CABLE ADDRESS "ARLAB"

LONGACRE 5-1300

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The Hammarlund Manufacturing Company, inc.

460 WEST 34TH STREET · NEW YORK 1, N.Y.

Dear O.M.

This letter was painstakingly prepared in an effort to pass along the experience gained in using the HC-10 Converter during the past few months. The HC-10 is really a "box of tricks" capable of making any reasonably good receiver out-perform even the most expensive presently available receivers. Obviously, if the old receiver is not stable and, therefore, guilty of excessive drift, the HC-10 will show this up with a vengeance, due to the excellent selectivity and especially the skirt selectivity the HC-10 provides.

Like any other device capable of the multi functions of the HC-10, a little experience is necessary, in order for the operator to be able to take full advantage of the more or less "magic" that can be accomplished with it.

P.1 In the first place, the use of the HC-10 completely eliminates the need of the beat-frequency oscillator the receiver is equipped with. Under these circumstances, the beat-frequency oscillator in the receiver should be disabled, either by pulling the beat-frequency oscillator tube out of its socket or, in the event the receiver uses a dual purpose tube, the BFO section of this tube should be made inoperative, by removing B+ from it. By doing this, you avoid the possibility of having two beat frequency oscillators working against one another, and at the same time, will have the additional advantage of using the receiver in the manual RF gain control position or, the AVC position for all forms of reception including CW. If the receiver is equipped with a switch that disables the BFO and at the same time provides the choice of AVC or manual RF gain control the above may be disregarded. The selector switch on the HC-10, will henceforth be employed for the selection of AM/MCW - CW/SSB.

P.2 For best results on single-sideband reception using the HC-10 Converter, the BFO control knob should always be used in the straight up or zero position. This will result in your obtaining maximum low frequency response from the sideband signal when the band-pass tuning control is employed, as the final adjustment for good speech intelligibility. Should you desire to sacrifice a little low-frequency response, this can be accomplished by setting the beat-frequency oscillator, plus or minus one kilocycle, depending on which sideband is being employed. Usually, for best sounding single-sideband or more natural reproduction, assuming the transmitter is putting this out on the air, the BFO of the HC-10 will be at or near the zero position.

P.3 For the best CW response, the beat-frequency oscillator should always be offset by 500 to 1000 cycles especially, if the 500 cycle bandwidth position of the HC-10 is employed.

P.4 Before going any further, it is absolutely essential, that the tuning instructions or initial adjustments of the HC-10 be made to the exact intermediate frequency of the receiver, if the full advantages of the HC-10 Converter are to be obtained. Even though your receiver is supposed to have a 455 kc I.F. system, when you initially install the HC-10, follow the procedure outlined in the instruction manual for peaking the input of the HC-10 to the exact I.F. frequency. This is the first adjustment; then adjust the center frequency of the slot filter to agree to this particular I.F. Naturally, if the receiver has an I.F. other than 455 kc, you will have to make the adjustments previously referred to before you will obtain any kind of response from the converter. Obviously, the warning applies to a receiver supposedly set at the same I.F. that the HC-10 has been factory adjusted to, namely 455 kc. This warning is prompted, since a one or two kilocycle variation between the receiver I.F. and the input circuit of the HC-10 will effect the performance of the HC-10.

P.5 Once the center frequency of the slot filter has been properly set, immediately rotate this control knob to extreme left or right so as to prevent the slot filter from rejecting the center frequency or desired signal. Only rotate knob towards center to remove QRM.

P.6 Since, the use of the HC-10 converter in no way disturbs the performance of the receiver to which it is connected, the increased selectivity and other advantages of the HC-10 will become very apparent if two loud-speakers or one loud-speaker with a switching arrangement is employed, to transfer the one speaker from the output of the receiver, to the output of the HC-10. If the receiver by itself is used to tune in for example, an AM phone signal, and also assuming that the slot filter and input tuning adjustments have been made properly, when the AM signal is being approached the "S" meter will start to read and you will begin to hear the AM phone speech. If at this time, the speaker is switched to the output of the HC-10 the chances are, that you will not hear this signal. Of course, you will hear the signal if it is tuned to exact resonance. You will not hear the signal if it is a few kc off of the resonance, with the "S" meter reading, but not peaked. This is a very excellent demonstration. Not only does it show the improved selectivity but also the excellent skirt selectivity of the HC-10. This is also, quite apparent by rocking the tuning dial of the receiver very slightly, where on the normal or average receiver very little if any difference will be noticed, except possibly a slight one or two "S" unit variation in the "S" meter. With the HC-10 in operation the chances are, that the signal will completely disappear under the same circumstances, depending of course, on the bandwidth adjustment of the HC-10.

P.7 The writer has found it possible to remove practically all heterodynes, on AM phone signals by using the following technique. Assume you are listening to an AM phone signal with a heterodyne on it. The first adjustment to make is to use single side-band technique. In other words, put the HC-10 switch in the upper or lower side-band positions, using the one that results in the most rejection of the heterodyne, then merely put the slot filter to work

and the chances are that what is left of the heterodyne can be either greatly attenuated or removed entirely. In some cases, when single side-band technique is employed on an AM signal, unless the AM signal has been tuned to exact resonance in the first place, you may find that upon switching side-bands that you will loose the signal. This is only because you have favored one side-band when making the initial tuning adjustment, so obviously, when you change to the other side-band you are far enough off of resonance to either loose the signal or obtain distorted AM response. It is also for this reason, the initial tuning adjustments on the HC-10 are so important.

P.8 When tuning in CW signals obviously, if the HC-10 is employed in the 500 cycle bandwidth position, tuning with the average receiver dial, including some bandspread tuning dials will be very difficult, due to the extreme selectivity or narrow bandwidth. It is, therefore, desirable to tune in the desired CW signal using the 1 or 2 KC bandwidth position. When the desired signal is tuned in, for best performance of the HC-10 the sideband switch should be in the upper sideband or extreme left position, when the selectivity switch is in the .5 kc or 500 cycle position. The use of the 500 cycle bandwidth position will improve the signal to noise ratio in view of the extremely narrow bandwidth, and at the same time the usual loss in gain will be conspicuous by its absence. In other words, practically all other devices that the writer has played with, have exhibited a loss of gain in the maximum selectivity position. This is not true with the HC-10 if the CW signal is peaked properly.

P.10 In some receivers, the type 6SG7 tube is employed as the last I.F. amplifier tube. When this tube is plugged into the octal adapter and re-inserted into the receiver socket, this particular tube type becomes unstable. This is due to the higher Gm of this particular tube and the fact that when the cathode choke is added, this tube type may oscillate. The solution is a simple one, merely replace the 6SG7 tube with a 6SK7 in the octal socket adapter or in other words, use the 6SK7 to replace the 6SG7 that was formerly employed. This will remove any instability and also avoid any re-alignment of the receiver, since the interelectrode capacity of these two tube types are almost identical. The only noticeable difference, will be if the particular receiver is used by itself, a slight loss of gain may be noticeable. Since the chances of your using the receiver by itself, when you are using the HC-10 is rather remote, this phenomena is only being mentioned for clarification purposes.

P.11 In addition to the above, the following information will also be applicable whenever the HC-10 input is adjusted to a higher I.F. in the 500 kc region. Under these circumstances, since you will be retuning the front end of the HC-10 by quite a wide range (40 to 50 kc) it is quite possible to run into the image of 60 kc when making this adjustment. Care, therefore, must be taken to avoid the input of the HC-10 being tuned to the image response, which will result in lower gain and output. Obviously, the image will be weaker than the desired response, therefore, if this phenomena is experienced, the stronger of the two responses is the correct one to use. We are confident, the image response problem will only be contended with, when it is necessary to tune the input of the HC-10 to 500 kc as is the case, with Collins 75A1, A2 and A3 receivers. Slight deviations from 455 kc to, for example, 465 kc, will call for only a very minor adjustment of the input tuning slug, therefore, the chance of running into the image response is rather remote. This phenomena should however be remembered.

P.12 On all receivers equipped with variable selectivity such as the old Hammarlund Super Pro's or even the Hammarlund SP-600, the bandwidth of the receiver should be adjusted to a maximum of 5 or 6 kc. On practically all of the SP-200 series BC-1004, BC-779, etc., this will usually result in the bandwidth control being set straight up or approximately 5 kc position. This will usually correspond with maximum "S" meter response. To employ the receiver itself in a wider bandwidth position when used with the HC-10 does not make sense, in view of the 6 kc bandwidth limit possible on the HC-10. The main reason for this mode of operation is to prevent a strong adjacent channel signal from swamping the AVC of the receiver, which would result in a decrease in gain and other possible undesirable effects.

In closing this letter, the writer feels that he still has a lot to learn about the tricks possible with the HC-10 Converter. There is also a good possibility, that a little experience on your part with the HC-10 just spent in playing with it and observing the different effects, not only will you be able to master this "gismo" but you will undoubtedly find many new tricks that will add to your enjoyment of using this "box of tricks". 73

Very truly yours,

THE HAMMARLUND MANUFACTURING CO., INC.

Frank Lester, W2AMJ
Commercial Products

FL:fg

P.S.
The information regarding the 6SG7 tube applies particularly to the Collins 75A1 receiver and, the chances are it will apply wherever the 6SG7 tube type is employed.