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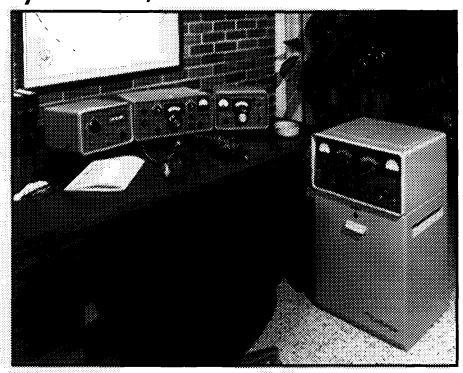
COLLINS S-LINE/KWM2 DIAL ASSEMBLIES - Part 3

by Ed Brooks, W5HTW ed.brooks@worldnet.att.net



*This is the third and final part of a multi-part article by **Ed W5HTW**.*

X. DIAL ALIGNMENT

Now the dials are mounted on the PTO shaft, and the PTO is mounted correctly. Be sure the lower bolt and nut in the front escutcheon is tight (remove the knob to check it.)

It is time to start dial alignment, the final step in mechanical operations (we may still have to do electrical alignment, if you rotated the shaft beyond the stop-tab.)

1. Using the tuning knob, rotate the dial to its maximum CCW position.
2. Check that the black dot on the front plate is at about the 11 0'clock position in the tuning window.
3. Rotate the back, numbered, dial plate (if necessary) so that the zero is directly centered beneath that black dot. You may have to use a small screwdriver with a flat blade to turn the back dial, while holding the shaft assembly with a pair of narrow pliers. The point now is to keep the PTO shaft against its physical stop, and not let it slip past it, and to keep the front dial stationary, while allowing you to position the back dial.
4. With that dial at zero, install the nylon idler gear. Remember how it came off? Reverse that. Be very careful not to move either dial, or the PTO shaft, more than one tooth width of the dials.

Note: Early idler gear assemblies consisted of the gear, the bushing, two washers, and the bolt. On later assemblies, there is a brass or metal disk affixed to the gear, to serve as a guide for the front dial. This disk fixes the problem of the front disk slipping off the idler.

5. That "loose" bushing allows the nylon gear to be positioned differently. The specification calls for a 30 to 80 percent gear mesh with the dial plates. You will have to judge that mesh. Too much pressure by the idler gear and you will find binding, and the dial will jump gear. Too little pressure and you will find the assembly not accurate at all.
6. This takes a good eye. Observe how close to the front of the idler gear the front dial plate meshes. On my unit it was too close, and any warpage, caused by overtightening those three or six dial plate mounting screws, would force the front dial plate to ride off the front of the idler gear. Consequently every time the knob is turned, the numbers change. Ideally, the dial plates should ride in the middle of that nylon gear. On newer units, though, with the protective disk, this is not as critical, as the disk prevents the front plate from jumping teeth.

ALMOST THERE!

7. Correction can be made by loosening the two set screws on the dial assembly and gently moving the dial further from, or closer to, the front panel of the radio. This is not easy unless the dial mechanism is really loose on the shaft. The easiest way to do it is to firmly grip the PTO shaft with narrow pliers (I used some miniature locking pliers I had) then loosen the two screws, and rotate the dial assembly CLOCKWISE slightly while applying pressure to push it back on the shaft. Once you are sure it is aligned, rotate it back so the black dot and zero are at the 11 o'clock level, and tighten the set screws.

Note: If you allowed either dial plate to slip off the nylon gear, you have to remove the nylon gear and reposition the two dial plates as in steps 2 and 3, above.

8. With everything in place, rotate the tuning knob, taking the dial through its entire range of revolution. If you hear clicking sounds, or feel high spots or binding, the nylon idler gear is probably not meshing sufficiently. You will probably have to remove it and again repeat steps 2 and 3, (don't forget to rotate the assembly back to the black dot and zero points!) If it works smoothly, you are basically done.
9. Now it is time to check electrical operation. Before doing so, I set the radio on the table and spent a good five minutes rotating the dial through its range, using the tuning knob. It worked smoothly and correctly.

There are those who will tell you that you should not center the zero at the black dot, but should offset it to the right. The object is to make the dial center at the 100 mark. However, I found on mine that it is so close throughout its range, if I center the zero beneath the black dot, my 100 mark is almost dead center, and my 200 mark is very readable.

10. Install the zero set plate, with the two small philips screws.
11. Set the dial zero set to the middle vertical position.

XI. FINAL ADJUSTMENT

Mechanically you are almost - not quite, but almost - done!

1. Reinstall all tubes and tube shields.
2. Connect a dummy load to the radio. (If this is a transmitter)
3. Connect the power supply.
4. Turn on the radio and allow it a half hour to warm up.

XII. ADJUSTMENT

With the radio warm, rotate the dial from one end of its rotation to the other. At vertical center, in the CCW position, the zero should appear to the left, by about eight kilohertz. At the high end of the dial, fully CW (clockwise) the 200 mark should be to the right of the vertical fiducial, by about the same amount, eight kilohertz. However, these settings are not critical at this time.

Now perform electrical (frequency) alignment. Briefly, the procedure is described as follows.

In this issue...

Send us a picture of your shack, your callsign, and any shack information and we may use it in a future issue of the *Signal*. Just mail it to the CCA address shown on the bottom of page 3.

COLLINS S-LINE/KWM2 DIAL ASSEMBLIES - Part 3 *(continued from page 1)*

by Ed Brooks, W5HTW

Top View - KWM-2

A. RECEIVER

You need an external frequency source of known accuracy for this first step. If you are certain the PTO did not rotate past the tab-stop, you can use the receiver's crystal calibrator, but if you have any doubts, use an external source. Tune that source to the low end of the operating band you have selected, then tune the receiver dial to that location, at the zero point. For my "frequency standard," I used an Icom 706.

Start at the low end of the tuning range. In our instructions, we will use the 14.2 MHZ band. Start at the point that would be 14200 KHZ. If you are using an external signal source, set it to that frequency.

1. Check that the "0" (zero) on the back dial plate is under the black dot on the front dial plate.
2. Remove the nylon idler gear. As precisely as you can, align the "0": under the black dot. Do this by holding the dial assembly hub stationary, and rotating the back dial plate by hand.
3. Replace the idler gear.
4. Find the signal at 14200 KHZ by tuning the tuning knob. Zero beat the signal, in either SSB position.
5. Be sure you can approach the zero beat from either direction. From zero beat (pay no attention to what the dial actually reads in doing this!) you should be able to tune down by approximately 8 KHZ marks on the dial. While eight KHZ is somewhat arbitrary, anything over 10 KHZ is too much, and anything under 5 KHZ is too little. You should reach the PTO stop before you go farther down. If you can not tune approximately 8 KHZ below zero beat with the signal, you will need to adjust the tuning slug on top of the PTO to move the signal upward so you can achieve that range. Before doing so, go to step 6.
6. Set the tuning dial to 14400, the high end of that range. Set your signal source to 14400 KHZ. Find the signal by tuning around that area. Zero beat the signal, notice the dial mark, and then tune above that mark, moving in an upward direction. You should be able to tune at least 8 KHZ above zero beat before hitting the mechanical stop. You may be able to tune more.
7. The object here is to shift the position of the PTO tuning range so that you can tune approximately the same number of KHZ below the 14200 zero beat as you can above the 14400 zero beat. This will take a lot of moving from one end to the other, and carefully adjusting the tuning slug on top of the PTO to move the signal where you want it. When completely done, you should actually be able to tune from around 14190 to around 14410, in rotating the PTO from stop to stop.
8. Rotate the tuning knob until the dial is set at 14300 KHZ. The "100" should be under the vertical fiducial.
9. Set your signal source to 14300. Note: If you have determined that the 14200 signal from your signal source can be tuned in at the low end of the receiver's tuning range, 14100, you may now use the crystal calibrator for your signal source.
10. Zero beat the 14300 signal. Don't reset the zero-set knob. If the zero beat is with the dial at "100" under the pointer, you do not need to do more than check end points. Go to step 16. If not centered, proceed to step 11.
11. Remove the nylon idler gear.
12. Loosen the two set screws in the dial hub, holding the hub to the PTO shaft. Leave your source signal on, so that if you accidental move the PTO shaft you will be immediately aware of it.
13. Rotate the entire dial hub assembly - be sure not to let one dial plate rotate more than the other! - until the "100" mark is under the zero-set pointer. If the dial plates slip a little, realign them so that the "100" is under the center mark of the front dial, and is also under the zero set pointer.
14. Tighten the set screws in the dial hub.
15. Reinstall the nylon idler gear, being sure it is meshed correctly.
16. Now tune to the low end of the tuning range and find the calibrator signal at 14200. It will probably be located below the indicated zero on the dial. With it zero beat, move the zero-set knob until the pointer is over the "0" on the dial.
17. Tune to 14400 calibrator signal. Zero beat that signal, and check that the zero-set pointer can be set to that point.
18. If at either end, the zero-set fiducial can not be turned enough to reach the correct point, "0" or "200" you will have to shift the PTO frequency up or down slightly. Since it will certainly reach one or the other of the two points, you will be shifting the PTO range in one direction. If, for example, the pointer can not be set to zero at the low end of the dial, but can be at the high end, you must shift the PTO frequency upward. If the pointer can not be set to 200 at the high end of the dial, but can be at the low end, you must set the PTO frequency downward.

Once you have moved the PTO (adjust the slug only about one half turn, of 180 degrees, at a time) you must again return to the 14300 center point and start from step 8, above, and repeat the process. Unfortunately, it may take several tries, but unless there is damage to your PTO, or the internal inductor has been modified, you will achieve the following capability: With the "100" mark on the dial exactly centered vertically in the center of the dial window, and the fiducial pointer exactly vertical, you will be able to set the pointer at the "0" or "200" marks at the end of the dial.

19. If you have NOT had to shift the PTO frequency, in other words, if you have not had to adjust the slug on top of the PTO, you probably do not have to do the VFO Shift alignment. However, if you have had to turn that slug, you must check VFO Shift alignment. Even if you have not moved the slug, you would be well advised to check VFO Shift.

For all VFO alignment and VFO Shift adjustments, refer to your Collins Instruction Book (Owner's Manual - you do not need a service manual for these adjustments.) If you do not have that information, I will be glad to supply it upon request, as quoted from my own Collins Instruction Book.

B. TRANSMITTER

The principal is exactly the same. After completing all dial disassembly, cleaning, reassembly, and mechanical alignment, go to electrical alignment. Remember, be sure the transmitter is in TRANS VFO mode for all electrical or frequency alignment, otherwise it isn't even on!! Disconnect the receiver's XTAL OSC cable if you are using it in full transceive. The transmitter must be in completely standalone operation for VFO alignment.

Now the transmitter becomes the signal source, and the receiver (again, in my case I used an Icom 706) as the monitoring device.

Use a good dummy load, or remove the screen voltage jumper, to remove screen voltage from the final. You may also remove the high voltage rectifier from the 516F2 power supply. The driver should generate a signal which can be heard in the external source. If you are using the transmitter with a Collins receiver, you want to defeat the muting circuit. On the 75S series that is as simple as switching the radio to OPR instead of leaving it in standby. The antenna relay will still be switched so you do not tune the transmitter into the receiver's input.

In swinging from 14200 to 14400, you will have to repeak the Exciter control throughout the range in order to generate a signal that can be heard in a separate radio. You may also wish to connect a wire to that external radio receiver (use an insulated wire, please!) and lay it across the top of the transmitter as a pickup wire.

Once you have completed dial and PTO alignment with the transmitter, you MUST do the VFO Shift alignment in the Collins Instruction Manual. Unlike the receiver, there is an additional step here, in unbalancing the carrier, then balancing it again when you are done. ALL DONE. Check your work.

C. FINALLY.

Before putting the radio back into its cabinet, I chose to operate it for approximately two hours outside the cabinet. This gave it a good workout. Once I had completed that, I removed all power, then placed the radio back into the cabinet. I hooked all the cables up, turned the unit on, put the TRANS VFO on, and allowed it to all sit for another hour, to build up heat within the cabinets. Then I tried the VFO knob. There was slippage. Not bad, but it was there. The heat had caused some changes. This was very easily corrected by simply adjusting the eccentric bushing, and this should be the only correction needed, unless your radio actually needs new parts.

Thanks. Remember, this is MY experience. It is not "Collins Approved" and may not reflect what others have done. I made it very detailed, as I got several requests from people who claimed to know absolutely nothing at all about the dial system. For those more experienced, this procedure could be cut down considerably, but I'd like to help everyone, not just the experts.

If you attempt this, and run into problems, feel free to let me know. I may want to include your problems and solutions in a future version.

I'd like to thank John, WA5VVT, and the others who gave me valuable info when I was stuck. Pay attention to the Angelfire web site, and check out the WA3KEY web site as well. Remove all power before working on radio equipment! Check your work.

Please Note: ***Some of the techniques and technical information discussed in the Signal are controversial and we invite you to share your knowledge and experience with us. Please send your letters and comments to the Editor.***

At the Mic with KW6KW

Sandy Meltzer
President, CCA

Please join me in welcoming Gayle Lawson K0FLY as a new member of the CCA Board of Directors. Gayle works at Rockwell Collins in Cedar Rapids and replaces Bill Standerfer W0GM who had to step down because of family and business commitments. Our best wishes to Bill and our thanks to him for serving on the CCA Board of Directors.

Don't forget to make your reservations for the CCA's Annual Awards Banquet to be held at the Dayton Hamvention on Friday, May 18th at 7pm at the Dayton Marriott. Please check the CCA web site for the latest information about our various CCA-sponsored activities at the Hamvention... including Banquet and membership meeting. If you don't have access to the Internet, just mail your banquet check for $35 per person to the CCA mailing address shown at the bottom right of this page.

Thanks to Larry WA9VRH and all of the Net Control Stations that have helped make our new monthly AM Night a great success. Fire up those old Collins AM transmitters and join the fun the first Wednesday night of each month on 3885 at 8pm CST.

Larry WA9VRH and I have continued to add new material to the Collins Archives on the CCA web site. The files are in .pdf format which are easily printed once downloaded. Please check out the Collins Service Bulletins, Service Information Letters and other unique Collins-related material now availalble...we have lots more coming!

73, Sandy

Join Us on the Air!

- Sunday 14.263 mHz at 2000Z
- Tuesday 3805 kHz at 8pm CST
- Thursday 3875 kHz at 8pm CST
- Friday (West Coast) 3895 kHz at 10pm CST

Sunday for Technical, Buy, Sell and Swap.
Tuesday, Thursday and Friday for Ragchew.

Visit the CCA web site at:
www.collinsradio.org

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My Elmer

by Dutch Maurer, WB7DYW

I was 6 at the time but I remember it like it was yesterday, we were driving down a new street to a new house and I was not happy about it, I didn't know anyone here and all of my friends were clear across town at my old school.

As we pulled into the driveway I saw my new home for the first time and knew I wasn't going to like it here. Standing in the front yard I couldn't help seeing a tower in the next yard that went clear up to the clouds and it was loaded with wires and junk hanging from it, I remember saying "what a mess". The old man in the yard was neatly coiling a garden hose on a hanger on the garage and I ask him "Hey mister what's that for?" pointing to the mess of wires on the tower and he motioned me to come over, as I followed him into the garage and over to a corner there was a desk with some old radios on it, he sat down and started clicking switches. As the old dials slowly began to glow, and the smell of old tubes filled the air, I didn't know if I liked it or not. He looked at me and his wrinkled old face found a bit of a smile and he said "Well lets see who we can talk to today" his hand was shaking when he started working his key da-dit-da-dit da-da-dit-da the speaker crackled to life and there was another fool I guess answering him...boring!

He could see I wasn't impressed and soon opened a drawer and pulled out a hand microphone and plugged it in, after working the dials and checking the meters we were ready again (Well at least he was). CQ CQ CQ he called and again the old speaker crackled to life and someone was answering him, he talked for a while and then I heard him say "I have a visitor in the shack today do you have a minute to say hello" as he handed me the microphone I remember him saying the mans name and then he said "He is in Paris France" suddenly my heart started pounding and my hand was shaking as I took the mic from him, WOW Paris.

I ran home to tell my mom that I just talked to a man in Paris and her answer was "Sure honey now wash up for supper" we were both in disbelief but I was hooked, I spent a lot of time over there in the following years, he gave me an old receiver to listen with and many a night I fell asleep listening to CW and hoping to pass the code test soon. One day after school I went over and the radios were strangely quiet and the garden hose was hung on the garage for the last time, I never knew his real name he just told me to call him Elmer and every time my speaker crackles to life I remember him and the thrill of ham radio, it's still there. Well I see we have a new neighbor moving in next door and there is a small boy in my yard looking up at my tower, he looks like he has a question.

CCA Equipment Auction

by John Bess, WA5VVT

The CCA is offering the following list of CCA owned Collins equipment for BID to its members. Non-members are welcome to bid, but please add $20 to your bid to cover CCA membership.

The money from the sale of this equipment will be used to help support the CCA's extensive Collins Radio archiving program now in progress. No bid is too low! :-)

All bids MUST be received no later than 2:00 pm Central time on 10 May 2001. Bids will be accepted on the TOTAL package as well as on the individual pieces within the package. This equipment is located in Michigan and while local pick up is preferred, it can be delivered to Dayton during the Hamvention the weekend of May 18th. If you cannot pick up this equipment either in Michigan or Dayton, ALL shipping charges will be your responsibility. This will also include a fee for the current custodian to manage the shipping details.

KWT-6 Modules
Writing Shelf 518-0153-2548
SWR Indicator Head 522-1696-0047
(2) Air Plenum
Air Blower HD-347/U1583
Air Blower HD-347/U104
Power Supply (High Voltage) PP-2153
Power Supply (High Voltage) PP-2153
Power Supply (Low Voltage) 429B-1425
Power Supply (Low Voltage) 429B-1110
Audio Control Panel 159B-2162
Audio Control Panel 159B-2758
Side Band Generator 786F-1852
Side Band Generator 786F-1138
Frequency Generator 786-E1869
Frequency Generator 786-E1663
Power Amplifier AM-2061 URT1165
Power Amplifier AM-2061 URTD15
Antenna Network 180U-291
Antenna Network 180U-276
CW/FSK Unit CV-730/URC638
CW/FSK Unit CV-730/URC26
Handset Adapter C-269/URC1572
Frequency Comparator CM-126/UR1583
(2) Junction Box & Interconnecting Cables
KWT-6 Type 5 Transceiver Instruction Book

Bids are to be submitted either in writing or by Email to: wa5vvt@troi.csw.net
or send your bid to:

John Bess WA5VVT
17661 Ponderosa Dr.
Springdale, AR 72764

REMEMBER, ALL bids must be received NO LATER than 2:00 pm Central time on 10 May, 2001. Thank you for supporting the CCA!

Editor's Operating Desk

by H Michael Crestohl, W1RC/VE2XZ
Editor, The CCA Signal

Welcome Spring! It's been long overdue! This winter has been especially miserable here in New England and from what I hear all over the country. Lots of ice storms to bring down antennas as well as tons and tons of the white stuff made the winter pass slower than usual. Fortunately that seems to be over and done with for yet another year as we are now seeing the return to warmer weather. Spring always means Hamfests to me and in particular, the Dayton Hamvention! I don't know if rooms are still available at the time of this writing but you can check our Collins reflector, web site, or on the CCA nets. Another fine banquet is being organized for Friday night and it is anyone's guess what will happen this year. Those of you who were at last the banquet last year will remember the fine "roasting" of John WA5VVT! Who knows whose turn it will be this year? At this time I cannot say for certain whether or not I can make Dayton this year but I'm trying! I look forward to seeing many old friends and making a few new ones too. There is a lot of material for this issue of THE SIGNAL so I won't add to the noise level with any more extraneous comments. If you have any ideas or stories that you'd care to share with up please feel free to e-mail me at w1rc@amsat.org or telephone (802) 658-9554. Remember that this is YOUR organization and you can only expect to get out of it what you put in.

See Bob Heil, K9EID at the CCA Banquet. Bob is our featured speaker. Come join the fun!

In the Shack

John Van Egmond, KI6ZS
John is interested in collecting and operting Collins amateur radio gear and doing minor repairs to keep them running.