



Cedar Rapids, Iowa telephone : area code 319, 365-8411 cable : COLINRAD

AMATEUR SERVICE AGENCY BULLETIN NO. 1011 DATE: 6-26-63
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EQUIPMENT TYPES: 32S-1,-2,-3, 75S-1,-2,-3,-3A, KWM-2,-2A, 312B-5, 399C-1,
 62S-1

SUBJECT: MAIN TUNING DIAL ASSEMBLY AND ASSOCIATED PARTS

With the addition of new products to our amateur line and revision in our original S-line equipment, the dial parts list included in Amateur Service Agency Bulletin No. 1007 has become obsolete.

A new, up-dated and expanded list has been prepared and in addition to this list the description and part number of the knobs used on all major units has also been included.

The attached description of amateur product dial assemblies and adjustment procedures should also be very useful and time saving.

<u>Escutcheons</u>	<u>Part Number</u>
62S-1	548-9277-004
KWM-2	553-5701-004
KWM-2A	553-5702-004
32S-1	553-5703-004
32S-2	553-5704-004
32S-3	553-5705-004
75S-1	553-5707-004
75S-2	553-5708-004
75S-3	553-5709-004
75S-3A	553-5710-004
312B-5	553-5711-004
399C-1	553-5712-004

Dial Parts for 32S-1,-2,-3, 75S-1,-2,-3,-3A, KWM-2,-2A, 312B-5, 399C-1

<u>Fiducial (Calibration Line)</u>	<u>Part Number</u>
Disc	543-8093-003
Drive Shaft	543-8042-00
Shim	331-7000-00
Bracket, Retaining	544-3128-002
Screw	343-0297-00
Internal Shakerwasher	373-8500-00
<u>Main Drive</u>	
Shaft	548-9326-00
"C" Ring	340-0025-00
Shim	331-9001-00
Panel Bushing	543-8035-00
Hex Nut	334-4030-00
<u>Dial Assembly</u>	546-7829-004
Consists of:	
Dial, Graduated	543-8033-002
Dial, Numbered	543-8034-002
Nylatron Drive Ring	546-7823-004
Screw	320-0008-00
Washer, flat	543-5577-003
Washer, split	310-0274-00
Washer, spacing	543-8084-002
Hub Assembly, Aluminum	543-8076-002
Setscrew	335-0022-00
Washer, felt	543-8104-002

<u>Idler</u>	<u>Part Number</u>
Gear, pinion	545-6002-002
Bushing	545-6000-002
Washer, flat	545-6025-002
Screw	343-0282-00
Washer, split	310-0076-00
<u>Dial Parts for 62S-1</u>	
Dial Assembly	548-9269-003
Dial Mask (hair line)	548-9237-002
Main Tuning Shaft	548-9235-002
Washer, shim .005 (4 ea.)	331-5020-00
Retaining Ring	340-0025-00
Bearing	543-8035-00
Hex Nut	334-4030-00
Escutcheon	548-9277-00
Washer, Lock #4 (3 ea.)	310-0296-00
Nut, Hex, 4-40 (3 ea.)	313-0156-00
Screw, 4-40 x 1/2	319-0044-00
Screw, 4-40 x 7/16	342-0155-00
<u>Knobs</u>	
<u>62S-1</u>	
Function, R-F Gain, Meter	543-8039-002
Main Tuning	543-8041-00
Exciter Tuning, PA Tuning	543-8044-00
Xmit Gain	381-0160-00
Loading Lever, Bandswitch Lever	548-9270-003

<u>32S-1,-2</u>	<u>Part Number</u>
Main Tuning	543-8041-00
Fiducial	543-8078-002
Setscrew	328-0005-00
VOX Gain, ANTI-VOX Gain, VOX Time Constant	281-0069-00
Freq. Control, Mic Gain, Band, Emission, Meter	543-8039-00
Exciter Tuning	543-8044-00
PA Tuning	543-8043-00
Loading Lever	544-3148-002
Band, Small (32S-2 only)	544-7268-00
Setscrew (32S-2 only)	328-0019-00
<u>32S-3,-3A</u>	
Fiducial	543-8078-00
Setscrew	328-0005-00
VOX Gain, ANTI-VOX Gain, VOX Time Constant	281-0069-00
Freq. Control, Mic Gain, Emission	543-8039-00
Band	544-0779-004
Setscrew	328-0473-00
Loading Lever	544-3148-002
Exciter Tuning	544-8044-00
PA Tuning	544-8043-00
CW Cal	553-2557-002
Band, Small (32S-3A only)	544-7268-00
Setscrew (32S-3A only)	328-0019-00
Spinner Knob	553-5787-003

<u>75S-1,-2</u>	<u>Part Number</u>
Fiducial	543-8078-00
Setscrew	328-0005-00
Off/On, R-F Gain, Band Emission	543-8039-00
Preselector	543-8043-00
AF Gain	543-8044-00
Band, Small (75S-2 only)	544-7268-00
Setscrew (75S-2 only)	328-0019-00
Main Tuning	543-8041-00
<u>75S-3,-3A</u>	
Fiducial	543-8078-002
Setscrew	328-0005-00
Off/On, Emission	543-8039-00
BFO	548-9321-00
Setscrew (2 each)	335-0041-00
Rejection Tuning	548-9325-00
Setscrew (2 each)	335-0041-00
AGC Switch Lever	548-9342-002
Preselector Pointer	543-8088-002
AF Gain	548-9322-00
RF Gain	543-9335-004
Band (75S-3 only)	543-8039-00
Band (75S-3A only)	544-0779-004
Setscrew (75S-3A only)	335-0041-00
Band, Small (75S-3A only)	544-7268-002
Spinner Knob	553-5787-003
Preselector	543-8043-002

<u>KWM-2,2A</u>	<u>Part Number</u>
VOX Gain, ANTI-VOX Gain, VOX Time Constant	281-0069-00
Fiducial	543-8078-002
Setscrew	328-0005-00
Off/On, Mic Gain, RF Gain, AF Gain, Emission	543-8039-00
Band (KWM-2 only)	543-8039-00
Meter Lever	281-0330-00
Band, Large (KWM-2A only)	544-0779-004
Band, Small (KWM-2A only)	544-7268-002
Spinner Knob	553-5787-003
Exciter Tuning	543-8042-00
PA Tuning	543-8043-00
Loading Lever	544-3148-002
<u>312B-5</u>	
Fiducial	543-8078-00
Setscrew	328-0005-00
Wattmeter	543-8039-00
Levers (3 each)	544-2852-00
Spinner Knob	553-5787-003
<u>399C-1</u>	
Lever	544-2852-00
Spinner Knob	553-5787-003

DESCRIPTION OF S-LINE AND KWM-2 DIAL ASSEMBLIES
AND THEIR ALIGNMENT PROCEDURES

Tuning of the amateur equipment vfo is accomplished through the use of two separate adjustable components. These are:

1. The calibrating fiducial with the red calibrating line.
2. The dial assembly which includes two dial discs mounted on the vfo shaft.

The calibrating fiducial is driven by rotating the zero set knob located in the upper right-hand corner of the black escutcheon. Driving torque is transmitted to the fiducial through a set of two friction drive washers, one washer bearing on either side of the fiducial near the top edge.

In the event that the fiducial becomes bound or its operation becomes irregular, the following adjustment procedure should be performed:

1. Loosen the setscrew on the zero set knob using a No. 4 Bristo wrench.
2. When the knob is turning freely on the drift shaft, rotate no fewer than five complete turns, at the same time pressing it lightly against the escutcheon. This allows the friction drive washers to center themselves with respect to the fiducial and, at the same time, keep the end play at a minimum.
3. Tighten the setscrew in the knob, and check the operation of the fiducial.

If the above procedure does not improve the operation of the fiducial, replacement parts are probably needed, and further checks should be made by factory personnel.

The two dial discs of the dial assembly are, in addition, two gears. The number of teeth on each of these gears is not equal, and when they are brought into mesh with a common idler, as is done in the S-Line and the KWM-2, relative motion between the two dials is produced. This motion is used to mask out one of the two sets of numbers printed on the rearmost dial, thus allowing two revolutions of the assembly over a bandwidth of 200 kilocycles. This arrangement makes it possible to double the space between two consecutive kilocycle graduations and, therefore, permits more accurate tuning of the vfo.

Improper mesh of the idler pinion with the dial discs may cause the dial to malfunction in one of the following ways:

1. Too great a mesh will prevent the dial from being driven by the tuning knob or may cause it to hesitate as it is being driven across the range.
2. Too little mesh may cause the proper relative position between the two dials to be lost.

In the event one of the above symptoms is present, the following procedure should be performed:

1. Dismount the light bracket by removing the two black oval-head screws from the top of the escutcheon. In the KWM-2, an additional self-tapping screw must be removed from the extreme left side of the light bracket, as viewed from the front of the radio. This will expose the idler for visual inspection.
2. Check the mesh between the idler and the dials while rotating the dial. The proper degree of mesh is from 30 to 70 percent.
3. If necessary, adjust the position of the idler by first loosening the Phillips-head mounting screw through the hub until the idler can be moved freely, and then hold the idler in the desired position while the screw is being tightened.
4. If the relative position between the two dial discs requires correcting, the idler must first be taken out completely and then replaced after the proper position of the dials has been obtained.
5. Before the light bracket is replaced, the calibration of the dial must be checked with the calibration signal and corrected if necessary. For adjusting the 75S-1 and the KWM-2, rotate the vfo shaft for zero beat against the crystal calibrator signal. The 32S-1 transmitter calibration may be set by placing the transmitter FREQ. CONTROL in the SYNC position and tuning for zero beat against the receiver indicated frequency.

The dial assembly, which includes the two dial discs, the black nylatron drive ring, and the aluminum hub, is assembled with six 0-80 screws whose heads are visible on the back of the aluminum hub. If these screws are not properly tightened, the dials may be free to turn relative to the oscillator shaft and, hence, cause the dial to drift out of calibration. If these screws require tightening, carefully make the following check.

On older units of the S-Line and the KWM-2, an all-nylatron drive ring was used. These units can be identified by the absence of split lock washers under the 0-80 screw heads and by the presence of blue liquid varnish (Blue Glyptal) applied as a liquid stake.

On newer units of the S-Line and KWM-2, a drive ring with an aluminum outer rim is used. These units can be identified by the presence of split lock washers under the 0-80 screw heads.

On the older units, the screws must be lightly tightened - repeat - lightly - and then liquid staked or cemented. It is recommended that each screw be removed individually to place a drop of liquid staking on the threads and then re-inserted.

On the newer units, a minimum of seven inch-ounces of torque must be applied when tightening the screws. No liquid stake or cement is required.

Seven inch-ounces will tighten screws properly. Seven inch-ounces of torque is approximately equal to maximum force which can be applied to these screws with the small to medium sized flat blade screwdriver which would be used on them.

If the dial operation continues to be erratic after the above adjustments have been performed, no further corrective action should be attempted by the operator. Special equipment and some experience are required to carry out any further adjustment and/or repair.

The installation of new dial parts requires a complete understanding of the dial mechanism and its operation. The tools that are required are a Phillips-head screwdriver, No. 4 and No. 6 Bristo wrenches, a 3/16 spin tight or wrench (pliers), a long-nose pliers, and a thin bladed small cabinet screwdriver. The new parts are lubricated before they leave the factory, and no further lubricant should be applied.

The dial assembly used in the S-Line and the KWM-2 is driven by the drive washers mounted on the tuning knob shaft. The principle of the drive can be demonstrated by placing the raised inner diameter of the black nylatron drive ring between the two sets of drive washers. By rotating the tuning knob shaft between the fingers, it is possible to feel the transmitted torque in the dial assembly held in the other hand.

The procedure followed while installing the new parts will consist of three distinct parts. These are:

1. Disassembly.
2. Installation of New Parts, Alignment, and Reassembly.
3. Calibration.

The disassembly operation will involve removing the light bracket and the oscillator from behind the dial. When this is done, access to the dial itself is possible. The final step in this operation will be the removal of the black plastic escutcheon from the front panel of the receiver. At this point, replacement of the old parts with the new will begin.

To read and interpret the newly assembled dial, it is necessary to calibrate it using signals of a known frequency. This will be the final step of the installation procedure.

Following is a step-by-step description for each of the procedures.

1. Disassembly
 - 1.1 Remove the chassis from the cabinet by removing the four rubber feet and the single Phillips-head screw from the bottom of the cabinet and the two Phillips-flathead screws which are under the lid at the front of the chassis. Pull the chassis forward out of the cabinet.

- 1.2 With the chassis right-side up on the bench, remove the 6AU6 tube from the top of the oscillator chassis and other tubes mounted in the immediate vicinity of the oscillator. This will eliminate the possibility of breaking them and provide added working space.
- 1.3 Remove the two black oval-head screws from the top of the escutcheon (the black dial face plate located in the center of the front panel). In the KWM-2, an additional self-tapping screw must be removed from the light bracket at the extreme left, viewing the radio from the front.
- 1.4 Pull the light bracket straight back until it is free of the screws and adjacent components, and place it to one side on the chassis. It is not necessary to remove any electrical connections.
- 1.5 Loosen the two setscrews on the dial hub, using a No. 6 Bristo wrench.
- 1.6 Remove the two self-tapping screws which hold the oscillator assembly to the chassis.
- 1.7 Keeping the dial pressed toward the front of the unit with one hand, carefully pull the oscillator assembly back until the oscillator shaft clears the dial hub. Set the oscillator back out of the way. Remove the dial, and set it to one side. It is not necessary to remove any electrical connections.
- 1.8 Remove the tuning knob by pulling it, firmly, straight away from the front panel.
- 1.9 The fiducial is the clear plastic sheet with the red calibrating line. This is held in position by an aluminum bracket at the rear of the escutcheon. Remove this bracket by removing the two Phillips-head mounting screws.
- 1.10 Remove the idler assembly by removing the Phillips-head mounting screw which passes through the hub, and set it to one side.
- 1.11 Remove the zero set knob by first loosening the setscrew with a No. 4 Bristo wrench.
- 1.12 Push the fiducial to one side, past its stop, and pull the zero set knob shaft through from the rear of the front panel. Leave the shim washers in place on the shaft.
- 1.13 Remove the flathead screw next to the tuning knob shaft, and remove the escutcheon by pulling it straight out from the front panel. DO NOT LOOSEN THE LARGE NUT ON THE PANEL BUSHING.
- 1.14 Remove the snap ring from the tuning knob shaft at the front of the escutcheon, and pull the drive washer assembly through the panel bushing from behind the escutcheon.

- 1.15 Remove the shim washers and snap ring from the drive washer assembly, and place on the new drive washer assembly in the same order.
2. Installation of New Parts, Alignment, and Reassembly
 - 2.1 Mount the new drive washer assembly in the escutcheon in the reverse order of step 1.14.
 - 2.2 Remount the escutcheon on the front panel in the reverse order of step 1.13.
 - 2.3 Remount the zero set knob and the fiducial in the reverse order of steps 1.11 and 1.12, making sure that the fiducial passes between the two sets of washers. Make sure that the fiducial operates freely and with a minimum of end play before tightening the setscrew on the zero set knob.
 - 2.4 Remount the fiducial bracket in the reverse order of step 1.9. A small amount of Artgum eraser or beeswax placed on the end of the screwdriver will aid in holding the screws in place on the tip while they are being replaced.
 - 2.5 Mesh the raised inner diameter of the black nyatron drive ring with the drive washers. This operation can be viewed through the inspection hole in the hub. Use care and make sure the ring surface seats in the space between the drive washers.
 - 2.6 Holding the dial in position, insert the oscillator shaft through the hub and into the nylon bushing in the front panel. Turn the dial by rotating the tuning knob shaft to make sure that the dial is being driven. Tighten the setscrews onto the oscillator shaft.
 - 2.7 At this point, the oscillator must be aligned so that no side load is applied to its shaft due to misalignment with the nylon bushing in the panel.

Viewing the radio from above, visually align the front surface of the oscillator chassis with the front panel, and replace the two self-tapping screws which mount the oscillator to the chassis. As a check, turn the radio over, and observe the alignment of the dial assembly with the front panel. The front surface should be parallel with the panel.

- 2.8 Loosen the two No. 6 nuts at the rear of the oscillator chassis until the oscillator moves freely on the mounting bracket. Set the radio with the panel facing up, and rotate the tuning knob until the oscillator centers on the mounting bracket. The oscillator should now be aligned horizontally (step 2.7) and vertically. Very carefully tighten the two No. 6 nuts, and set the radio back in an upright position.

- 2.9 Once again, loosen the two setscrews in the dial hub until the dial assembly is free to turn on the oscillator shaft. Rotate the tuning knob no fewer than eight complete revolutions to allow the dial assembly to seat itself axially with respect to the drive washers. Do not tighten the setscrews at this time.
- 2.10 Adjust the fiducial until the red line is vertical, and then align one of the 10-kc marks behind the red line. Directly behind this, align the center digit of a three-digit number.
- 2.11 Carefully mount the idler assembly, refer to step 1.10, making certain that the dial alignment is not disturbed. Make sure that the washer behind the idler gear lies between the fiducial and the clear plastic dial.
- 2.12 Rotate the dial by turning the tuning knob shaft, and check for interference between the idler and the dial. If there is interference loosen the idler mounting screw and pull the idler away from the dial. Tighten the mounting screw and recheck. The mesh should be from 30 percent to 70 percent during complete revolution of the dial assembly.
- 2.13 Replace the tuning knob.

3. Calibration.

- 3.1 Tighten one of the setscrews on the dial hub, and rotate the dial counterclockwise until it comes against the stop.
- 3.2 Loosen the setscrew, and rotate the tuning knob counterclockwise holding the oscillator shaft stationary, until the dial has passed 6- to 7-kc marks past the 0 mark. Tighten both setscrews.

(To align the numbers so they appear centered in the window may also be accomplished by rotating the dial assembly in the proper direction a few complete revolutions with the setscrews securing the hub to vfo shaft loosened to allow free rotation. The numbers will automatically center in the window.)

- 3.3 Rotate the dial clockwise until it comes against the stop. Check whether the dial has come to a stop at approximately an equal number of kilocycle marks past 200 as it had past 0. If not, readjust as outlined in step 3.2 until the dial comes to a stop at equal points past the 0 and 200-kc marks.
- 3.4 Final calibration of the dial is accomplished as follows:
 - a. Replace the 6AU6 and other tubes removed.
 - b. Make the external power connections
 - c. Adjust the zero set until the red line of the fiducial is vertical

- d. Turn on the receiver, and rotate for a zero beat against the 100-kc calibrator. For the 32S-1, place the FREQ CONTROL in the SYNC position, and rotate for a zero beat against the receiver indicated frequency. If the dial calibration is excessively to the left or right, loosen the setscrews in the aluminum hub, and rotate the vfo shaft slightly for a zero beat condition with the hairline in a more nearly vertical position. Retighten both setscrews in the aluminum hub. Check the calibration of the dial mechanism; the frequency calibration accuracy should be within ± 1 kc after midband calibration at the 100-dial marking.
- 3.5 Remount the light bracket in the reverse order of steps 1.3 and 1.4.
 - 3.6 Remount the chassis in the cabinet in the reverse order of step 1.1.

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