating. If **G** is also adjustable, there is just this much more latitude in making the alignment.

With **E** still clear, adjust **C** for optimum distance between **D** and **C**. This is probably the most difficult adjustment to make because some experimenting is required. When the paddle is pushed for dots, the lever butts up against **C**, which sets up the oscillations of the arm. Moving the lever from **D** to **C** takes time, so that transforming from dashes to dots is faster, and therefore smoother, if the distance is kept small; but then, unfortunately, the arm does not gain enough momentum to make long slow dots. This is where many hams fail to make the best compromise, and end up with very poor dots at speeds below 25 w.p.m.

Since there is seldom any problem getting fast dots on a bug, it is best to start with the **D** to **C** distance quite large. This will feel awkward, but try it with the weigh set for the slowest possible speed after setting up the dot contacts. The moveable contact **F** on the arm should mate evenly with its counterpart **E**. After checking this, adjust so that **E** and **F** just barely short together after making a string of dots. Lock **E**, and now connect an ohm-meter across the bug terminals. While making a string of dots, the average deflection of the meter should be mid-scale = 10% for both slow and fast speed settings. The reading should be taken for the first five or ten dots only, because after that it will start to change, depending on the **E** setting. It is typical to have too low a reading and, hence, have choppy dots. Too high a reading will probably result in mushy dots. Of course, adjust the screw **E** closer or farther as required. In case your meter has a poor transient response, a good ear is the final check for this test.

Now if the arm oscillations die out too quickly with slow dots, **C** has to be adjusted to increase the **D** to **C** distance and, hence, the lever momentum. This is also true if the dots cannot be made slow enough, say 20-25, words per minute.

If **C** is changed, **E** must be re-set before further testing; and so these compromise the bulk of the adjustments which affect your fist. If **D** to **C** is too large, one will find it too difficult to switch from dots to dashes smoothly and vice-versa.

At this point another problem occurs with many bugs: contact **D** is usually mounted on a hairpin spring which sometimes has a high-frequency vibration visible after some dots are made when the arm comes to rest. This vibration will make the next dot scratchy, a good cure for this problem is to cut out a small cubicle of fine grain, soft, synthetic sponge and fit it snugly - but not too tightly - inside the hairpin behind the contact, so that the vibrations are damped out. Use a small dab of glue on the back side to hold it in place.

The dash contact spacing **B** can be set to personal preference. Too wide a spacing and too much spring tension will result in jerky dashes, while small spacing and low tension may cause an occasional joining of what was intended to be two dashes. Contacts should mate perfectly for maximum life and may be cleaned with good silver polish; or they may be lightly scuffed with the very slightly abrasive material used to clean relay contacts, if they have become pitted. **DO NOT** use emery paper or sandpaper, as these leave an unwanted residue on the surfaces and can also excessively wear down the surface.

OPERATING

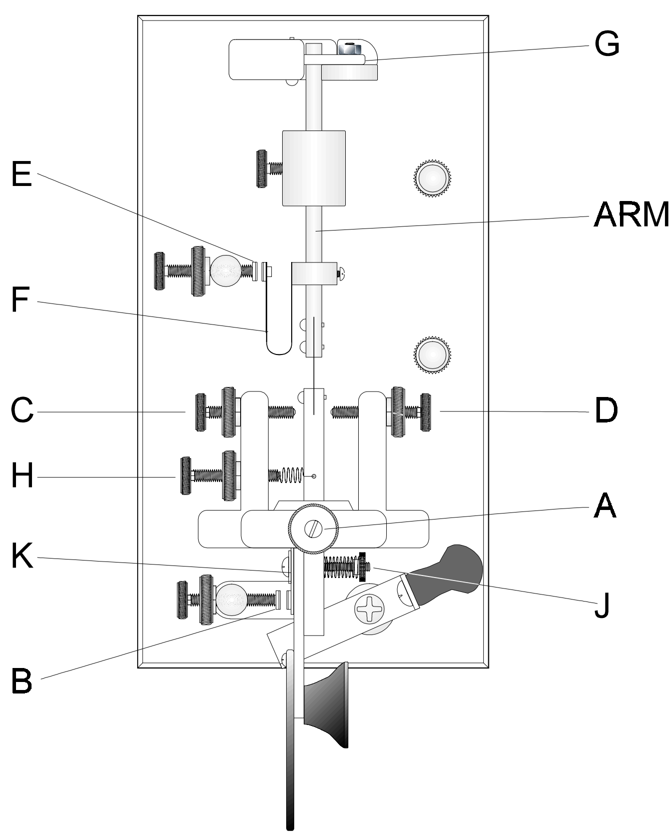
When using a bug, it is essential that it be firmly mounted, even if it is heavy and has rubber feet. It is sometimes inconvenient to attach it directly to the table top. If the table top is smooth, suction cups with protruding studs are available at hardware stores that can be stuck on the table around the sides of the bug, so that the studs keep the bug from sliding sideways.

The following will describe some ideas on how to send, at the risk of fiery disagreement from A1 operators across the land. Most surely, this is not the only way; but the basic ideas might lead one to recognize a weakness in his own method.

The hand should rest on the table, with the paddle located between the print of the thumb and the side of the index finger. Using the tip or the print of the index finger is all right provided the wrist action, not finger action, is maintained on dashes. Dashes should be made by rocking the wrist with the fore-arm resting on the table. No part of the hand, wrist or arm should feel constricted. When a row of dashes is made, the side of the index finger should remain in contact with the paddle, while the wrist is rocked back and forth, with no slipping on the table. This helps the continuity of the row, rather than hold the remaining fingers outstretched in midair, curl them under so that they may rest on the table. Most of this comes naturally; but it is mentioned to prevent beginners from starting off completely wrong.

There is a great tendency to set the dot speed too fast. Concentrate on sending good code at the slowest dot setting possible which should be a least down to 20-25 w.p.m.. A technique which produces amazing results is to send as slow as absolutely possible for one QSO, then, a fast as you are able for the next QSO. The effect of sending slow engrains good ration, spacing and general good form, while sending fast gives practice in timing and muscle control. I would strongly discourage leaving the speed control always set to the favorite spot, because this seems to lead to the freezing of bad habits, and definitely results in poor ratio when trying to vary the speed by varying the dashes only. On a bug, or keyer, variation of speed is the key to learning control.

For good practice, open up the telephone book as some page other than Smith, an send the names, addresses and phone numbers at slow, fast, slow, fast, ... speeds. Ten sets at 15 w.p.m. and 30 w.p.m. without one error is excellent. Those numbers are terrific practice for dashes!



A Main Pivot
B Dash Contact
C Dot Lever Stop
D Dash Lever Stop
E Dot Contact

F Dot Spring
G Damper Arm
H Dot Lever Tension
J Dash Lever Tension
K Dash Lever