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202B-1

PROCEDURE FOR REPLACING MECHANICAL DRIVE CABLES ON MODEL 202B

The photographs and drawings included here, are for the identification of parts mentioned in these notes and to aid in carrying out the instructions. If difficulties are encountered, please write to the factory Service Department, describing your troubles and giving the serial and type numbers of your instrument.

GENERAL:

A complete set of replacement drive cables for the 202B consists of:

- 1 15" main drive looped on one end.
- 1 11" main drive looped on one end.
- 2 10" capacitor drive looped on one end.
- 2 sets of 4" and 4-1/2" cables connected with 1/2" coil spring with all ends looped.
- 4 clamping eyelets.

The basic principle of operation of the drive assembly can be seen by carefully studying the illustration in fig. 2. Briefly, the two cables (27) and (35) are connected to the lateral drive shaft pulley (30) and held in tension by the helical spring (24). Radial motion is transmitted to capacitor banks, (1) and (17), through the capacitor drive pulleys (5, 10, 18, and 20).

The right hand bank (1) is driven through pulley (5) which clamps to the turned down shoulder on pulley (30) by means of a set screw (6).

Motion is thence transferred to the lower pulley (10) by means of the cables (7) and (12).

The left hand bank of capacitors is rotated in a similar manner by a shaft (42) which is clamped in the center of the drive pulley (30) and again in the center of the upper drive pulley (18).

When properly aligned, all four capacitor banks move simultaneously as the panel frequency control is rotated.

REMountING OF DISLODGED CABLES:

It may be necessary to remount the cables due to the dislodging of the cables from the pulley troughs. This condition is usually the result of shipping

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damage or by the frequency control being rotated violently against the stops or by the controls being forced against the tuner shipping blocks. These wooden blocks are installed to prevent the swinging of the capacitor banks during shipping and must be removed before attempting to turn the frequency control.

If the cables do not show abrasion or worn spots, they may be remounted, necessitating only a slight adjustment of the frequency calibration. However if the cables need replacement, complete recalibration may be necessary.

Tools required for this Operation:

A pair of long nose pliers with electrical tape wrapped around each jaw to prevent damage to the cable, a screwdriver similarly padded, a Phillips screwdriver and a #8 and a #10 allen wrench.

PROCEDURE:

1. Remove top cover by removing 4 screws at the rear of the instrument.
2. Examine cables to see which one is dislodged or damaged. If the cable in question is accessible without further disassembly, remount cable in the following manner.

REMOUNTING OF DISLODGED MAIN DRIVE CABLES:

The cables (27) and (35), (fig. 2) counterbalance each other and are kept at proper tension by the coil spring (24).

Make a scribe mark on hub (23) and shaft (43) to indicate their relative position.

In removing either of these cables, it is necessary to relax the tension by loosening the set screw (22) to enable the hub (23) to rotate clockwise, thus slackening the cables. The cables may now be remounted on their respective drums and pulleys, as shown in fig. 2.

To restore tension, rotate hub (23) counter-clockwise until the two scribe marks line up and tighten set screw (22).

CAUTION: Do not disturb the set screw (32) as this holds the position of the main drive cable relative to the frequency dial.

3. If the cable or cables to be replaced or remounted, are not accessible, remove the mechanical drive assembly (together with the front panel) from the instrument.

REMOVAL OF DRIVE ASSEMBLY:

1. Remove four Phillips-head mounting screws from the corners of the front panel.

2. Disconnect the eight wires connecting the assembly to the instrument.
3. Remove front panel and mechanical drive unit,
4. Place the assembly right side up on the bench with the front panel away from you. Place the front panel in a bench vise or block up the assembly in a level position. You are now ready for the replacement or remounting of the cables.

Clockwise or counter-clockwise, right or left when referred to, in this sheet, are with the unit in the above position.

REMOVING MAIN DRIVE CABLES:

In removing either (27) or (35) it is necessary to release the tension by loosening set screw (22) as explained in preceding section. Remove the screws holding the cable ends and the cables can be taken from the instrument. Before removing cables, examine each one carefully to determine the manner in which it was mounted. Any sharp edges or projections that might wear the cables, should be removed with a file or sandpaper.

REPLACING MAIN DRIVE CABLES:

With capacitor drive set to the high frequency stop, attach un-looped end of the 11" cable under the head of screw (36) on pulley (30). Wind the cable 1/4 turn, toward the front panel, on the large diameter groove and then wind clockwise on drum (33). Insert a 4-40 x 1/8 round head machine screw (34) through the loop in the cable and attach to drum.

With capacitor drive still at the high frequency end, attach un-looped end of 15" wire cable under the head of screw (29) on pulley (30). Wind cable 2/3 turn on the small diameter groove in the opposite direction from the other cable and then wind counter-clockwise 1-1/2 turns around the idler (28). Bring the cable counter-clockwise around drum (25). Secure the loop in the cable to the drum with a 4-40 x 1/8 round headed screw (26).

Hold the drive firmly against the high frequency stop. Insert #8 allen wrench into set screw (22) and rotate hub (23) 1/2 turn in a counter-clockwise direction and tighten set screw. Rotate drive from end to end about a hundred times to make sure cables wind properly on drums and to take the stretch out of the cables.

The length of cables given here, are before the ends have been looped.

In case the replacement cables are the new plastic impregnated type, they will require a different technique as explained in section entitled INSTALLATION OF CLAMPING EYELETS ON CABLE ENDS.

REMountING OF DISLODGED CAPACITOR DRIVE CABLES:

The procedure is the same for the right and left capacitor drives. The description here deals with the right side.

The cables (7) and (12) are counter-balanced by the tension of the small coil spring on cable (7).

Should the (12) cable become dislodged, procede in the following manner: With the frequency control turned to about midway on the frequency dial, hold the upper pulley (5) rigid. Rotate the lower pulley (10) so as to stretch the coil spring slightly. The resultant slack in cable (12) should permit remounting. When the cable is in its place, release the lower pulley to re-establish the proper tension.

WARNING: Do not disturb set screw (6) which anchors pulley (5) to drive pulley (30) as relationship of capacitor drive pulleys to main drive pulley, will be disturbed.

Reference to fig. 2 will make the remounting of cable (7) a simple procedure.

Rotate the tuning control several times, to ensure proper operation of remounted cables.

Although it is unlikely that the calibration of the instrument has been disturbed, it is advisable to recheck the unit as explained in the REALIGNMENT section.

REPLACEMENT OF CAPACITOR DRIVE CABLES:

Remove cables (7) and (12) on right hand side, in the following manner:

1. Remove panel and drive assembly as described in the section on remounting of cables.
2. Unsolder one end of heavy bus wire, connecting the right hand capacitor bank with the left hand bank.
3. Scribe match marks across pulleys (30) and (5).
4. Loosen allen set screw (6) which clamps pulley (5) to the shoulder of pulley (30).
5. Remove two mounting screws and washers holding the left end of the right hand capacitor bank to the casting. Remove nut and washer holding the right end of this bank to the casting.
6. Carefully remove capacitor bank from the instrument and stand it on its right end with the pulleys up.

7. Take out screws (11) and (13) and remove the 10" cable (12) from the instrument.
8. Slip the unlooped end of the replacement cable through the hole in pulley (5). Pull it through and run it through the hole in pulley (10).
9. Make a loop in the unlooped end, using the mounting screw as a form and solder the cable, or in the case of the plastic impregnated type cable, install the clamping eyelet.
10. Wind the cable as shown in fig. 2 and fasten the ends with their mounting screws (4-40 x 1/8 round head machine screw.)

The coil spring on cable (7) consists of two lengths of cable joined by a small coil spring.

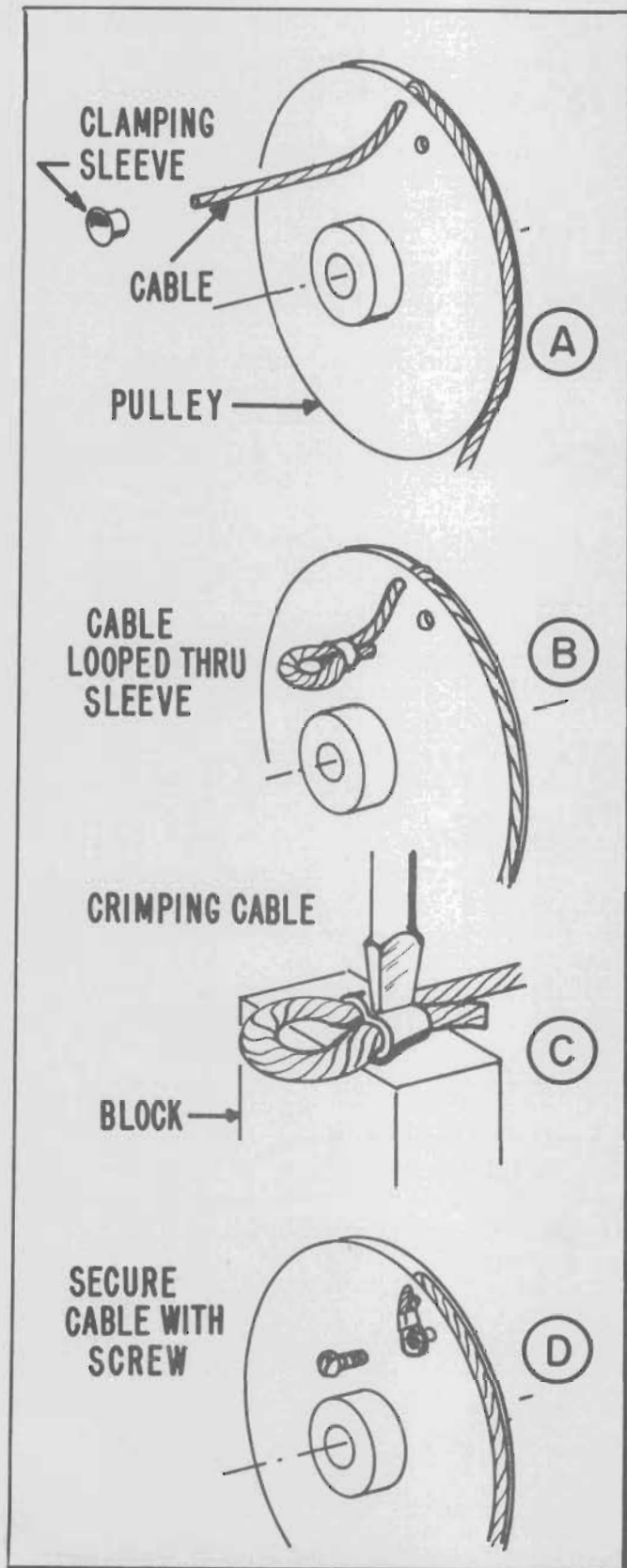
1. Remove the cable by removing the two mounting screws (8) and (9).
2. Install the replacement cable with the longer, 4-1/2" section down and the 4" section at the top. Both ends of this cable are looped ready for installation.
3. Wind the cable as shown in fig. 2 and fasten the ends with the mounting screws (8) and (9).
4. Place the capacitor bank back in its proper position against the casting, with pulley (5) over the shoulder of pulley (30). Replace and tighten mounting screws and nut, line up scribe marks on the two pulleys and tighten set screw (6).

To remove the capacitor drive cable (7) or (12) on the left hand capacitor bank, it is necessary merely to remove the mounting screws (8) and (9) or (11) and (13) and remove the cable from the instrument. In this case, it is not necessary to dismount the bank from the casting. In installing these cables, the same technique may be used, as outlined in the instructions for the right hand side.

OLD MODELS:

In certain older models, the tuner consists of three sets of four-gang capacitors instead of the current four sets. In this model (type no. 102747 and earlier) the technique of replacing drive cables is the same, except that the right hand capacitor drive cable is not included, therefore, the removal of the right hand capacitor bank from the casting is not necessary.

INSTALLATION OF CLAMPING EYELETS ON CABLE ENDS.



New type cables are constructed of plastic coated copper woven wire with a stainless steel core, and cannot be satisfactorily soldered.

These cables, together with the necessary clamping eyelets, may be obtained from the factory. They are supplied with one end already equipped with a clamping eyelet, and the other end bare so as to permit it to be threaded through holes provided in pulleys. (See fig. 2.)

Fig. 1a at left shows bare end of cable threaded through hole in pulley and eyelet ready for installing.

Fig. 1b at left shows cable end looped back through eyelet ready for crimping. Size of loop and length of end protruding from eyelet should be the same as the other end of the cable.

Fig. 1c shows method of crimping cable eyelet. Tap lightly with a small plastic headed hammer until eyelet is flat, then add a center groove as shown, by means of a screwdriver and a hammer.

Fig. 1d. Cable is now properly clamped and may be attached to the pulley using a small screw.

WARNING: If the cables are made of the uncoated material, the clamping eyelets will not hold. The unlooped end may be formed around the mounting screw, folded back upon itself and soldered.

Fig. 1.

MECHANICAL ALIGNMENT

If the relationship of the various capacitor banks and drive pulleys has been maintained, the frequency calibration of the instrument will be a simple matter; otherwise the procedure will become more complex.

The instructions here are for the unit with the four sets of four gang capacitors.

1. Be sure that the stop arm, located in back of the dial, strikes the pin before the capacitor rotors strike the frames in either the closed or open position of the tuner. If this does not occur, loosen the set screw which holds the shaft of the offending capacitor. Rotate the capacitor so that its relative position is the same as the other banks and retighten the set screw.
2. When the banks are open all the way, the space between the rotors and the capacitor frames should be approximately the same. However, if there is a slight difference, this should not be corrected until the frequency calibration has been checked. The unit may have been calibrated in this condition originally. Any alteration of this relationship may cause poor tracking of the frequency dial.
3. If the left hand bank does not have the same relative position as the right hand bank, loosen the set screw (6), holding pulley (5) to the shoulder of pulley (30), turn the left hand bank to its proper position and retighten set screw (6).

FREQUENCY CALIBRATION:

The unit should be left on for at least an hour before the calibration should be attempted.

Equipment required for this operation:

An insulated, non-metallic screwdriver
 A small metal screwdriver
 A #8 and #10 Allen wrench
 A suitable patch cord
 A frequency standard such as an -hp- Model 524A, 524B, 522A or 522B.
 An oscilloscope may be used, in conjunction with an -hp- Model 100A, 100B, 100C, or 100D.
 An AC voltmeter (400A, 400B, 400C, 400D, or 410B)

1. Set the range-switch panel knob to "X100" and the frequency dial to "5", (bottom of dial.)
2. With a 1000 ohm resistive load across the output terminals, connect the output to an AC voltmeter and to your frequency measuring setup.

3. Set the output voltage to a reference point on the meter.
4. Turn the dial to "5" (top of dial).
5. By adjusting the trimmer capacitor (C22) the output voltage may be brought to the same reference level on the meter and at the same time, the frequency should be brought on calibration at this point on the dial.
6. If flattening the output does not bring it on frequency, check the calibration at the middle of the dial. The calibration may be off the same amount. In this case, remove the main tuning knob (top one) and loosen the four #10 allen screws holding the dial to the hub. Change the dial's position, relative the hub, until the calibration is approximately on at the middle of the dial.
7. Set the calibration on at the top of the dial with trimmer (C22). In doing so, you may be unable to flatten the output frequency response. If this is the case, adjust the value of the fixed capacitor (C2) and try again.

CAUTION: This capacitor must be of high quality, such as a silver mica ceramicon. The slightest leakage here will cause an error in calibration, especially on the "X1" range.

8. Check the calibration all over the dial and on all other ranges. If the calibration is consistant on all ranges, turn back to the "X100" range. Any error in calibration may now be corrected by bending the plates in the tuning capacitors.

BENDING PLATES:

1. On "X100" range, check calibration at the top of the dial. Set on if necessary, with (C22) as before.
2. Check "3" on the dial. If it is off calibration here, bend the plates to bring it on. If the frequency comes in too high on the dial, bend the outer rotor plates of each section, where they are meshed, away from the stator plates. Try to bend each plate the same amount. If the frequency comes in too low on the dial, the plates should be bent in. Use caution here to make sure that the plates do not short out.
3. Turn to "2" on the dial. If necessary, do the same here, making sure that you do not disturb the adjustment at "3" on the dial.
4. Check at "1", ".7" and ".5" on the dial. Bend the plates if necessary. Do not attempt too large an adjustment with this method. If the dial tracking is too far off, slip the dial on the hub again and start over.

RANGE-SWITCH ADJUSTMENT:

Check the calibration at the bottom of the dial on all ranges. One or more of the ranges may not line up with the others. In this case, change the value of the 1/2 watt padder resistors in series with the precision range-switch resistors for those particular ranges. You will find that increasing the resistance will bring in the frequencies higher on the dial. The range switch resistors are in matched pairs. Do not make too great a change in the resistance of one side. This unbalance will change the relative output voltage for this range. The padders on both sides can be changed, thus maintaining the proper balance.

LAMP CAPACITOR:

Check the calibration at the top of the dial on the "X10K" range. The calibration is set on at this point by adjusting the value of the lamp capacitor (C7).

The technique of aligning the old three-gang-capacitor model is essentially the same, except that in this version, two trimmer capacitors are provided, facilitating the simultaneous adjustment of both the frequency and the output voltage at the top of the dial.

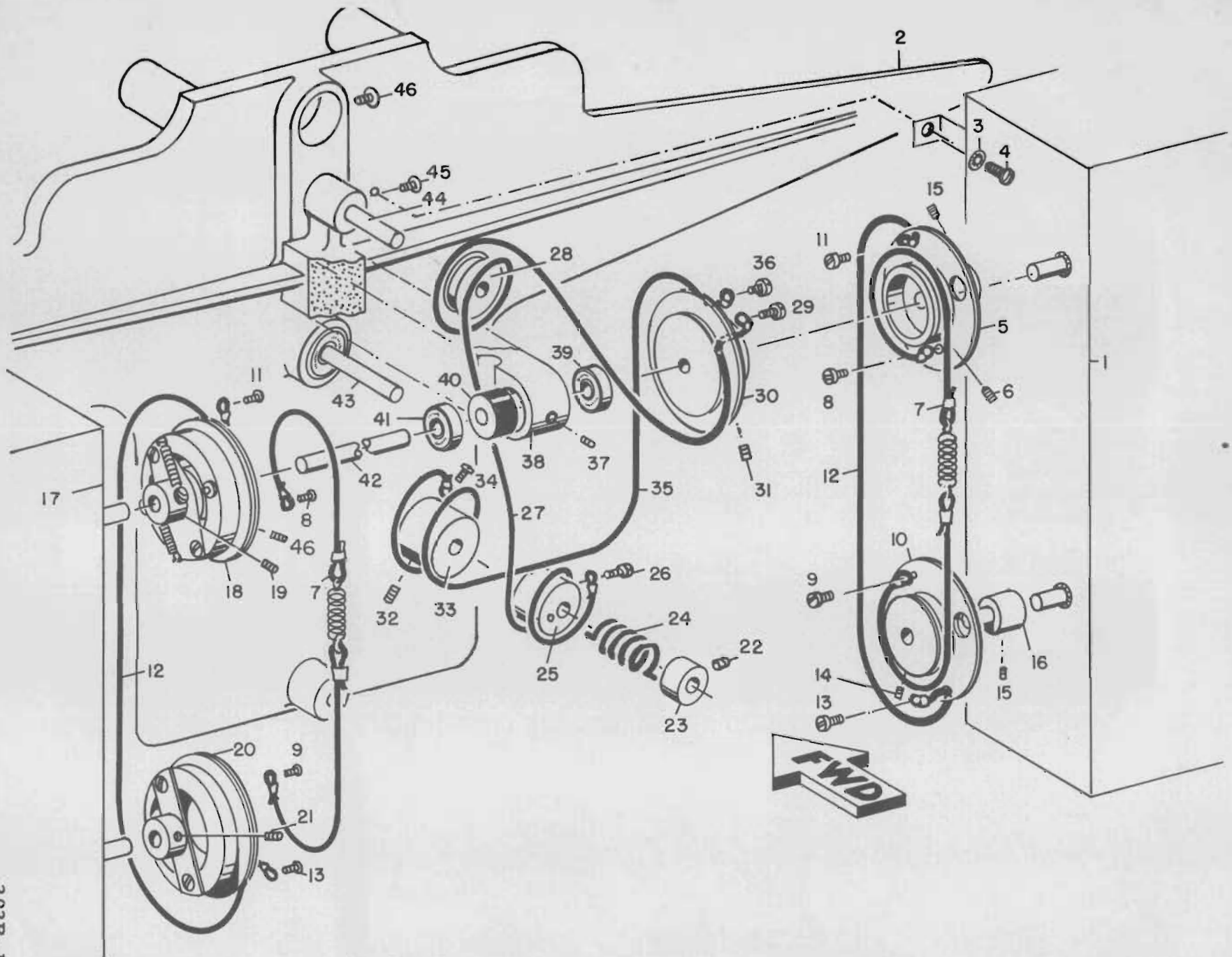
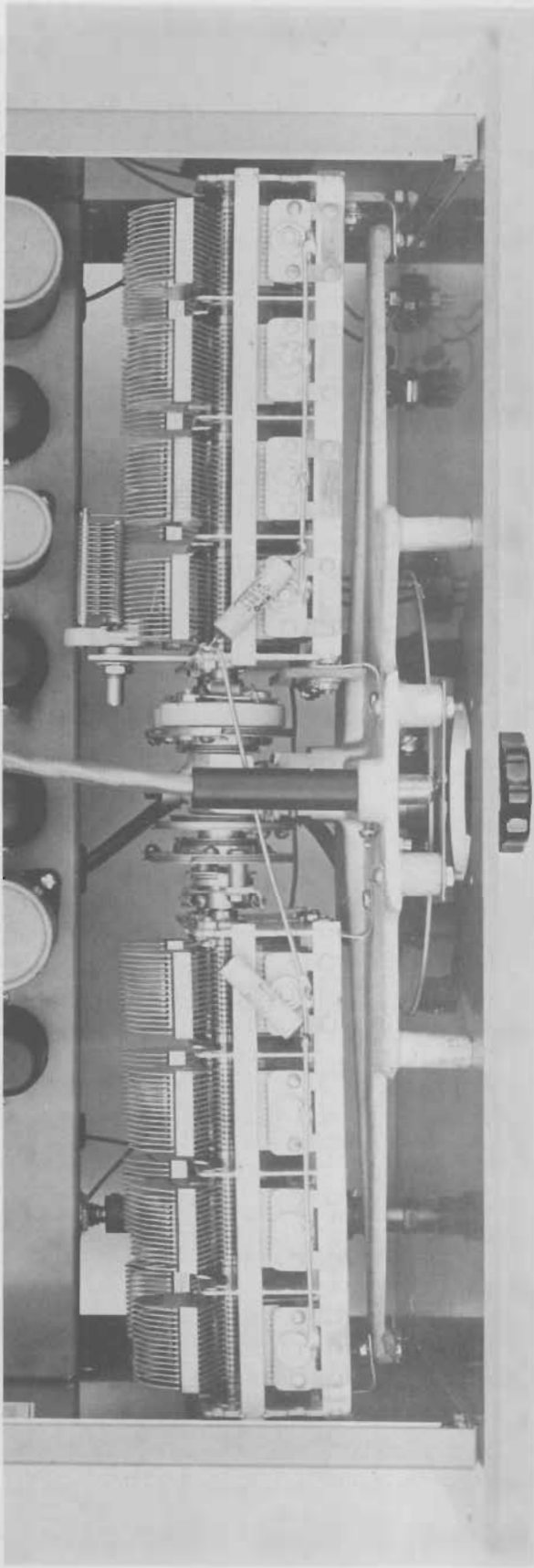
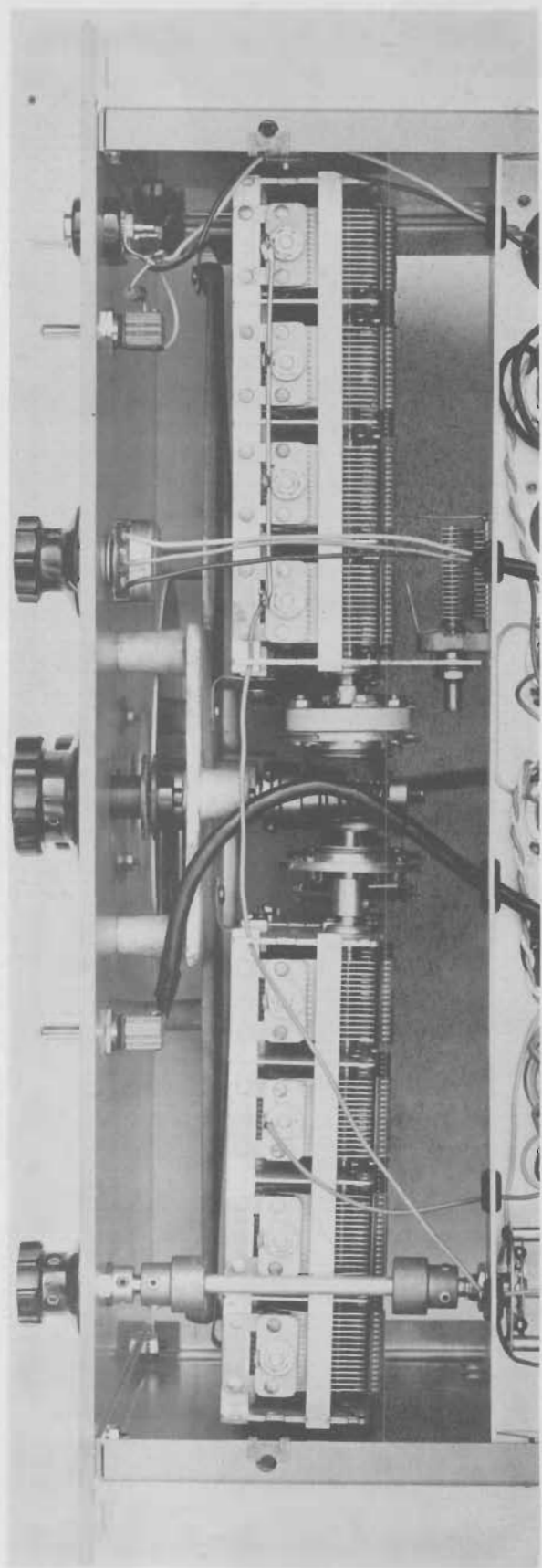


Fig. 2. Exploded View of Mechanical Drive Unit

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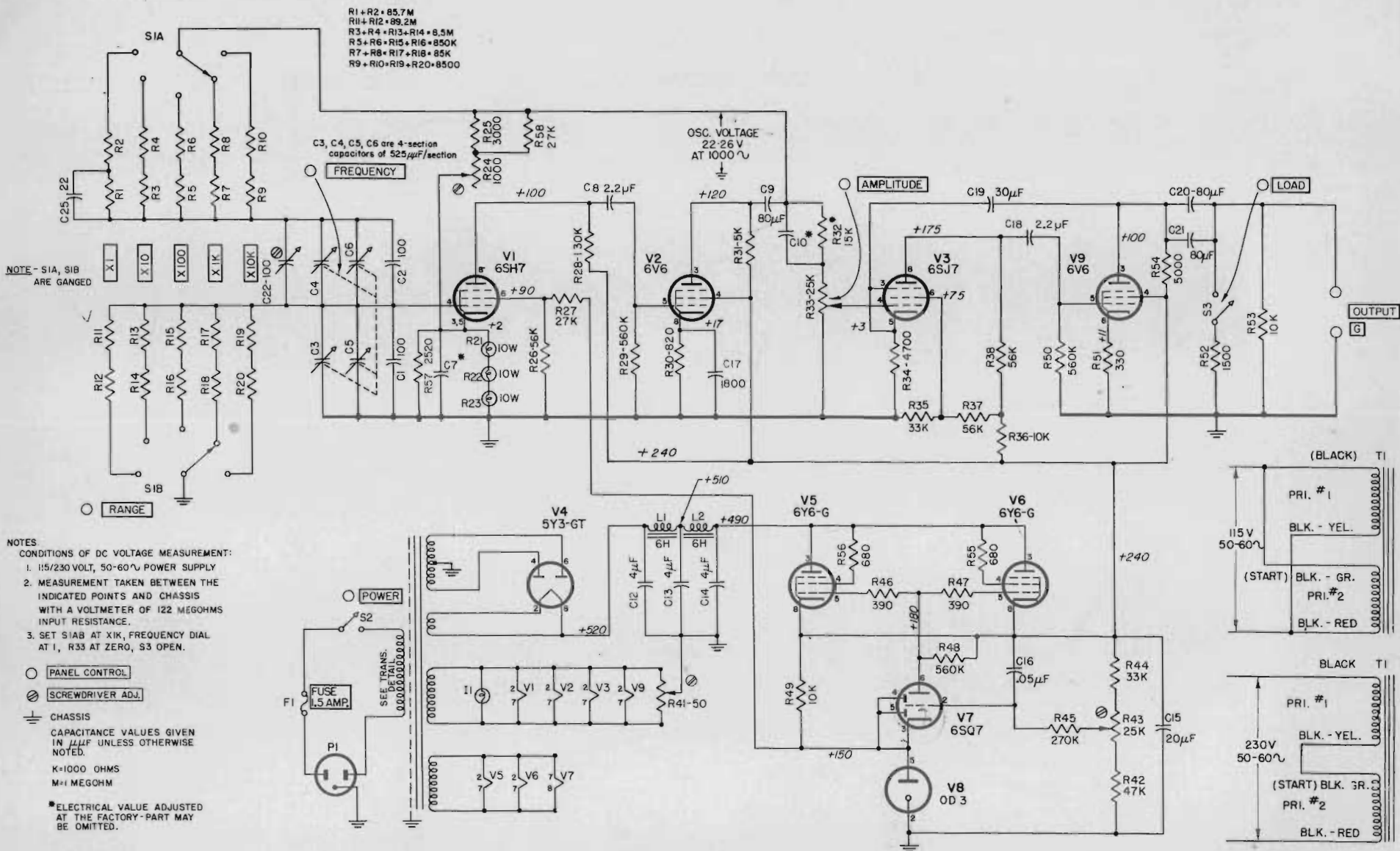
Top View



Bottom View

Fig. 3.

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NOTES

- CONDITIONS OF DC VOLTAGE MEASUREMENT:
- 115/230 VOLT, 50-60 \sim POWER SUPPLY
 - MEASUREMENT TAKEN BETWEEN THE INDICATED POINTS AND CHASSIS WITH A VOLTMETER OF 122 MEGOHMS INPUT RESISTANCE.
 - SET S1AB AT X1K, FREQUENCY DIAL AT 1, R33 AT ZERO, S3 OPEN.

- PANEL CONTROL
- SCREWDRIIVER ADJ.

CHASSIS
 CAPACITANCE VALUES GIVEN IN μF UNLESS OTHERWISE NOTED.
 K=1000 OHMS
 M=1 MEGOHM

*ELECTRICAL VALUE ADJUSTED AT THE FACTORY-PART MAY BE OMITTED.

SCHEMATIC DIAGRAM OF MODEL 202B

This circuit is basically correct, but small differences may exist for any particular instrument. Comparison and cross-checking will enable satisfactory identification of necessary parts.