

*IMPROVING the  
CALIBRATION and  
TUNING OPERATION  
of RECEIVERS HAVING a  
SLIDING - POINTER DIAL*

*by Bill van Schlaf*

Many people begin their SWling with portable or fairly inexpensive receivers. As they become more interested in selecting certain broadcasts, they discover some inadequacies of the so-called "slide-rule" dial. This term is applied since the mechanism usually consists of a pointer sliding either in front or in back of a fixed frequency scale (Knight 'Star Roamer, Heathkit SW717 & GR78, etc). The following article will deal with some of the things a listener can do for himself to improve the tuning operation and "read-out" accuracy of this type of receiver.

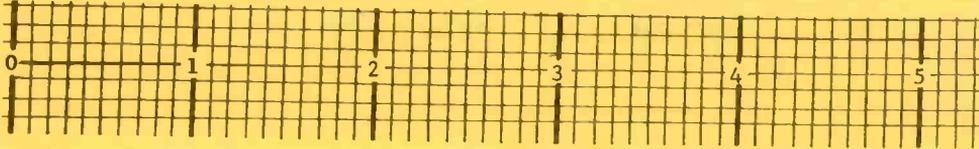
Before any dial accuracy remedies can be undertaken, a fixed reference must be established which involves removal of as much of what we'll call "slip", "slop", "backlash", and "drag"...for lack of proper technical terms. In other words, the operator must make sure the same station will appear on the exact same dial position every time, and that a minimum of mechanical hang-ups are encountered in doing so. This means a check of the tuning drive system is the first order of business.

The layout of tuning drives varies from one model to another, but basically they are all some form of cord and pulley system linking the main tuning control knob, the large variable capacitor (which electronically determines the reception frequency), and the dial pointer or indicator. Before removing the receiver enclosure to inspect this rigging, be sure to disconnect the power at its source!!...Even battery powered sets. Some less expensive equipment that runs on 110 volt "house-power" have little or no protection against a possible serious shock hazard; while an accidental shorting of components in any set could result in permanent damage....Better to be safe than sorry, as they say.



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Once inside the receiver cabinet, the first thing to do is to thoroughly inspect the tuning drive mechanism. Check to see that the drive cord is tight at all pointer settings (some models maintain tension by means of a spring). Next, check to see that all pulley and/or pointer mountings are tightly secure. Now rotate the main tuning control knob slowly backward and forward so that the pointer covers the entire dial span several times, taking note that:

(1) All pulleys are turning freely without "jerks". If not, use a dry lubricant at the points requiring attention. Special attention should be given to the bushing where the main tuning control shaft passes through the cabinet face. Be extremely careful not to put any lubricant on the drive cord or those parts of any pulleys that might come in contact with it. (Note: Never use oil for this type of lubrication, powdered graphite or one of the silicone lubricants is recommended).

(2) There should be no slippage of the drive cord in relation to rotation of the tuning capacitor. If slippage is noted, either tighten the cord or apply a "dressing" to it. Beeswax is quite good for this purpose, or candlewax (even soap) makes an effective substitute.

(3) Whatever sort of a guide or "track" is used to direct the pointer should be inspected for any friction points that might tend to impede smooth, even linear motion. If some rough spots are noted, smooth them out with fine sandpaper first, and then apply dry lubricant to the entire length of the "track"...again being careful not to allow any to get on the drive cord.

(4) Sometimes it is advisable to replace the drive cord if worn or frayed spots are noticed. Braided fishing line (not "monofilament") makes an excellent replacement, provided it has been pre-stretched beforehand by suspending a weight from it for several hours. Before restringing a new cord however, the cause for the wear on the old one should be located and eliminated first.

When satisfied the main tuning indicator mechanism is functioning at peak efficiency, take a look at the "bandspread" control (if the set has one). This will be a small variable capacitor usually mounted on the back of the front panel. When the control knob is at its mid point (most often 50°), the capacitor itself should be exactly half open (fixed plates at a 90° angle with the rotating plates). If not, the necessary adjustment can usually be made by loosening the knob set-screw.

The final item inside the receiver enclosure is the main tuning dial face. This should be rigidly mounted in such a manner as not to slip or move in any direction. Some models having the calibrations marked on a glass plate are especially prone to slight shifts in position...In this case, application of plastic tape at some out of the way points usually corrects the problem. This last check-out is perhaps the most important of all, because if the main dial shifts even slightly, it could result in a drastic variation of the calibration characteristics!!

Double check that everything that is supposed to be turning freely is doing so, and that everything that is supposed to be tight actually is, then replace the set in its enclosure. Be very sure all knob set-screws are solidly down and tight in the proper position. This completes the inspection and servicing end of it...next comes the actual tuning operation itself.

It is rarely the case with this type of receiver to find that the frequency references placed on the dial face are even reasonably accurate from one end to the other. For this reason, all measurements or determinations should be made using the "logging scale". Some less expensive sets are so equipped (usually with graduations from 1 to 100), some are not. In case your set does not have this feature, or if the scale provided by the manufacturer seems a little less adequate, the machine-divided strip across the top of pages 2 and 3 may be clipped off and pasted on the receiver dial. Other than numerical references, this strip has no intermediate indices and may therefore be modified to suit nearly any application. In mounting the strip, it is not important that "0", "10", or any other reference be placed at any certain point...Just be sure the entire span of the tuning pointer falls somewhere within the length.

6                      7                      8                      9                      10                      11

The next step is to prepare a graph, or "curve", so that the logging scale readings may be translated into frequencies:

- (1) Switch on the set (if it's a tube-type, allow 20 to 30 minutes for "warm-up").
- (2) Set the "bandspread" control exactly at the mid point, and do not re-adjust it during the following procedure.
- (3) Tune several stations of known frequencies, recording the exact logging scale reading for each one. (See Figure 2).
- (4) After recording a number of stations across the entire dial span, take out some graph paper and plot them off. (See Figure 3). Connecting the plotted points will produce a "curve" which may later be used to determine the frequency of unknown transmissions simply by reversing the procedure. It is also suggested that these curves (one for each "band" on the receiver dial) be upgraded for more accuracy as time goes on by adding plots for other stations of known frequency.

Now to the "bandspread". At best, on this type of receiver it should be considered as a fine-tuning control. After preparing your graphs, tune one of two known-frequency stations that are fairly close together. The bandspread should remain at mid-setting until the first station is squarely tuned in. Then, without touching the main tuning, rotate the bandspread until you pick up the second. The difference in control readings between mid-point (first known station), and the present value (second known station) will represent the actual frequency difference, and a reference can be established. However, this ratio will hold true for only a very small segment of the dial!! At least one such "reading" should be taken for each of the several broadcast bands, and the results recorded for reference along with the graphs.

When starting out on a DX tour, you will now have a fairly accurate means of frequency determination using the logging scale along with your prepared graphs, plus the added advantage of being able to "compute" the frequency difference between known and unknown stations (provided they both fall within the 90° rotation range of the bandspread). If you have also "serviced" the mechanism as outlined during the first part of this article, you will have probably increased the ability to "fine tune" without difficulty as well, and it may be safe to assume you will be obtaining the maximum tuning performance possible from this particular set. It would be misleading to imply that following these procedures will bring "read-out" capabilities associated with more sophisticated gear, but certainly they should result in a significant improvement over what the manufacturer had originally provided.

FIGURE 2

| STATION | FREQ  | LOG SCALE |
|---------|-------|-----------|
| BBC     | 9510  | 5.6       |
| RSA     | 9650  | 5.8       |
| ETLF    | 9725  | 6.0       |
| WWV     | 10000 | 6.3       |
| NHK     | 11705 | 8.4       |
| BBC     | 11860 | 8.5       |

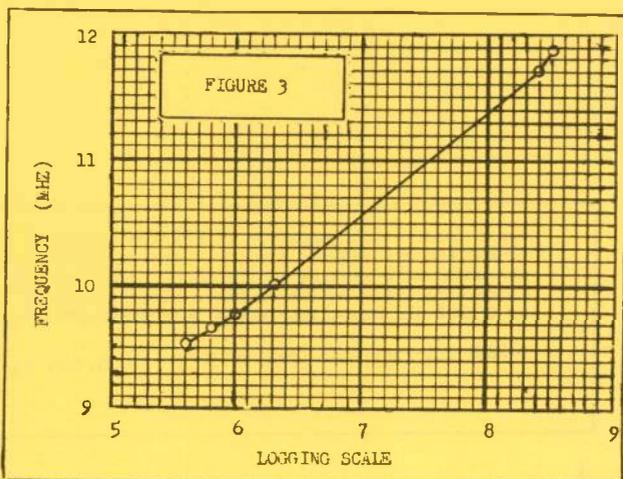


FIGURE 4. Example of determining bandspread/frequency ratio.

| <u>Station</u> | <u>Frequency</u> | <u>Logging Scale</u> | <u>Bandspread</u> |
|----------------|------------------|----------------------|-------------------|
| R South Africa | 9705             | 7.45                 | 50                |
| HCJB           | 9715             | 7.45                 | 60                |
| <hr/>          |                  |                      |                   |
| Difference:    | 10 kHz           | -0-                  | 10                |

Therefore, each bandspread graduation represents 1 kHz ...on this particular portion of the dial.

One point which was not touched upon earlier is the use of a "crystal calibrator". This is an electronic device that will supply an audio "marker" at exact frequency increments.. usually 100 kiloHertz. These may be easily added as an outboard accessory. Prices range upward from around 9 or 10 dollars, and they are available either fully-assembled or in kit form from almost any radio supply outlet. A calibrator can be a very useful addition for frequency determination on less expensive sets, but since it seems to be the pattern for SWLs to "move up" to more elaborate equipment as they gain experience, it is suggested that each person weigh for himself the value of adding a calibrator to their present set against the possibility of a future purchase of another receiver already equipped with one.

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