

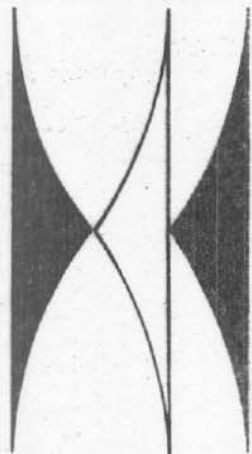
SERVICE MANUAL

for

Electro-Voice®

Electronic Organs

Models 6200 and 6210



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ELECTRO-VOICE, INC.
ORGAN DIVISION
BUCHANAN, MICHIGAN

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The following guarantee applies to Electro-Voice Models 6200 and 6210 Electronic Organs; it is printed in the Owner's Manual which is packed with each organ.

The Electro-Voice organ is guaranteed for one year from date of purchase by original owner to be free from any defect in workmanship or material. Electro-Voice, Incorporated agrees to repair or replace, at its option, within that year, any part used in its manufacture. Finishes are excepted. All transportation charges incurred in the carrying out of the terms of this guarantee are to be borne by the purchaser.

This guarantee becomes void if the organ is in any way not subjected to normal use and care as outlined in the owner's manual, or if unauthorized parts or service are employed, or if there is evidence that the serial number has been removed, defaced or changed. This guarantee is in lieu of all other guarantees, expressed or implied, and no representative or person is authorized to assume for Electro-Voice, any liability in connection with the sale of the Electro-Voice organ.

The method by which the dealer implements the above guarantee during the one-year period is as follows:

1. The dealer removes from the organ any modular unit which is defective and replaces it with a like unit from his service kit. (Method of replacement, and description of the service kit are in a following section of this manual.)
2. The defective unit is returned to Electro-Voice, Incorporated, who will then repair or replace the unit for a nominal handling charge. (Details of shipping such units are covered in a later section of this manual.)

The same procedure is followed after expiration of the one-year guarantee period. In this case, however, the organ section will be repaired and an appropriate charge will be made for labor and materials.

Note that tubes and loudspeakers are included in the one-year guarantee. If tubes or loudspeakers are defective, they should be returned to Electro-Voice; replacement will be made without charge.

The woodwork of the cabinet is guaranteed only against defects which are caused by manufacturing errors.

Damage to the organ after it leaves the Electro-Voice factory will not be handled under guarantee. Claim should be made against the carrier for damage incurred during transportation.

NOTE CAREFULLY: The following sections of this manual include instructions and warnings concerning certain types of repair operations which persons not directly employed by Electro-Voice are not authorized to perform. Contravention of these rules may, at the option of Electro-Voice, Incorporated, entirely or partially void the guarantee.

LIMITS OF FIELD SERVICE

Models 6200 and 6210 are manufactured in modular form. This means that each of the major components of the organ is a separate assembly which can be removed from the organ and replaced with a like section. Spare modules or sections are included in the Electro-Voice organ repair kit, which each Electro-Voice organ dealer should have.

Repairs made to Electro-Voice organs outside the factory should, therefore, be confined almost entirely to (A) tube replacement (not including neon lamps), (B) replacement of complete sections, and (C) re-adjustment of synchronizing potentiometers and tuning coils. The only exceptions to this rule cover such actions as resoldering of a wire which may have been broken through rough handling and similar very minor electrical work.

II.

SERVICING PROCEDURE

3. If such adjustment does not cure the trouble, a new 12AX7 tube is inserted in the generator at fault.
4. If a new tube does not cure the trouble, the ailing generator is removed, as described later, and a new one of the correct notes is inserted and, if necessary, adjusted.
5. If the amplifier-power supply appears to be at fault, the technician may attempt a repair by changing appropriate tubes. If this is not effective, the power amplifier subassembly is removed and a new one inserted.

NOTE: If a generator or the amplifier-power supply is replaced, or if a generator 12AX7 tube or and OA2, or OB2 tube in the power supply is replaced, the tuning and octave synchronization of the generators should be checked and if necessary, adjusted.

6. If loudspeakers, swell shoe, keyboards or pedals are defective, a new component is substituted for the bad one. If the technician is experienced and sees an obvious and easily repaired cause for the fault without disassembling the individual unit, he may make a simple repair; but he does so at his own risk as improper repair may void the guarantee.
7. If the front-panel volume control, vibrato control, or chord switch is faulty, the technician will replace the offending unit with one bearing the same stamped identification number from his service kit. Use of controls other than those furnished by Electro-Voice, Inc., voids the guarantee.
8. The pilot lamp or fuse may be replaced by an identical unit. Before inserting the new lamp, work the plastic shield off the old one and place it on the new lamp with the same orientation so the light will be directed at the panel jewel.

III.

THE DEALER'S SERVICE KIT

To facilitate servicing through the modern technique of simply replacing defective modules, Electro-Voice makes available to its dealers and authorized service depots a service kit which contains all items other than standard electronic parts and tools, which may be required for a repair. It includes, for example, such items as a complete set of spare tone generators, a spare amplifier-power supply, a special key-contact adjustment tool and the like. The kit contains a complete list of its contents. All the items are packed in a carrying case which the service technician may easily carry with him to a customer's home.

Each of the fragile replacement modules in the kit are packed in a corrugated carton especially designed for it. When such a module is to be used to replace a defective one in a customer's organ, remove it carefully from its carton without damaging the carton or its inserts. Place the old, defective unit in the same carton, using the inserts just as they were used for the original packing. Fill out completely one of the DEFECTIVE ORGAN PART REPORT forms furnished in the service kit. Retain the third copy for your files and place the remaining two copies in the carton with the module. Seal the carton; place a label on it and mail to Electro-Voice, Inc., Buchanan, Michigan. A repaired or new module will be

sent to replace the defective one, along with an invoice for either the small handling charge or the regular repair charge, depending on whether the organ from which the part was removed was in warranty. This same procedure is used for individual parts, such as potentiometers and the like, except that no special carton is furnished for such parts. IN EVERY CASE THE "DEFECTIVE ORGAN PART REPORT" MUST ACCOMPANY THE SHIPMENT.

IV.

HOW THE ORGANS WORK

This section gives a technical explanation of how the 6200 and 6210 organs operate. While an understanding of the organ's functioning is not essential to servicing, it will be of great help in diagnosing trouble and locating the section which requires replacement in a defective instrument. The illustrations given in connection with this section are only for the purpose of explanation and are not complete; a complete schematic diagram of each model is to be found inside the rear cover of this manual and that diagram should be used for actual servicing when a diagram is required. Almost all servicing is best done, however, by employing the two sections which follow this on Component Replacement and Trouble Diagnosis.

A copy of the Owner's Manual is included with this Service Manual. Each technician should read the Owner's Manual as the information therein is not repeated here.

Figure 1A is a block diagram of the 6200 with Serial Numbers over 2200. Figure 1B is a block diagram of the 6200 with Serial Numbers through 2200. Figure 1C is a block diagram of the 6210.

Operation begins with the 12 tone generators, one for each of the 12 notes in the chromatic scale. Two of these generators are located on each of six etched-circuit boards. Each 3-octave generator consists of a vacuum triode L-C master oscillator and two neon lamp frequency-divider stages.

A seventh, smaller board contains a single divider stage for the lowest C note, since the organ's range goes from C to C and requires four C's. A vibrato oscillator operating at slightly over 6 cps varies the grid potential of all the master oscillators to produce a sine-shaped frequency variation at a fixed rate with the deviation controlled by a front-panel knob.

Generator outputs ranging from C-1047 down through F-174.6 (the figures are cycles per second) are fed through 100K isolating resistors to a single bank of key switch fingers under the 32 melody keys. The buss, which these fingers contact when a key is depressed, is connected to the input of a bank of 6 format filters, each designed to provide a spectrum response imitative of one of the six voices provided. Each filter output goes to a stop-tablet switch, which the player uses to select the voice or voices desired and which feeds them to the amplifier, volume control (and swell shoe on the Model 6200) and speaker. An output jack, which disconnects the speaker when a plug is inserted, may be used for low-impedance headphones or for connection to an external audio system.

The 17-key accompaniment manual actuates four banks of key switches. The first bank contains a switch finger for each key and a common buss which the fingers contact when a key is depressed. To each finger is fed one of the generator outputs from E-329.6 down through C-130.8. Note that this range overlaps the range of the melody manual. The buss for this first bank goes permanently to an accompaniment filter which produces a fairly flute-like sound, one which is bland and whose output level is always enough less than any voice or combination of voices on the melody manual to blend with the melody satisfactorily.

The second and third banks of switches under the accompaniment keys are connected to appropriate generator outputs to produce a 3-note chord when heard along with the permanent note switches by each key. With the chord switch in "on" position, the outputs of these second and third busses are paralleled with the first, so that the tone passed through the accompaniment filter is in every case a chord when one key is struck.

Series 100K resistors are incorporated on all switch fingers of the top three banks of switches, on the Models 6200 and 6210.

For both neon stages, synchronization to the master oscillator is obtained by connecting the neon lamp to the oscillator cathode instead of ground. It has been found that this circuit yields truly remarkable stability when the 5-megohm potentiometer is correctly adjusted so that its neon oscillator synchronizes an octave below the master (half its frequency) or the previous stage. The 5-megohm potentiometer may be varied over a very wide range without destroying sync--and when it does go far enough, the typical stage simply jumps up or down to the next frequency without any intervening area of "hash".

To enrich the tone of the organ, since it has stops of only one pitch register, the cathode-ground impedance, which is common to both neon dividers, is made large enough to cause the lower outputs to couple slightly to the highest tone so that a small amount of lower-octave tones appear in the high octave. The 220K resistor between outputs 2 and 3 does the same thing artificially for output 2. The numbers below the output terminals indicate the frequency ranges over which the outputs operate. All 12 generators are identical except as shown.

To give the organ a full 49-pitch C to C range, the C generator was made the highest of all and a separate divider added to produce an extra C note at the bottom. This is diagrammed in Figure 3. It is the now common 2-neon circuit, coupled to the lowest main-generator C stage by a small capacitor for sync. It is on a separate small printed circuit.

All the 5-megohm potentiometers are the new printed-on-ceramic type. In the assembled organ they can be reached from the rear of the console without any disassembly, so that in the event it is necessary, making a slight adjustment to restore lost synchronization for a note is a matter of a few seconds and is extremely easy. The coils may also be reached from the rear, but they are protected by a fairly small hole in a fishpaper guard, so that casual changing of the fine tuning, a much harder adjustment to make correctly, is discouraged.

Keying and Voicing

The keys used in the new organ are of metal and plastic design. The entire action is metal, built on a steel chassis running the length of each manual. The only plastic portions are the keytops themselves, fitting over the metal key extensions.

The illustration on Page 4 in the Owner's Manual shows plainly how the two manuals are differentiated by their mounting positions. The accompaniment manual is mounted slightly forward of the melody keys.

The key-switch assemblies fit entirely under the keyboard chassis, as shown in Figure 4. Each switch assembly is made up of a multilayer phenolic "sandwich" between the layers of which thin metal switch blades are held. Figure 5 shows one of the switches, made up of a rear flat section with holes for soldering wires from the generators, a resistor, a forward section which flexes when a key is pressed, and a small piece of silver wire which contacts the transverse gold-clad buss.

The melody manual covers F below middle C through C two octaves above middle C. To each switch assembly a cable harness routes the generator output of the appropriate pitch. The transverse gold buss bar, which all switches contact when keys are down, is connected to the filter circuits in Figure 6. These are formant filters, the purpose of each being to shape the spectrum in the same way mechanical filtering shapes the spectrum for tones passing through orchestral instruments or organ pipes. The sawtooth tone, passed through a given filter, will then be subject to the same influences which cause the primary generator of a normal instrument (reed or lips) to emerge with the instrument's characteristic tone. Six such voices are provided in the organ and they are selected with rocker tablet controls on the front panel.

When more than one voice is switched on at a time, there is interaction and true mixing of tones is possible only with some combinations. The interaction, however, helps to keep volume almost constant, so that the player need not readjust pedal and accompaniment volume every time he makes a change in melody registration, thus eliminating some of the complication normally inherent in organ playing.

Accompaniment and Pedals

The key switches for the accompaniment manual have four banks rather than one. The top bank of switches is similar to those in the melody manual and each switch is simply fed a tone from the generator output corresponding to the key. The buss which all switches contact is marked "1" in Figure 7. It is permanently connected to the input of a flute-type filter, the output of which is passed to the amplifier, along with the filtered tones from the melody manual.

The second and third bank of switches under each key are connected to generator outputs which give the correct notes for a chord. For instance, under the lowest C key, the top switch carries C tone, and the second and third switches carry E and G tones respectively, C-E-G being a C-major chord. When the chord switch is off, outputs of the second and third busses are connected directly in parallel with the top buss so that now the three tones of a chord are fed to the filter input.

With the chord switch on, the transfer circuit comprising the fourth bank of switches or the fourth buss under the accompaniment keys feeds a single tone into a 12AX7 amplifier triode and thence to an Eccles-Jordan multivibrator. The multivibrator output, which is taken from the first triode plate, contains one cycle of square wave for each two cycles at the input. It thus divides input frequency in half and gives a foundation bass note. Output of the multivibrator is fed into the same filter as other accompaniment tones through a simple R-C network which tends to emphasize the higher harmonics somewhat to give greater presence.

With the chord switch off, the switches operated by the 13 pedals on the Model 6200 determine the note to be fed to the multivibrator and the switches under the keys are ineffective. The pedal switches, too, are of the transfer type, so that even if more than one pedal is pushed at a time, only the lowest note will be used. On the Model 6210, there are no pedals, so the under-key contacts always control the bass.

Amplifier, Power Supply and Vibrato

Figure 8 is a diagram of the amplifier. Its input is fed signals in parallel from the sections diagrammed in Figures 6 and 7. It is a simple 3-stage unit but of high quality because of the large amount of feedback from the output transformer secondary to the cathode of the preamplifier stage. There is a balance control on the panel and the master volume control on the swell shoe or expression pedal. As can be seen from the circuit, the balance control on the panel controls the volume of the accompaniment and pedal notes. The player may adjust overall volume range with the swell shoe. On the 6210 there is no swell shoe and all volume is controlled by the 100K potentiometer on the control panel.

The output jack is of the transfer type, so that when an external speaker or cable to a high-fidelity system (or headphone set) is plugged in, the built-in speaker is automatically disconnected.

The amplifier, power supply, filters, multivibrator and vibrato oscillator are located on the amplifier-power supply assembly. This is a metal chassis with a large cutout for the printed circuit carrying everything but the power supply, which is mounted on the metal portion. An extension to one chassis apron carries output jack, fuse and line cord; the extension fits over a cutout in the rear panel of the console for access.

Figure 9 is the power supply, conventional except that two VR tubes are used to keep the B plus applied to the generators at a constant 255 volts for maximum stability.

The vibrato oscillator, operating at about 6.5 cps, is shown in Figure 10. A front-panel control allows the player to select exactly the depth of vibrato desired at any moment or to turn it completely off.

Construction

Refer to the photo #1, which shows the wooden tray that contains all parts of the organ except speaker, swell shoe and pedals. This tray is the foundation on which all the subassemblies are mounted; it is simply slid into grooves in the console shell from the back and secured with screws. The tray is electrically complete and even includes the keys, so that it can be placed on the service bench and actually played with all components accessible. (An external speaker and volume control must be placed into the 6200

The six generator printed circuits (and the seventh containing the lowC divider) are mounted on the floor of the tray behind the keys and removal involves removing a single wing nut for each one of them. Small connectors make all wiring to these units removable with a slight pull, yet hold firmly when in place. The amplifier-power supply chassis is mounted vertically on the rear wall of the tray. It, too, is wired with small connectors and six nuts which enable quick removal and replacement. The keyboards may easily be dismantled from the wood base and tipped backward to reveal the switches without disconnecting any wires. Connection to the speaker, pedals and swell shoe in the lower portion of the 6200 console proper is made by an 18-pin plug and socket.

V.

INSTALLATION

Installation of either the 6200 or 6210 is merely a matter of selecting the location and plugging the power cord into a wall outlet. This is covered in the Owner's Manual and does not require the services of a technician. However, some special installations may be made and the technician may have to take a part in these.

VI.

EXTERNAL SPEAKER SYSTEMS

An external speaker may be connected to either organ to enhance reproduction. To do this, make a 2-wire cable, one end connected to the terminals of the speaker system and other terminating in a standard single-circuit phone (not phono) plug. When the plug is inserted into the jack on the back of the organ, the internal speaker will not sound.

Any good speaker system will work well though the same treble response as required for a good high-fidelity system is not required. Any external speaker system should be reasonably efficient; in general "bookshelf" type speakers will produce a lower maximum level than that obtained from a built-in speaker. Ideal impedance is 8 ohms, but other impedances cause no harm except to induce some loss of efficiency.

Connection to High-Fidelity System

The organ output may be connected to a high-fidelity system to take advantage of its amplification and speaker system, or for distribution of the sound to other rooms or throughout large areas. A cable is required; it may be but does not have to be shielded. However, if it is not shielded, the two wires should be readily identifiable so that the external amplifier ground may be connected to the organ ground.

The amplifier end of the cable should be terminated in a connector appropriate for the amplifier and plugged into the "auxiliary" input existing on most system preamplifier-control units, or directly to the input of the power amplifier if no preamplifier is used. The selection of this type of input is dictated by the requirement, that no amplification be interposed between organ output and power amplifier input, as the organ output signal is large and would cause overloading.

To retain a correct load on the built-in organ amplifier and to reduce the overlarge organ output signal to proper level, a simple resistor network must be placed at the organ end of the cable. This is diagrammed in Figure 11. Note carefully the identifications in the diagrams of the tip and barrel plug connections and the "hot" and grounded connections to the amplifier, and observe these polarities. Reversing them may cause slight hum.

The volume control on the amplifier or preamplifier must be used to set maximum sound level with the volume of the organ set at minimum. On preamplifiers having "loudness" controls, see that the owner realizes that setting it lower than maximum will alter the tone of the organ by boosting the bass. There is no harm, however, in doing this deliberately or even in using the preamplifier's tone controls to alter the overall tone of the organ at will.

External Speaker Location

No electronic organ sounds best when the speaker points directly at the listener. To take best advantage of the superiority of an external speaker, the speaker should face away from the organ or even directly at a wall or ceiling so as to diffuse the sound before it reaches the listener. As this may be difficult to

Headphones

No normally available headphones have sufficient bass response to sound as well with an organ as a speaker; In addition, the sound reaches the ears too directly, there being no opportunity for the sound to diffuse.

Headphones are often used, however, for practicing without disturbing other members of a household, and in a family situation where it is appropriate, the dealer and service technician should recommend the purchase of as good a pair of headphones as possible without representing that the sound will be equal to the built-in loudspeaker.

Headphones of any impedance can be used only if 10-megohm resistor is included on HI-Z phones; however, the lower-impedance units, down to 8 ohms, are desirable as they match the organ output more closely. If, as is probable, the sound in the headphones is too loud, the player can simply lower the volume control or the swell shoe setting. However, this reduces the range of control while playing and the technician should be ready to install within the headphone plug a resistor network equivalent to that shown in Figure 11, substituting for the 470-ohm resistor a value which yields comfortably loud volume with the swell shoe set at maximum.

VII. PRELIMINARY SERVICE CHECKS

Before doing anything else on a service call, check the following items to see that the organ is correctly set for operation. Refer to the photos in the Owner's Manual to identify controls.

1. The line cord must be plugged into a working outlet furnishing a nominal 117 volts of 60-cycle AC.
2. The balance control should be fully on and the top of the swell shoe (expression pedal) should be pushed toward the rear of the organ.
3. The upper 32 keys (melody manual) will not sound unless the bottom of at least one of the six voicing tablets at the right of the control panel is pushed all the way in.
4. The pedals on the 6200 will not sound unless the chord switch is at off.
5. If headphones, high-fidelity system, or external speaker is plugged into the jack on the organ rear, the built-in speaker will not sound and failure to play is probably the fault of the external equipment.
6. Remove the fuse post by twisting it 1/4 turn counter-clockwise and examine the fuse. If the wire within the glass is severed, replace the fuse only with a 1-1/2-ampere type 3AG unit.
7. Examine the large 18-prong Jones plug in the Model 6200, accessible through the rectangular cutout in the wooden rear panel, to see that it is pushed up firmly into its socket. It is possible to have the plug in the wrong socket holes; to avoid this, look carefully to see that the outline of the plug matches the outline of the socket above it and is not one step too far toward the rear of the organ. It cannot be reversed entirely, however.

VIII. SYNCHRONIZATION AND TUNING

Refer to the keyboard illustration Figure 5, showing the two keyboards and labeling each key. You will use this illustration in all synchronization and tuning or until you become familiar enough with the keys to discard it. (Note: Allow organ to warm up for one-half hour before tuning or synchronizing.)

Two kinds of adjustments may be required for the tone generators. Like almost all musical instruments, the organ may eventually need tuning. Tuning is a precision adjustment of the frequencies of the notes. In Electro-Voice organs, there are twelve such adjustments, each made by turning the screw which locates the slug in one of the master-oscillator coils. These screws are available through unmarked holes in the gray insulating paper visible at the rear of the organ through the lower ventilating slots. The illustration shows the controls behind these slots. The small hole slightly above and to right or left of each labeled pair of blue plastic knobs is the access point for the tuning screws of the generator of which the blue knobs are a part. For example, the F[#] tuning hole is slightly above and to the right of the two F[#] knobs. A single tuning adjustment simultaneously tunes all octave repetitions of a given note. For example, tuning the screw behind the F[#] hole will simultaneously change the tuning of all the F[#]'s in the organ. Tuning procedure is given later and should be preceded by synchronization adjustments as necessary.

The second type of generator adjustment is octave synchronization. The three stages of each of the twelve main generators are "locked" together electrically so that in each case generator output 2 must always be exactly an octave below output 3, and output 1 an octave below output 2. In each case, the lower octave is half the frequency of the one above it. These frequency relationships will occur, however, only if the free-running frequency of a neon-lamp stage is somewhere within the range over which the signal it receives from the master oscillator can "catch" it and force it to exactly the correct frequency. This free-running frequency is determined by the R-C values in the neon stage. The C is fixed, but the R may be varied by rotating the small blue knobs.

The effect of synchronization is exactly like the synchronization of the horizontal and vertical scanning generators in a television receiver. When the picture is moving up or down in the frame or is flopped over on its side, it is because the scanning generator within the receiver is not adjusted so that it can be forced to the proper frequency by the synchronization signal sent out by the station transmitter. When you rotate the "hold" control, you are adjusting a timing element in the scanning generator. At some point in the adjustment, the generator characteristics come within the range where the station's sync pulses can "catch" it and force it to the correct frequency--and the picture suddenly stops rolling or straightens up.

In the organ, this sudden reversion to correct operation is identical. As you rotate a sync knob, the tone abruptly jumps into place at the correct frequency. This is not a precision adjustment; it is either entirely correct or entirely wrong. It is, therefore, easily made by ear.

IX.

OCTAVE SYNCHRONIZATION PROCEDURE

An easily recognized symptom and no other indicates loss of octave synchronization. When a key other than one of the top twelve (counting both blacks and whites) sounds at the wrong pitch (not an octave below the same key an octave higher) or when its sound is garbled and not of one clean, definite pitch, sync must be readjusted.

Note carefully that no key can produce a sound almost an octave below the same key an octave higher; if, therefore, the tone is clean and seems just slightly different from an exact octave, you can conclude that your ear is at fault. To be out of sync, a note must either sound very "dirty" (or give occasional loud clicks while it is held down) or, if clean, must sound several notes higher or lower than it should.

When you determine that a note is out of sync, first check the same note in the highest octave--the highest twelve notes--to see that it is at a pitch somewhere between those of the next higher and lower keys. This indicates the master oscillator is working properly. (This note may have a little "dirt" in the background, simply due to a back-coupling from the lower note which is out of sync.)

To identify and make the adjustment which will correct the synchronization of the bad note, refer to the keyboard illustration. Note: Sync with vibrato "full on".

(See insert for Sync Instructions)

Sync adjustments can be made by any intelligent owner, though he may call the service technician the first time just to be sure he has done it correctly. Depending on his judgment of the owner's abilities, the technician may teach him how to do it; this will avoid needless service calls in the future.

Tuning

Electro-Voice Models 6200 and 6210 employ an L-C master oscillator for setting and stabilizing the exact tuning of each of the twelve generators. As is always true of such oscillators, they may drift away from the frequencies to which they were originally tuned after a period of time, even though the ones in the organ are of exceptionally stable design. They may eventually, therefore, require retuning. The time between tunings depends primarily on how good an "ear" the owner has; the typical person is relatively tolerant and does not recognize mistuning as such until it is bad enough to sound really sour. Note: Tune with vibrato "Off".

Almost everyone, however, having become accustomed to an instrument that is somewhat out of tune, will unfailingly recognize the difference after it has been retuned correctly. Even though he may not know why, the organ will sound much more pleasant to him, with greater tonal life and vibrancy. It is recommended that every service or sales call include a tuning job. With the proper instrument, it will take less than five minutes, but it will leave an extremely good impression of the call. As no technical knowledge is required to tune an Electro-Voice organ with a suitable tuning device, the dealer may have his salesman make a courtesy call occasionally for this purpose, taking advantage of the opportunity to renew acquaintance and keep the dealer's name in the customer's mind.

The technician should keep in mind, of course, that Electro-Voice organs are fully as stable as the best all-electronic organs available anywhere, and should never have or give the impression that constant retuning is necessary; nothing could be farther from the truth. The simple facts, in summary, are these:

1. All electronic oscillators tend to change tuning after a time, simply due to the effects of age. Even after a year or two. However, the change in tuning will never be such as to make the organ unmusical.
2. The very fact that Electro-Voice organs can be tuned means that they can be tuned to agree with other instruments, such as a piano for ensemble playing, even though this kind of tuning may not agree with the theoretical international standard.
3. Retuning an Electro-Voice organ is extremely simple--much easier and faster than tuning a piano or most other kinds of organs.

There is one recommended method of tuning. For all service technicians and others who habitually work on organs use one of the instruments especially made for the purpose. The Schober Autotuner and the Conn Strobotuner can be used by anyone to tune an Electro-Voice organ to the highest possible accuracy in five minutes or less. Both of these instruments are stroboscopic and should be used in accordance with the instructions accompanying them.

The following general hints apply to tuning:

1. After tuning the organ, always check synchronization by moving each blue knob in both directions to assure that its final adjustment is in about the center of its synchronized range. Do this for all the octaves of each note, in reverse numerical sequence--B2, then B1; A#2, then A#1, etc. (For C, begin with C3 and go down through C1.)
2. No matter what the tuning method, only the top octave of notes (fundamentals) need be tuned.
3. Turn vibrato off while tuning all twelve fundamental oscillator coils.

4. The holes giving access to the coil screws are rather small to protect the adjustments. It is much easier to engage the screwdriver with the screw slot if the organ "tray" is slid out so the technician can see what he is doing. When sliding out the tray, be sure to disconnect the 18-prong plug first, then connect extension cable furnished in service kit on the Model 6200.
5. When you have finished tuning and you are ready to leave, make a final check by playing each note of both manuals in turn from bottom to top, just to make sure you have replaced everything properly and not jarred anything loose.
6. For a final test, play the lowest bass pedal note and corresponding lowest note on the 17-note manual at the same time. Do this for each pedal note to determine accuracy of sync adjustment. If the two corresponding notes played are not clean, readjust the sync control for the key depressed on the accompaniment manual.

X. COMPONENT REMOVAL AND REPLACEMENT

This section tells you exactly how to remove and replace any component of the organ. The section following this one tells you when to replace sections. Photo #1 is a photograph of the inside of the tray with all the components identified.

A. The Component Tray

All electronic components are mounted on a wood tray which must be slid out to give access to any of the electronic assemblies.

Remove the six wood screws found around the top and both ends of the gray-painted rear top panel. On the Model 6200, reach into the slot near the bass end and pull straight down on the large 18-prong plug. Do not let this plug drop down into the bottom of the instrument; take it out and let it hang down the back of the organ.

Remove the wood screw under the keyboard just under Middle C (C2) on the melody manual, which goes through a metal angle bracket.

Grasp the gray rear panel by putting your fingers into the upper ventilating slots and gently slide the entire assembly out the back of the case. You may slide it just halfway out if that will suffice to give access to what you need; or you may pull it out entirely, holding it carefully and place it on a table, floor or service bench.

WARNING: Screwheads may protrude beneath the bottom board of the tray. Do not place the tray on a finished surface without heavy cloth padding or ten or more sheets of newspaper under the entire tray. Always avoid dragging it across the table surface even when padded.

When replacing the tray, fit it carefully into place. Notice that on each end of the organ, in the space where the tray goes, there is a slot running from front to rear. The bottom board of the tray must be fitted into these slots. Push the tray in until the front of the bottom board approaches the metal angle under the front horizontal board of the console. Then place your hand under the bottom board at the front and lift it over the bracket as you slide it in the rest of the way. Replace the six rear screws and the one for the bracket. Reconnect the large plug.

B. Tone Generators

There are several connections (usually 16) between each generator and (A) the generators on each side of it and (B) the key switch harness. To remove connections of a generator, grasp the small connector firmly at the end of the wire with long-nose pliers next to the printed circuit of that generator. Pull straight up without much force while holding the board down near connector area. (DO NOT TWIST.)

When reconnecting the replacement generator, you need simply reconnect each wire straight across horizontally without referring to any color code. The place for each connection is, in other words, obvious. To reconnect a wire, simply slip the female connector at the end of the wire over the male connector projecting up from the printed circuit and press gently.

To remove the connections at the end of the generator which is nearest the keyboards, remove the same way. To find the correct connections when the new generator is installed, simply use the standard RTMA color code and connect in sequence. (See Figure 13.) For example, the wires on the F-A# generator are gray, white, black, brown, red, orange, corresponding to numbers 8, 9, 0, 1, 2 and 3. They are connected to the terminals in that order. Notice carefully that the numerical order runs from treble to bass end of the organ-- from left to right as you face the rear of the organ. In case you become confused, you need only look at the wiring to adjacent generators and the scheme will become immediately apparent.

After you have removed all connections to a generator, remove the wing nut which holds it down. Then lift the forward end of the generator over the screw on which the wing nut was attached and slide it forward slightly and carefully remove.

To insert a generator, orient it to correspond with the other generators--the quadruple potentiometer toward the rear of the organ. With the rear edge of the printed circuit, find the horizontal slot in the wood into which all generators are fitted and slide it into the slot. Then allow the forward end of the printed circuit to drop down so that the vertical screw passes through the printed-circuit hole. CAUTION: Do not force the board over the screw. Keep wires out of the way while doing this. Then add and tighten the wing nuts and reconnect the wires as above.

C. Amplifier-Power Supply

Figure 13 shows all the connections made to this unit with wire colors. All except a few connections are made with the same connectors as used for the generators and are to be removed and replaced in the same way. The exceptions are as follows:

1. The cable shield connection at the treble end of the chassis. Remove the screw going through the printed circuit at this point and draw out the shield connection with its solder lug.
2. The green and black wires from the output jack to the 18-prong plug should be unsoldered from the jack. Note in Figure 13 which wire goes on which jack terminal when replacing.
3. The 2-wire AC cable going to the switch on the VOLUME control on the 6210 and the balance control on the Model 6200. This is connected to the unit with wire nuts. Hold the wires in one hand and unscrew the wire nut (counter-clockwise) with the other. Then pull the connection apart.

When all connections have been removed, remove the nuts holding the chassis to the rear wall of the tray. Hold the unit carefully to prevent it from falling on the generators and remove it.

D. Keyboards and Key Switches

To replace a defective keyboard or to obtain access to the switches under the keys, use the following procedure:

1. Remove the screw holding the long metal bracket which is attached to the rear center of the control panel to the floor of the tray.
2. Remove the screw holding each end of the control panel to the side pieces of the tray.

3. Raise the control panel and slide it back as far as possible, being careful not to bring it back far enough to break any of the wires attached to it. Use a piece of string or tape to tie it back so it will stay out of the way.
4. Upend the tray so its back is on the table, the underside of the board to which the keyboards are attached being vertical and facing you.
5. Take out the screws under the tray floor which hold the keyboard to the floor. There are four screws for the accompaniment manual, six for the melody. Note that there is a ground connection to a lug under the rear mounting screw of the accompaniment manual at the bass end and a jumper from here to the melody manual. Be sure to keep track of these and replace them when you replace the manuals.
6. Tilt the entire keyboard back so that the under-surface of the switch assembly is facing up. You are now in a position to work on keys or switches. CAUTION: Place heavy protective covering over keyboard to avoid scratching keys.

E. Voicing Switch Assembly

You may wish to examine or clean the contacts of the six tablet-operated voicing switches or to replace it entirely. To remove this unit from the control panel, simply push firmly and squarely against the gray plastic housing back of the panel until the assembly emerges from the front. To reinsert it, push it back into place, holding it so that it will go squarely into the panel cutout. If it is necessary to disconnect the wires from it, note that when the unit is upside down, and you observe it from the front of the organ, the six terminals are connected to numerically color-coded wires, from 1 to 6 and from right to left. The center conductor of the shielded cable is connected to an eyelet in the phenolic terminal board through a hole in the top of this board. (Figure 5)

F. Panel Controls

Panel controls may be replaced individually. First the metal plate on which all three controls are mounted must be removed from the rear of the panel by taking out the three screws holding the plate. A fairly short Phillips screwdriver will do the job. However, if necessary, you may dismount the panel itself and turn it so the rear face is more accessible. To do this, remove the screw which fastens the control panel at each end to the sides of the tray. Also remove the wood screw holding the rear of the metal brace at the center of the panel to the tray floor between the two center generators. Be careful during this entire procedure to avoid breaking any wires or switches.

G. Loudspeaker (Model 6200 Only)

To gain access to the loudspeaker, swell shoe and pedals, you must remove the back piece from the lower part of the organ by taking out the fourteen wood screws around the edges. Before removing the back piece, allow the Jones plug to drop down through the speaker port.

To remove the loudspeaker, disconnect the two wires from the binding posts and remove the four nuts holding the speaker to the knee panel.

NOTE: While the speaker used in Model 6200 is basically the Electro-Voice LS12, it has been specially modified to give suitable response for the organ. It should be replaced only with an LS12 especially made for the organ, not with a standard LS12 from high-fidelity component stock.

H. Swell Shoe

The thick wooden block on which the swell shoe is mounted is an integral part of the assembly and must be removed whenever either the entire swell shoe or just the potentiometer is to be replaced. To remove this block, pad the floor carefully, then tip the entire organ over on its back. Remove the three screws found under the swell shoe in the organ floor.

Disconnect the dual-conductor shielded cable from the potentiometer, noting the location of the connections. If only the potentiometer is to be replaced, proceed as follows:

1. Loosen the setscrew holding the metal to the potentiometer shaft.
2. Take off the potentiometer nut and lockwasher, noting their position and remove the potentiometer. (This is a special control and can only be purchased from Electro-Voice.)
3. After the new potentiometer is in place, tighten the setscrew. (If possible, place a drop of Loctite on the screw threads just outside the threaded hole.)

I. Pedals

If you wish to examine or adjust pedal switches, remove lower back panel. Then remove masonite cover over pedal switch assembly. For proper pedal switch adjustment, see Figure 5.

XI. WIRING DIAGRAM

This manual contains a complete wiring diagram of the organ showing all individual wires and connections with wire colors needed for correct servicing. It should not ordinarily be necessary to use this diagram; where you remove a component, it is always good practice to make your own sketch or list showing the connections removed so you can replace them the same way. However, the diagram may rescue you if you fail to do so or become confused for any reason.

XII. TROUBLE SHOOTING

The remaining pages of this Service Manual contains a list of typical symptoms of malfunctions (each symptom numbered and underlined). Under each symptom is printed the correct remedy. By simply running down the list and finding the symptom which matches the situation, you should be able to make the repair.

Be sure that what the customer believes is a fault is not a misunderstanding of how the organ works. A typical case of this would be an owner who calls in to say that when he plays chords on the accompaniment manual, he gets terrible discords. The service technician may make the call and find the owner has the chord switch at "On" so that each key depressed produces three notes--and, of course, depressing the three keys of a normal chord produces as many as nine notes, making a discord. The same lack of knowledge of the chord switch might cause the complaint of no pedal operation; the pedals will not operate unless the chord switch is "Off". It is, therefore, a good idea to get some preliminary information when the complaint is telephoned in; this may save a service call.

Do not confuse a "fault" found in mere testing with a normal situation that would not impair playability. For instance, if all stop tablets are in the "off" position, pushing melody keys with the swell shoe all the way open will produce faint sound due to stray leakage of tones. This is common to almost all electronic organs. However, it is completely insignificant, because it would be foolish to play on a manual without any stops on. You will find that, like all electronic devices operated from house AC power lines, there will be a small amount of hum and background noise in the speaker when the volume is raised (swell shoe in) and no music being played. This is of no importance because when the organ is played the music will be so much louder than the background noise that the noise will not be apparent.

The Models 6200 and 6210 are somewhat different from "conventional" organs--witness the special chord feature, the two manuals side by side, and so on. All persons connected with the dealer store should deliberately make themselves familiar with how the organ operates, so that an inquiring customer can be quickly and authoritatively given answers to any questions involving operation and corrected if he believes a normal function to be a fault.

Electro-Voice, Inc., is willing and anxious to receive suggestions and information from technicians in the field regarding all technical matters as well as to give full and prompt answers to any questions and solutions for any field technicians encounter. A letter or telephone call to the Service Department at the Buchanan plant will bring complete cooperation.

The symptoms and cures below are not listed in any particular order, since apparently related symptoms may relate to quite different parts of the organ. As time passes and additional information is acquired, service bulletins will be issued to owners of this Service Manual.

XIII.

SYMPTOMS AND CURES

1. With one stop on, tones when melody keys are played are intermittent or not present. Other stops work correctly.

Stop switch contact may be improperly adjusted. Remove stop tablet assembly from control panel by simply pulling outward. See Figure 5. Turn assembly upside down. Remove curved blade carefully from its position in rear of stop tablet. Bend silver wire slightly as indicated in Figure 5. Replace curved blade end in its tablet.

2. A note, other than those in the topmost octave of the melody manual, is very "dirty" or at incorrect pitch.

A stage of frequency division in a generator needs adjustment. See Page 9 of this manual. If the procedure given there will not correct the fault, replace the generator.

3. Tone not heard when a key is pushed or tone constantly heard even with its key not pressed.

Key switch finger is bent up or down so it is either not touching its buss when key is pressed or is touching buss even when key is not pressed. Remove and upturn manual; see Page 12. Examine Figure 5 which shows correct positions of switch fingers. Use switch adjusting tool from your service kit to adjust finger in the right direction by bending slightly. Be very careful not to bend switch contact any farther than necessary. Bend blade only at its root as indicated in Figure 5. A silent note may also be caused by a broken wire at rear of key switches or at front of a generator. Examine visually and if necessary feel with fingers or check with ohmmeter to detect wire broken within its insulation. If no results, disconnect appropriate wire from generator and touch to another generator output. If key then sounds (though it will be the wrong note) generator is faulty. Replace.

4. Dead note or notes; one or more neon lamps not lit.

If only one neon lamp is out, the generator is defective; replace. If more than one neon lamp in the organ is out, a wire passing B-plus voltage to the affected generators is broken or disconnected.

Refer to large schematic diagram to see path of B-plus between generators. Wires carrying B-plus are white with red tracer. Find broken or disconnected wire and reconnect.

5. Dead notes; all neon lamps on one or more generators extinguished.

A ground wire is broken or disconnected. This is a white wire with black tracer running either to another generator or to the amplifier-power supply. Most generators have two such wires. Locate and reconnect faulty wire.

6. Dead note in top octave of keys only. Lower octaves of same note sound out of tune or "dirty".

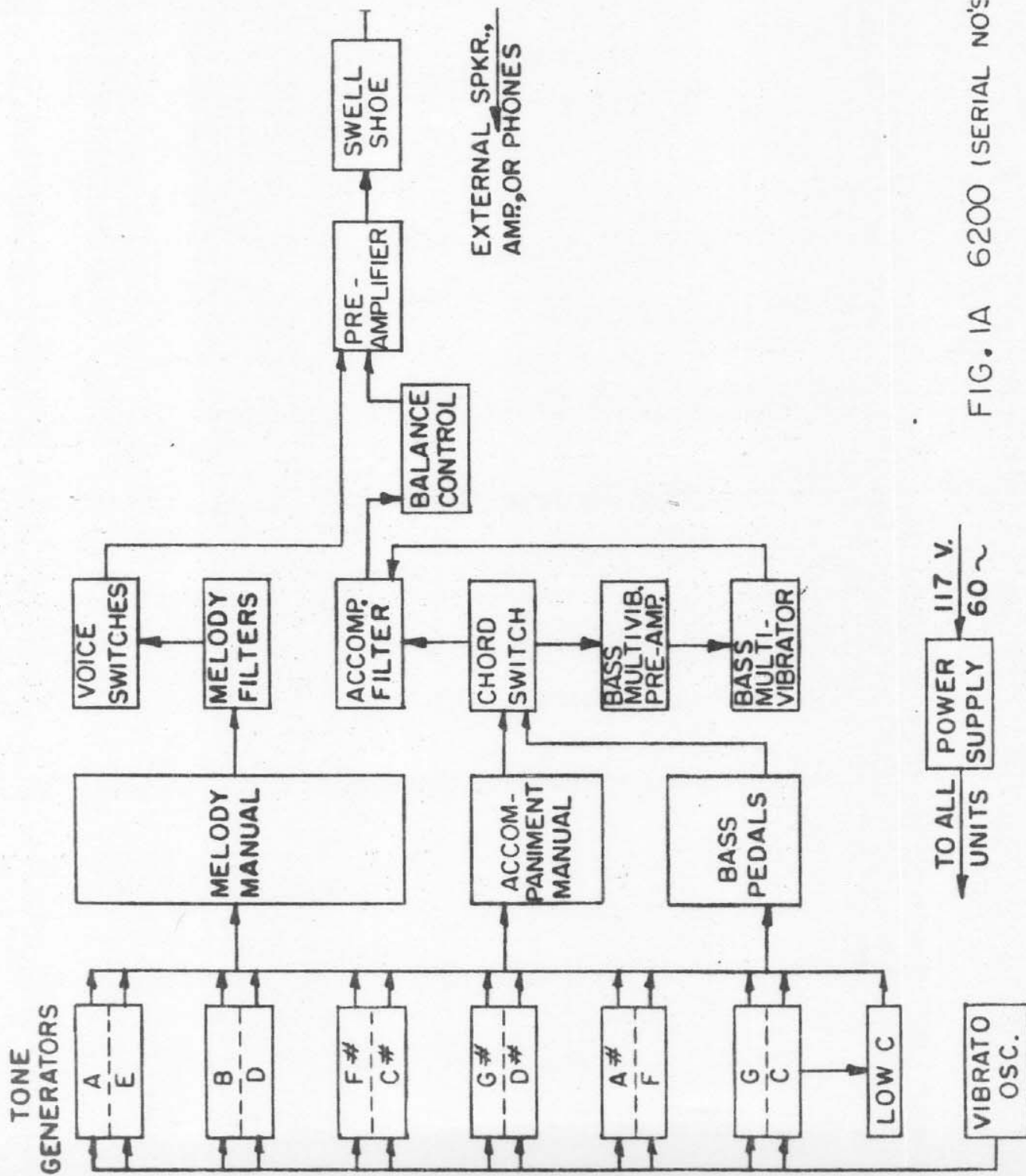
Replace 12AX7 in affected generator and retune generator.

17. Dirty key contact. Usual symptom is scratchy attack of note or note sounds intermittently.

Work key rapidly 20 times or more. Wiping action will usually clean. If organ is not used for some time, silver wire fingers of switches may need cleaning. Use small piece of cotton wound tight on thin stick (drug store Q-tip is excellent) moistened in non-residue contact cleaner such as methyl-ethyl-ketone. Use sparingly.

18. Noisy operation of volume control, vibrato control or swell shoe.

Replace appropriate potentiometer.



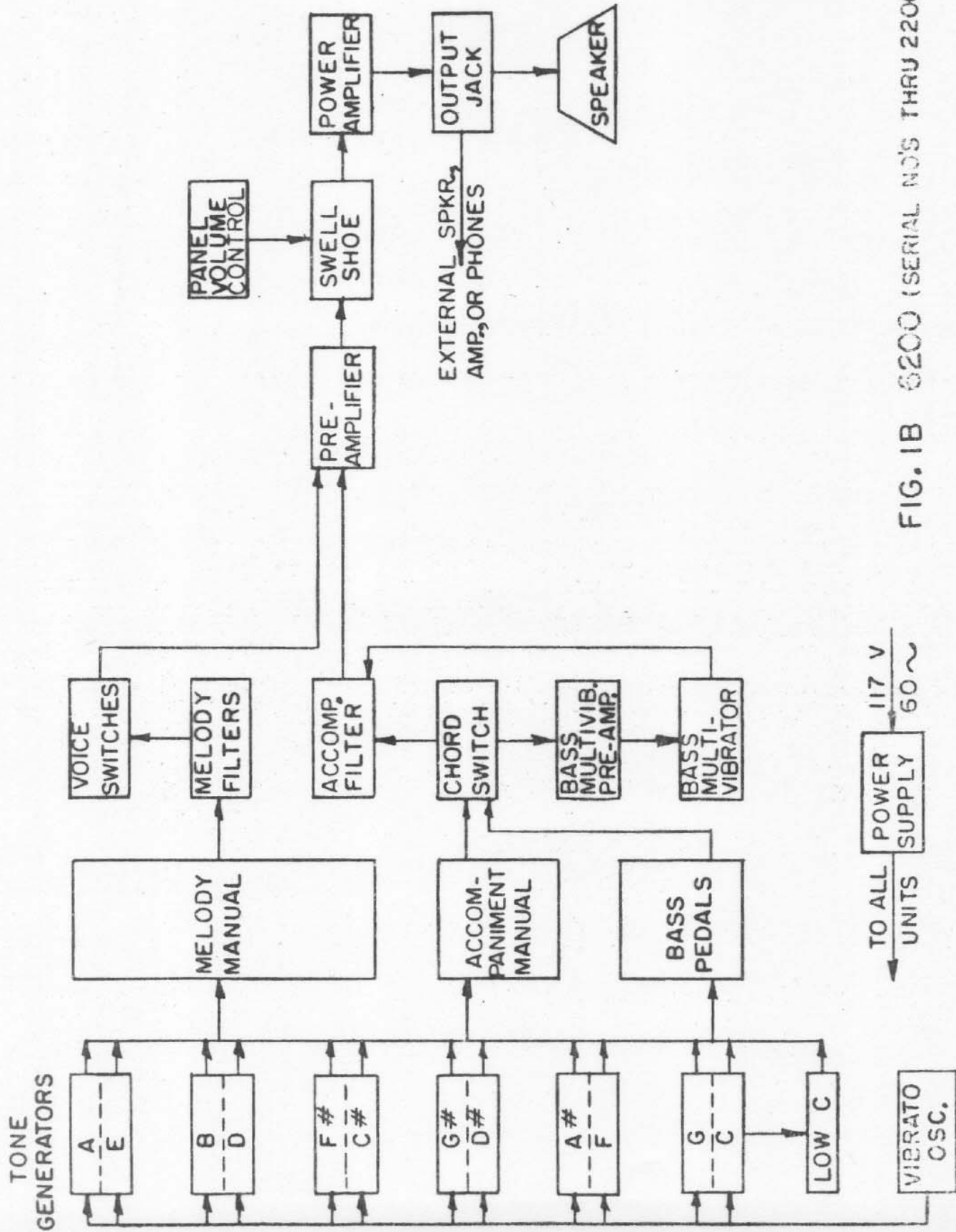


FIG. 1B 6200 (SERIAL NO'S THRU 2200)

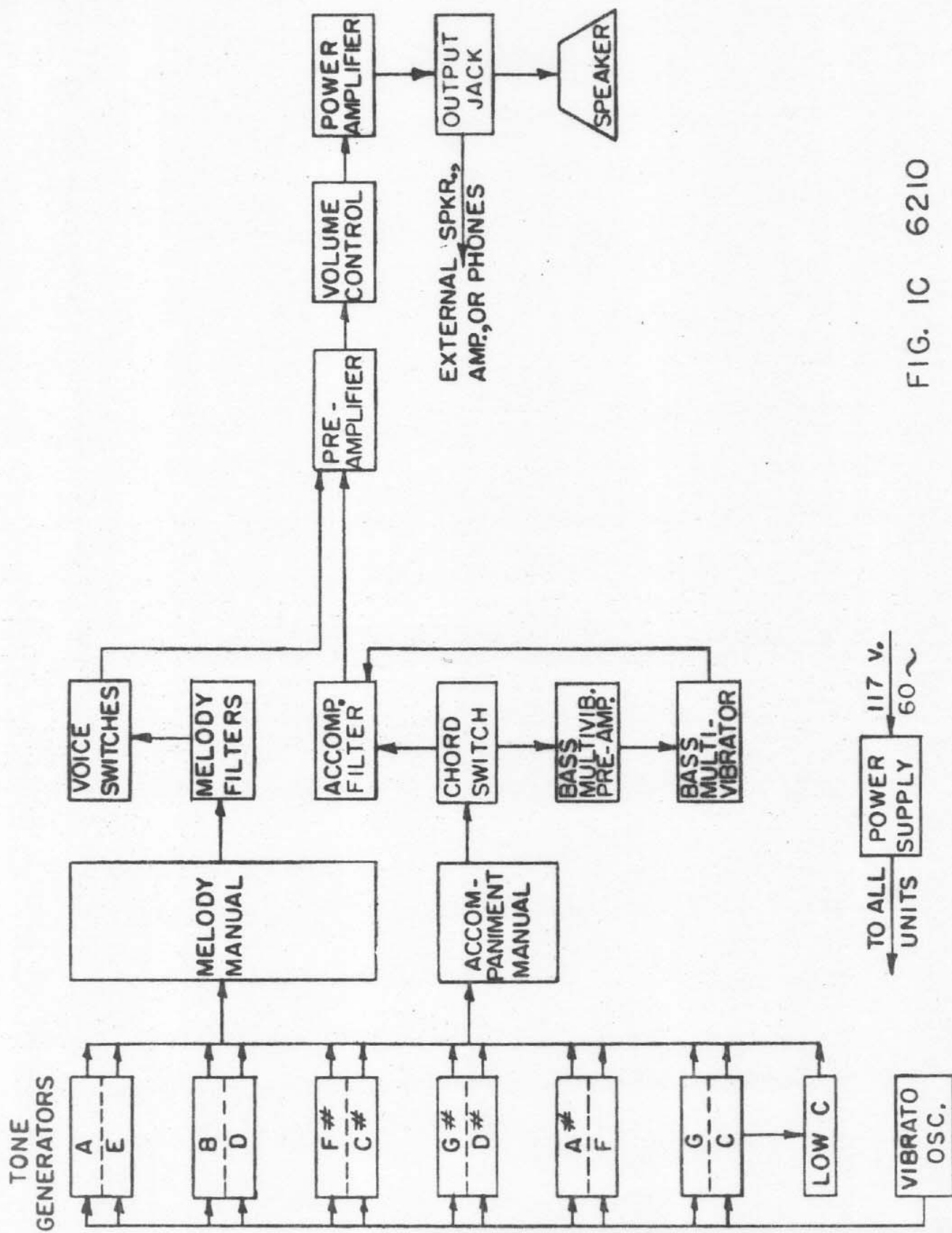
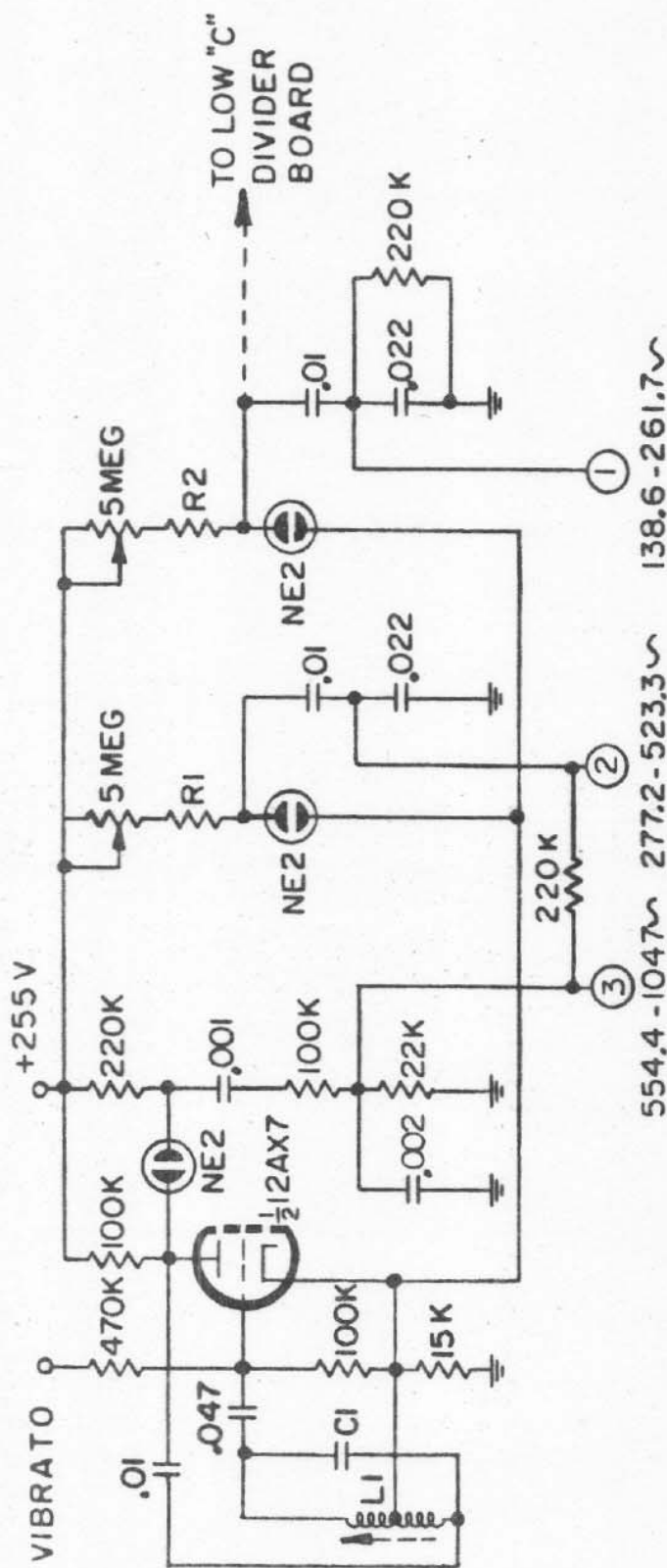


FIG. 1C 6210



NOTE	R1	R2	LI/CI PART NO.
C	1.2 M	1.8 M	C8538
A#	1.2 M	3.9 M	A8538
G#	1.2 M	4.7 M	F8538
B	1.2 M	3.3 M	B8538
A	1.2 M	3.9 M	8538
F	1.2 M	5.6 M	D8539
D	1.8 M	6.8 M	A8539
E	1.8 M	5.6 M	C8539
G	1.2 M	4.7 M	E8538
F#	1.2 M	5.6 M	D8538
D#	1.8 M	6.8 M	B8539
C#	2.2 M	6.8 M	8539

FIG. 2 TONE GENERATOR

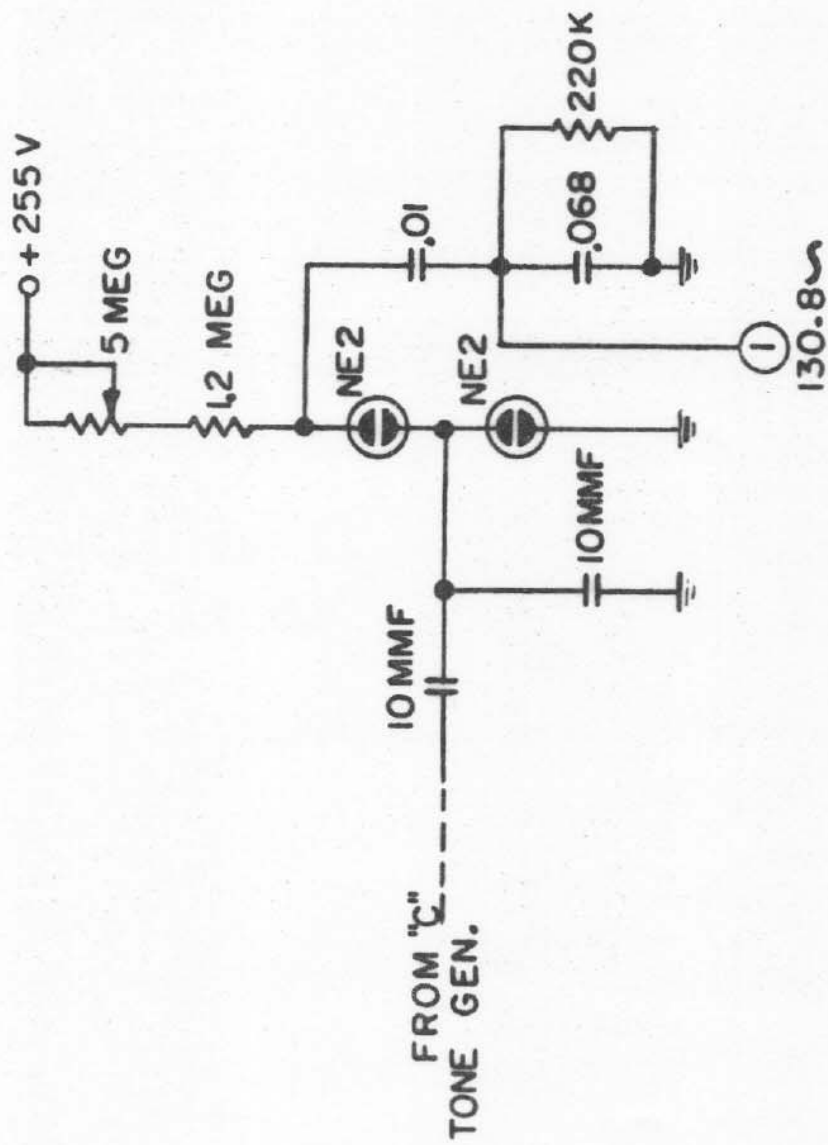
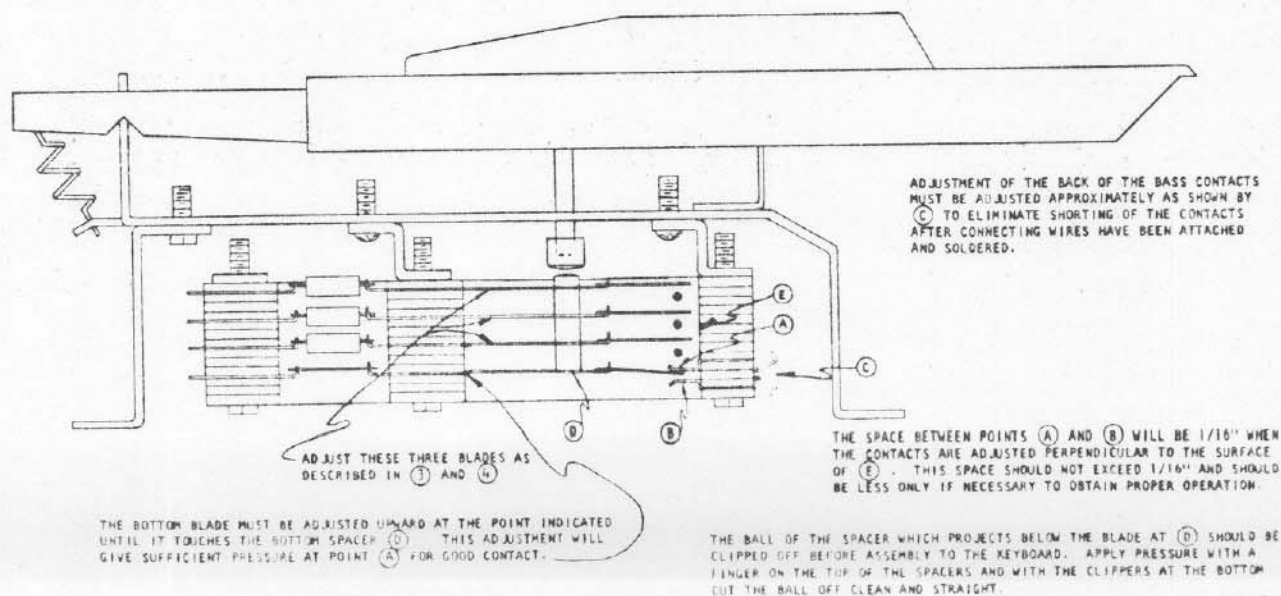
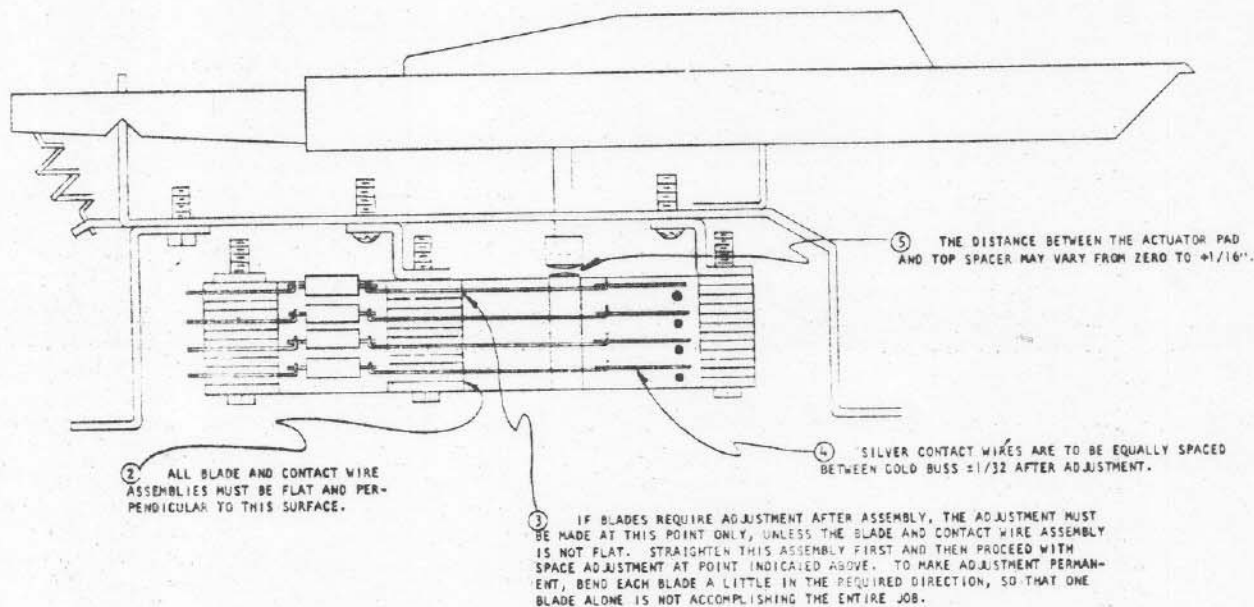
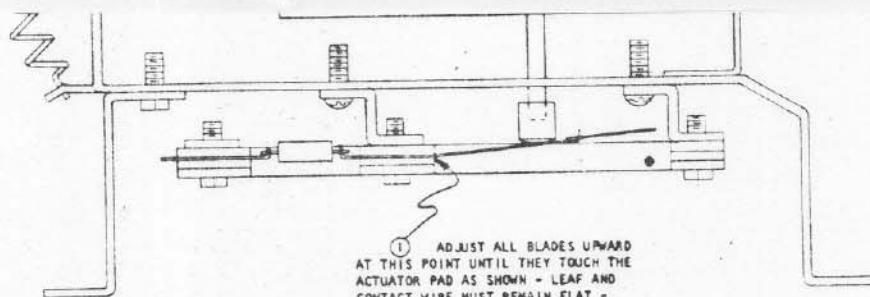


FIG. 3 LOW "C" DIVIDER BOARD



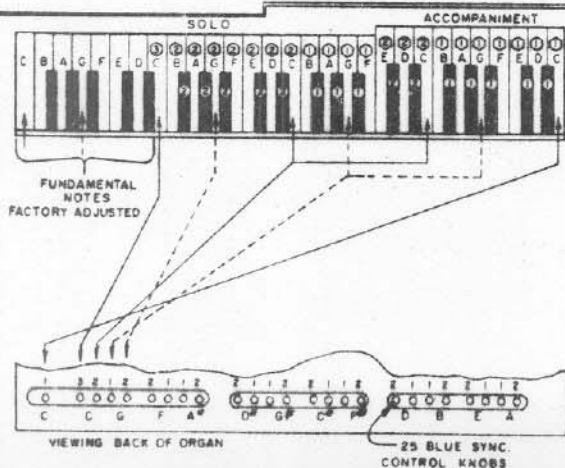
5210					5200				
KEY	CHORD	NOTES			KEY	CHORD	NOTES		
C ¹	C	C ₀	C ₁	G ₁	C ₁	C	C ₀	C ₁	G ₁
C ₁ [#]	A ^o	C ₀ [#]	F ₁	A ₁	C ₁ [#]	A ^o	A ₀	C ₁ [#]	A ₁
D ₁	D	D ₀	D ₁	F ₁ [#] A ₁	D ₁	D	D ₀	D ₁	F ₁ [#] A ₁
D ₁ [#]	G ^o	D ₀	B ₁	G ₁ [#] B ₁	D ₁ [#]	G ^o	D ₀	D ₁ [#]	B ₁
E ₁	E	E ₀	E ₁	G ₁ [#] B ₁	E ₁	E	E ₀	E ₁	G ₁ [#] B ₁
F ₁	F	F ₀	F ₁	A ₁ C ₂	F ₁	F	F ₀	F ₁	A ₁ C ₂
G ₁ ^b	B _m	G ₀	G ₁ ^b	D ₂	G ₁ ^b	B _m	B ₀	G ₁ ^b	D ₂
G ₁	G	G ₀	G ₁	B ₁ D ₂	G ₁	G	G ₀	G ₁	B ₁ D ₂
A ₁ ^b	F _m	A ₀	F ₁	A ₁ ^b C ₂	A ₁ ^b	F _m	F ₀	F ₁	A ₁ ^b C ₂
A ₁	A	A ₀	A ₁	C ₂ [#] E ₂	A ₁	A	A ₀	A ₁	C ₂ [#] E ₂
B ₁ ^b	B ^b	B ₀	F ₁	B ₁ ^b D ₂	B ₁ ^b	B ^b	B ₀	F ₁	B ₁ ^b D ₂
B ₁	B	B ₀	G ^b	B ₁ E ₂ ^b	B ₁	B	B ₀	G ^b	B ₁ E ₂ ^b
C ₂	A _m	C ₁	A ₁	C ₂ E ₂	C ₂	A _m	A ₀	A ₁	C ₂ E ₂
C ₂ [#]	F _m [#]	C ₁ [#]	F ₁ [#]	A ₁ C ₂ [#]	C ₂ [#]	F _m [#]	F ₀ [#]	F ₁ [#]	A ₁ C ₂ [#]
D ₂	D _m	D ₁	F ₁	A ₁ C ₂	D ₂	D _m	D ₀	F ₁	A ₁ C ₂
E ₂ ^b	C _m	E ₁	G ₁	C ₂ E ₂ ^b	E ₂ ^b	C _m	C ₀	G ₁	C ₂ E ₂ ^b
E ₂	E _m	E ₁	G ₁	B ₁ E ₂	E ₂	E _m	E ₀	G ₁	B ₁ E ₂

[illegible]

A schematic diagram of a control panel. It features several components: a large rectangular area on the left containing four circular buttons labeled V1, V2, V3, and V4; a circular component labeled C3; a rectangular component labeled T2; and a row of five small circular buttons at the bottom, the first of which is labeled 1. The diagram is enclosed in a rectangular border with a small 'P' in the top-left corner.

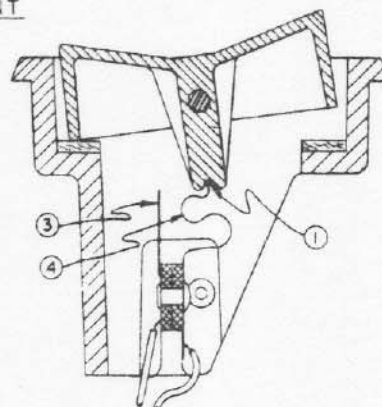
V1: 12 AX7	V5: 5Y3
V2: 12 AX7	V6: 0A2
V3: 12 AX7	V7: 0B2
V4: 6AQ5A	

A cross-sectional diagram of a mechanical assembly. It shows a shaft with a central component, possibly a bearing or a bush, which is secured by a pin or a screw. The shaft has several holes along its length, and the central component has a flange or a shoulder.



A technical cross-sectional diagram of a mechanical assembly. At the top, there are two vertical components, possibly pistons or valves, with hatched sections indicating specific materials or internal features. Below these, a horizontal plate or manifold is shown. In the center of this plate is a circular feature labeled with the number '2'. This feature is connected to two vertical tubes or channels that extend downwards. At the bottom of these tubes, there are two circular openings, each with a small screw or fastener. The entire assembly is mounted on a base, which is also shown in cross-section. The diagram uses various hatching patterns to distinguish different parts and materials.

WHEN TOGGLE ACTION OF THE VOICE SWITCH IS TOO LIGHT, A SIMPLE CORRECTION MAY BE MADE. SINCE THE WIDTH OF THE SPRING IS SLIGHTLY LONGER THAN THE WIDTH OF THE TOGGLE, THE SPRING MAY BE REMOVED WITH A PAIR OF LONG NOSED PLIERS. GRIP THE SPRING AT THE POINT WHERE IT RATES THE WIRE WITH THE TAB AND RAISE GENTLY UNTIL IT CLEARS. STRETCH SPRING STRAIGHT FORWARD AND RETURN TO THE TAB CAREFULLY. THE SAME WAY IT WAS REMOVED. AFTER TOGGLE ACTION HAS BEEN ADJUSTED CHECK THE LOCATION OF THE WIRE IN RELATION TO THE SPRING AS SHOWN IN THE SKETCH (FIGURE 1). FIGURE 2 (A) AND (B) THE SPACING OF THE CONTACT WIRE AND SPRING SHOULD BE APPROXIMATELY 1/32" WITH THE VOICE TAB IN THE OFF POSITION. CAUTION MUST BE OBSERVED TO MAKE SURE THAT THE SPRING CONTACT IS NOT UNNECESSARILY DEFORMED.



1/32" CONTACT SPACING MUST BE MADE
BY ADJUSTING CONTACT WIRE ①.

[illegible]

VOLTAGE READINGS TAKEN WITH VTVM - REFERENCE TO GND. - ALL CONTROLS FULLY ON - ALL VOICING SWITCHES ON - LINE VOLTAGE = 117 V.A.C.
RESISTANCE READINGS TAKEN WITH REFERENCE TO GND. - ALL CONTROLS FULLY ON - ALL VOICING SWITCHES OFF. drun = DO NOT MEASURE.

The diagram shows a three-phase transmission line with phases labeled 1, 2, and 3. A fault is indicated on phase 1 by a lightning bolt symbol. The fault is located between two insulator strings. The fault is labeled 'F'.

THE SWITCHES USED IN THE BASS PEDAL ASSEMBLY ARE OF THE DOUBLE POLE SINGLE THROW TYPE. IF ADJUSTMENT OF THESE SWITCHES BECOMES NECESSARY, THE FOLLOWING PRECEDENCE SHOULD BE FOLLOWED:

WITH BASS PEDAL IN REST POSITION, ADJUST LEAP ① TO OBTAIN $1/32"$ SPACING BETWEEN CONTACTS ① AND ② JUST MAKE CONTACT.

ADJUST ③ TO OBTAIN $1/64"$ SPACING BETWEEN ③ AND ④.

CAUTION ② AND ③ MUST BREAK CONTACT BEFORE ① AND ③ MAKE CONTACT AND ALL THREE CONTACT POINTS MUST HAVE VIBRATING ACTION.

THE SMALL BLUE KNOBS LOCATED IN THE SLOTS ON THE BACK OF THE ORGAN ARE THE SYNC CONTROLS. THESE KNOBS CONTROL ALL OF THE NOTES ON THE ORGAN EXCEPT THE TOP 12 WHICH ARE THE FUNDAMENTAL NOTES AND RARELY NEED ATTENTION. THE ADJUSTMENT OF THE SYNC CONTROLS IS EXTREMELY SIMPLE, IF THESE INSTRUCTIONS ARE FOLLOWED.

THE FIRST ONE ADJUSTED BY THE SYNC CONTROLS IS C₃ ONE OCTAVE BELOW THE TOP OR HIGHEST NOTE (THE 8TH WHITE KEY COUNTING FROM RIGHT TO LEFT).

DEPRESS THE KEY MARKED C₃ AND ADJUST THE SMALL BLUE KNOB MARKED C₃ ON THE BACK OF THE ORGAN. TURN THE KNOB CLOCKWISE UNTIL THE NOTE BECOMES DISCORDANT OR DROPS OUT OF SYNC AND OBSERVE THIS POINT. NOW TURN THE KNOB COUNTER CLOCKWISE, THROUGH THE SYNCHRONIZED RANGE AND OBSERVE THIS POINT. SET THE CONTROL APPROXIMATELY 1/2 WAY BETWEEN THESE TWO OBSERVED POINTS. THIS IS THE CENTER OF THE SYNC RANGE.

NOTE: IT SHOULD BE UNDERSTOOD AT THIS POINT THAT THERE IS INTERACTION BETWEEN THE NOTES ONE OCTAVE APART AND THE NOTE JUST SYNCHRONIZED MAY NOT BE CLEAN AT THIS POINT. FOR THIS REASON STEP 4 AND STEP 7 ARE NECESSARY.

STEP 2 DEPRESS THE NOTE MARKED C₂. (THIS IS ONE OCTAVE BELOW THE NOTE JUST SYNCHRONIZED.) FOLLOW THE SAME PROCEDURE USED IN STEP 1.

STEP 3
DEPRESS THE NOTE MARKED C, (THE LOWEST NOTE ON THE ORGAN) AND ADJUST AS IN STEP 1 AND STEP 2.

STEP 4
REPEAT THE FIRST THREE STEPS TO OBTAIN NOTES WITH BEST PURITY OF TONE.

STEP 5
DEPRESS KEY MARKED B₂ AND ADJUST BLUE KNOB MARKED B₂ ON THE BACK AS IN STEP 2.

STEP 6
DEPRESS KEY MARKED B₁ AND ADJUST BLUE KNOB MARKED B₁ AS IN STEP 3.

STEP 7
REPEAT STEPS 5 AND 6.

REPEAT STEPS 5 AND 6.

STEP 8

REPEAT EACH REMAINING NOTE IN THE SAME MANNER, REPEATING THE 16 SENTENCES FOR EACH QUALITY OF YOUR

NOTES: IF ONLY ONE NOTE GOES OUT OF SYNE, ONLY THAT NOTE NEED BE ADJUSTED; HOWEVER, ALWAYS READJUST THE OTHER OCTAVES OF THAT NOTE FOR COMPLETE AND RELIABLE RESULTS.

FREQ 400 CPS SINE WAVE		BD LOAD - RES.
VOL. CONTROL FULL CW. CELLO STOP ON		
FROM	TO	DB
MELODY BUSS	PIN 2 OF VIA	-16 DB
PIN 2 OF VIA	PIN 1 OF VIA	+32 DB
PIN 1 OF VIA	PIN 6 OF V18	+22 DB
PIN 8 OF V18	PIN 5 OF V4	-16 DB
PIN 5 OF V4	BD LOAD	-20 DB

OVERALL GAIN FROM MELODY BUSS
TO 8Ω LOAD = +25 DB ±2 DB

OVERALL GAIN FROM PIN 2 OF VIA
TO BG LOAD = +41 DB

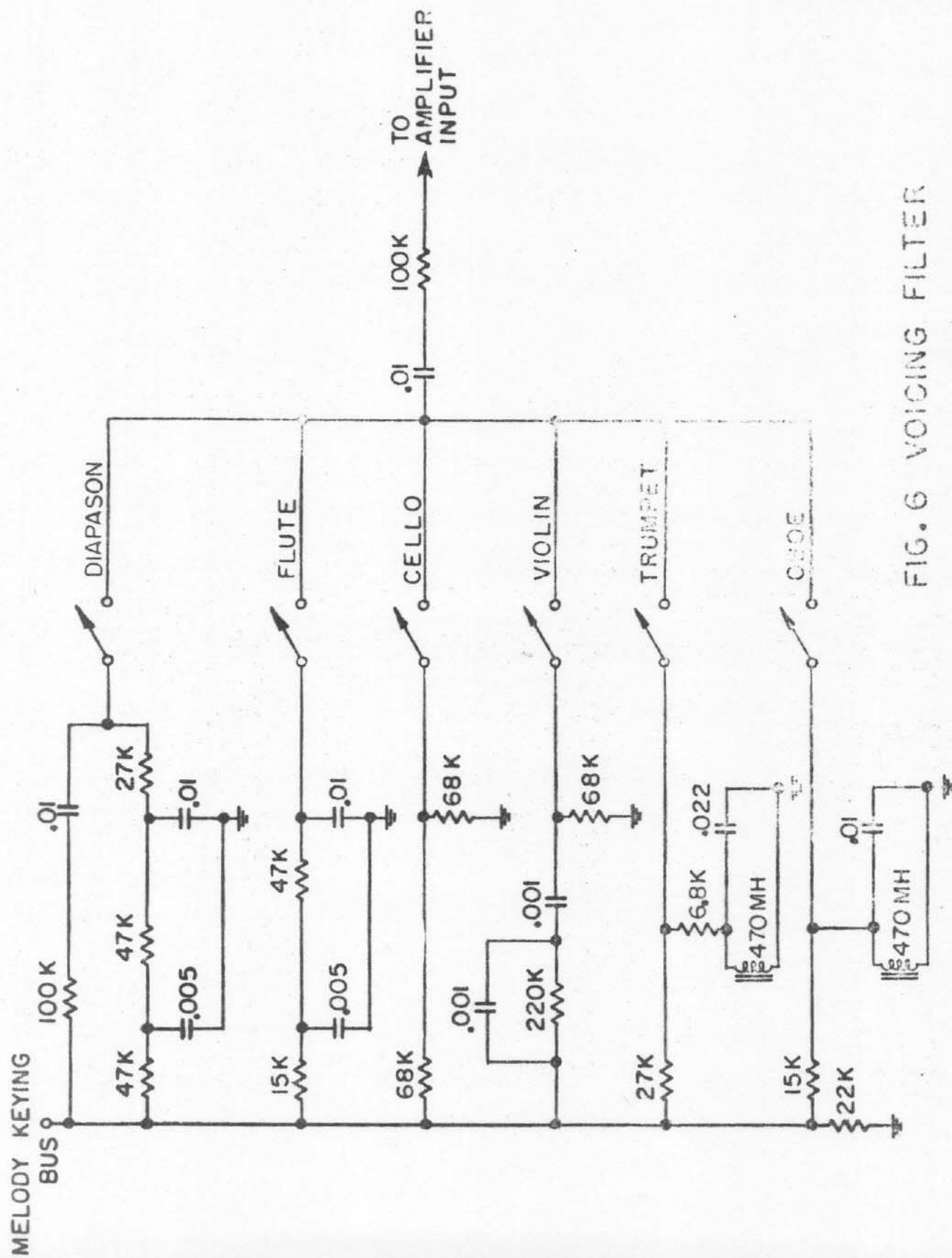


FIG. 6 VOICING FILTER

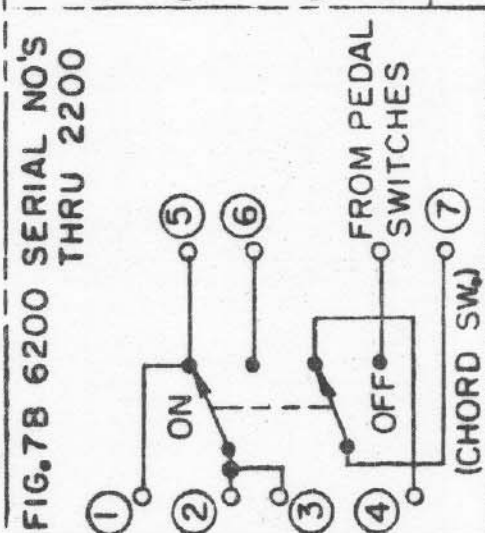
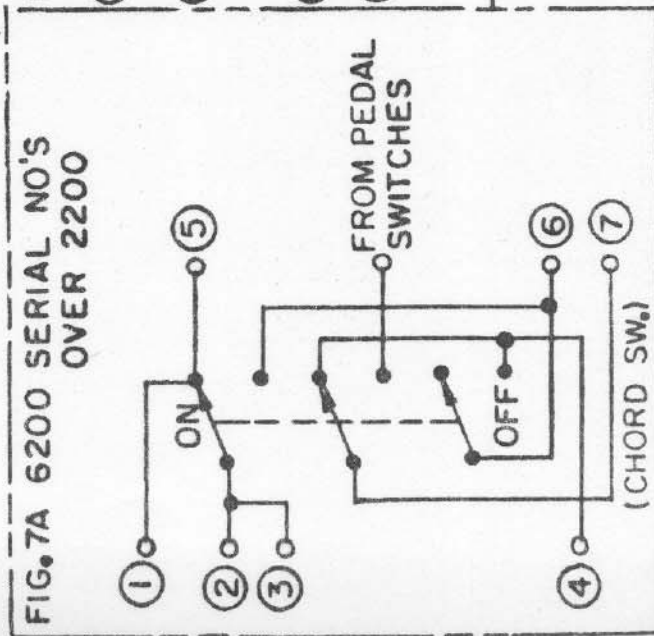
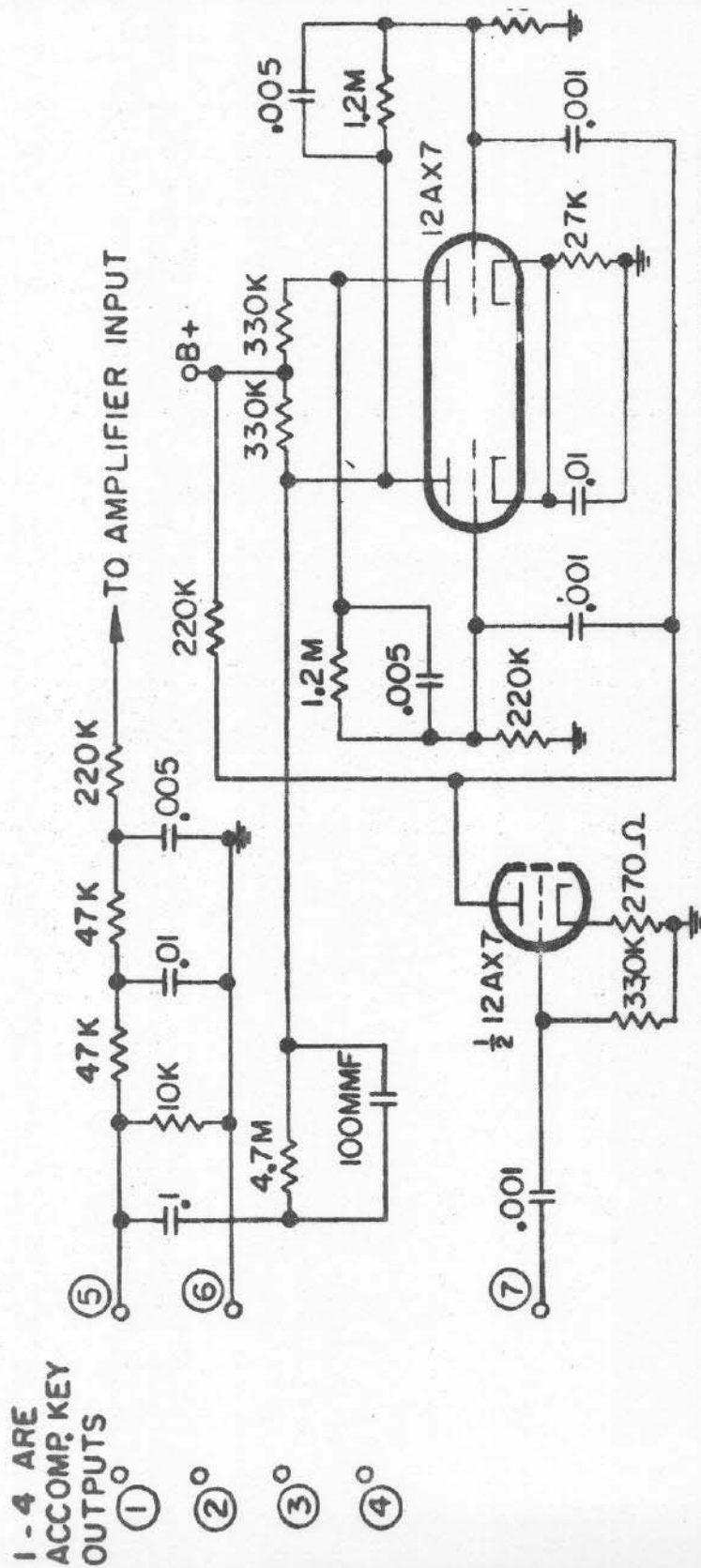


FIG. 7 MULTIVIBRATOR CIRCUIT

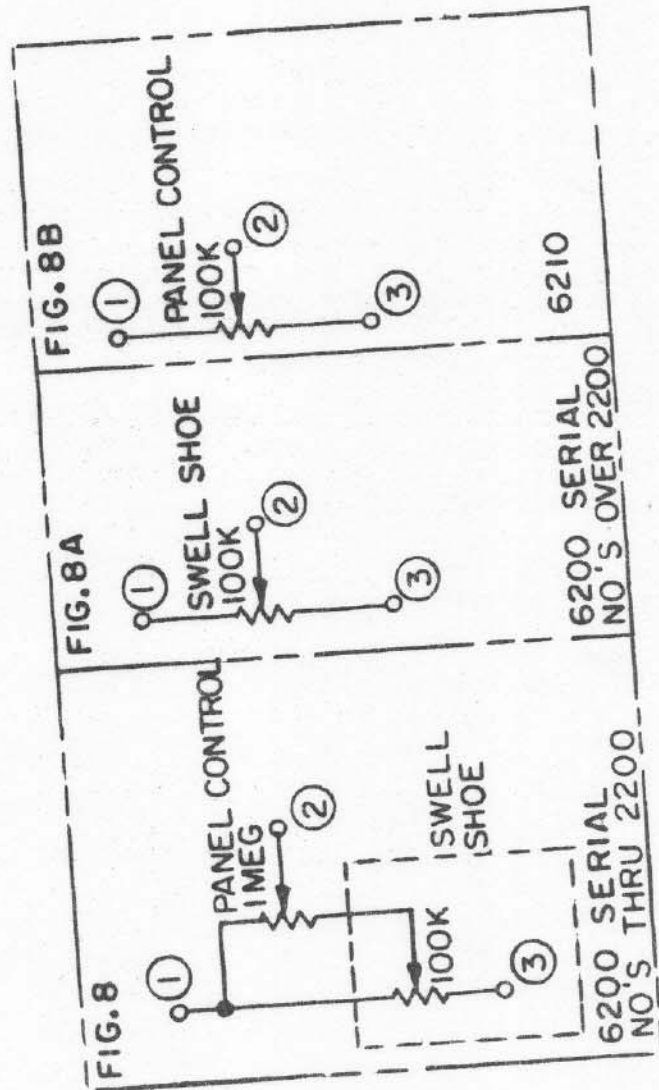
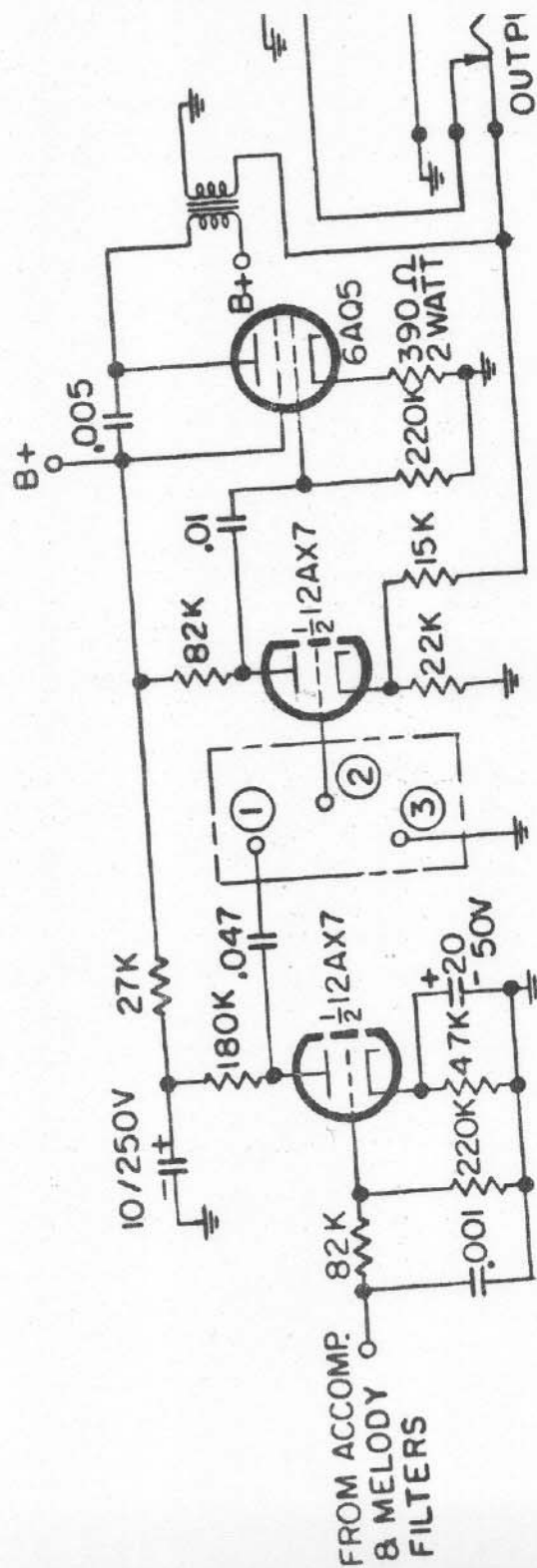


FIG. 8 AMPLIFIER

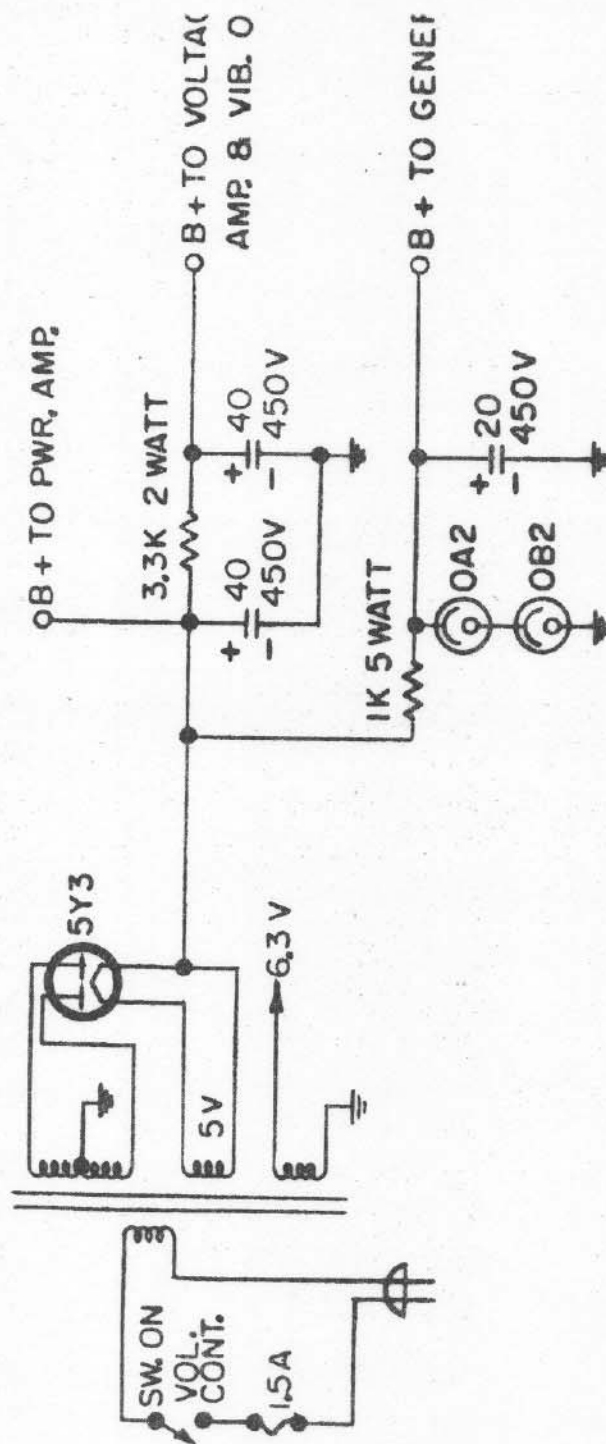


FIG. 9 POWER SUPPLY

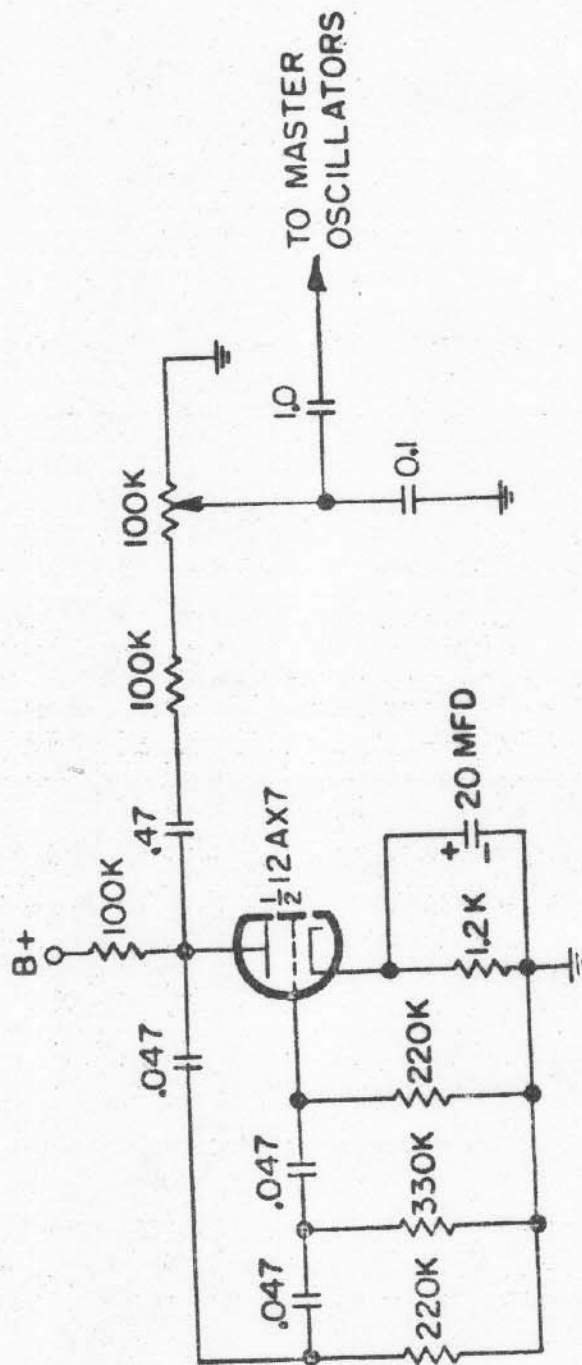


FIG. 10 VIBRATO CIRCUIT

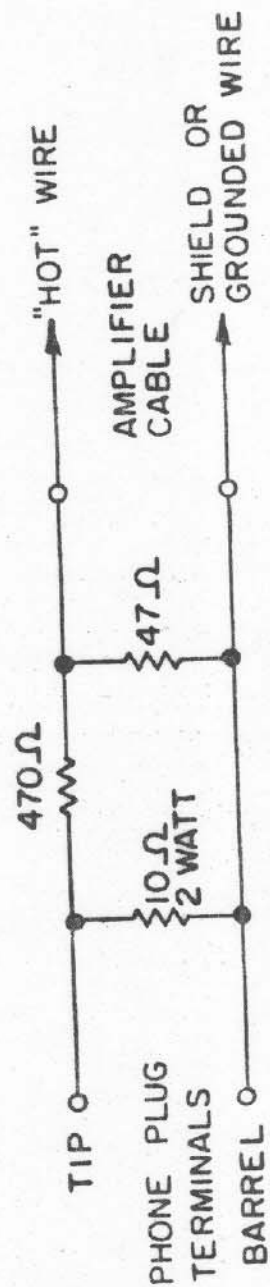
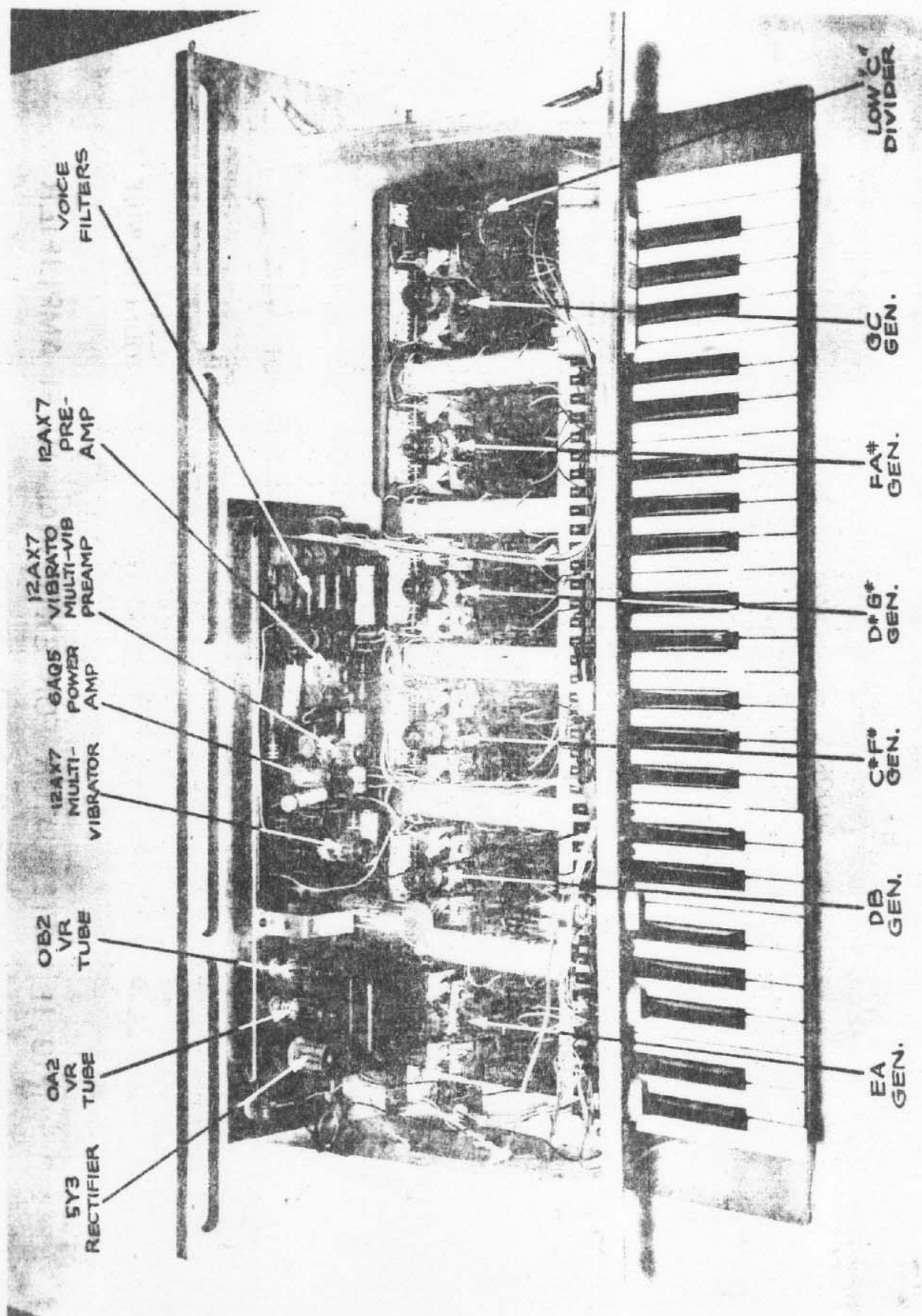
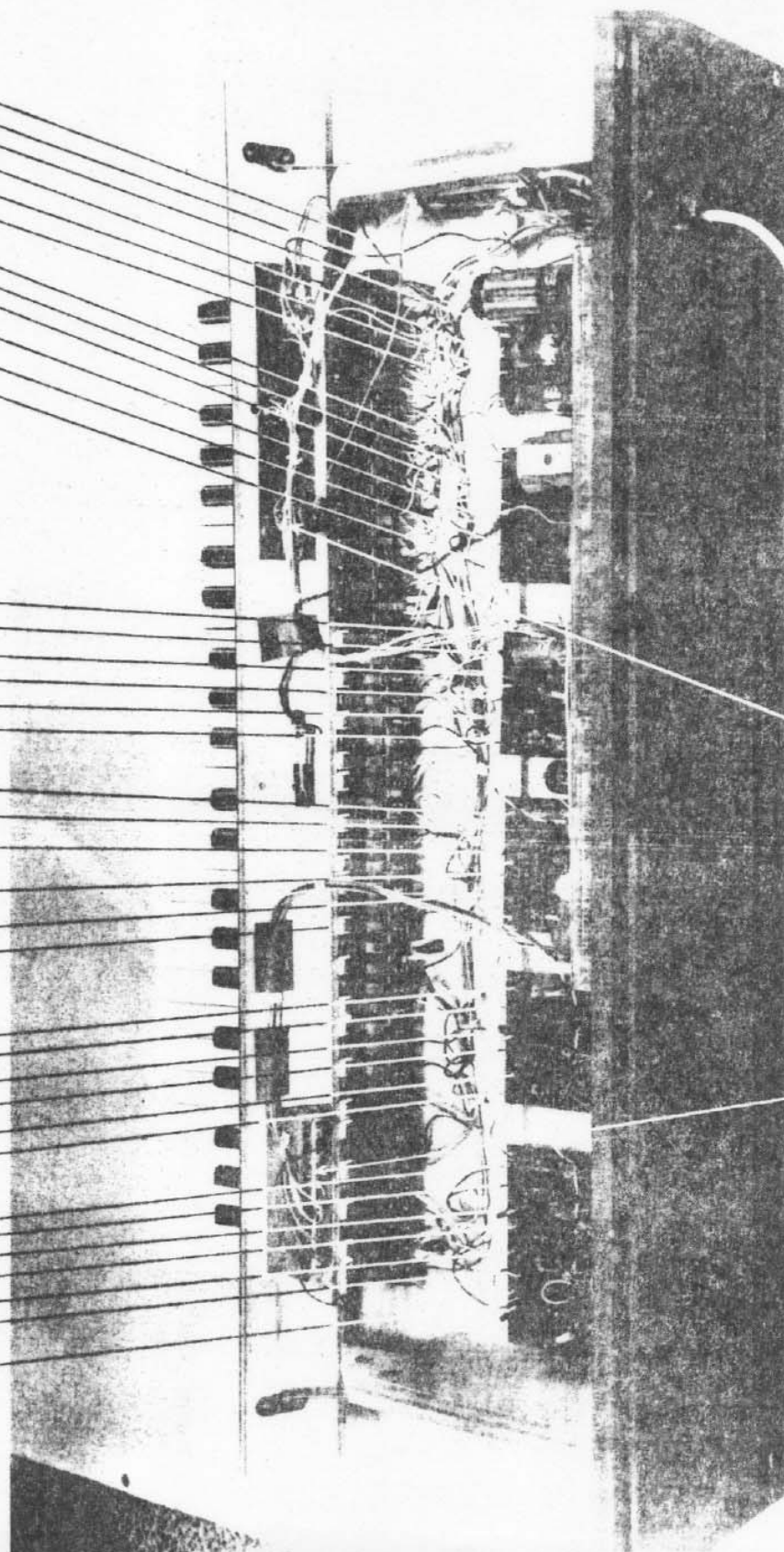


FIG. 11 ATTENUATOR FOR EXTERNAL HI-FI AMPLIFIER



ORGAN TRAY

BROWN
 RED
 ORANGE
 YELLOW
 GREEN
 BLUE
 VIOLET
 GREY
 WHITE
 BLACK
 BROWN
 RED
 ORANGE
 YELLOW
 GREEN
 BLUE
 VIOLET
 GREY
 WHITE
 BLACK
 WH/BROWN
 RED
 ORANGE
 YELLOW
 GREEN
 BLUE
 VIOLET
 GREY
 WHITE
 WH/BLACK
 RED
 YELLOW
 WH/GREEN
 BLUE
 VIOLET

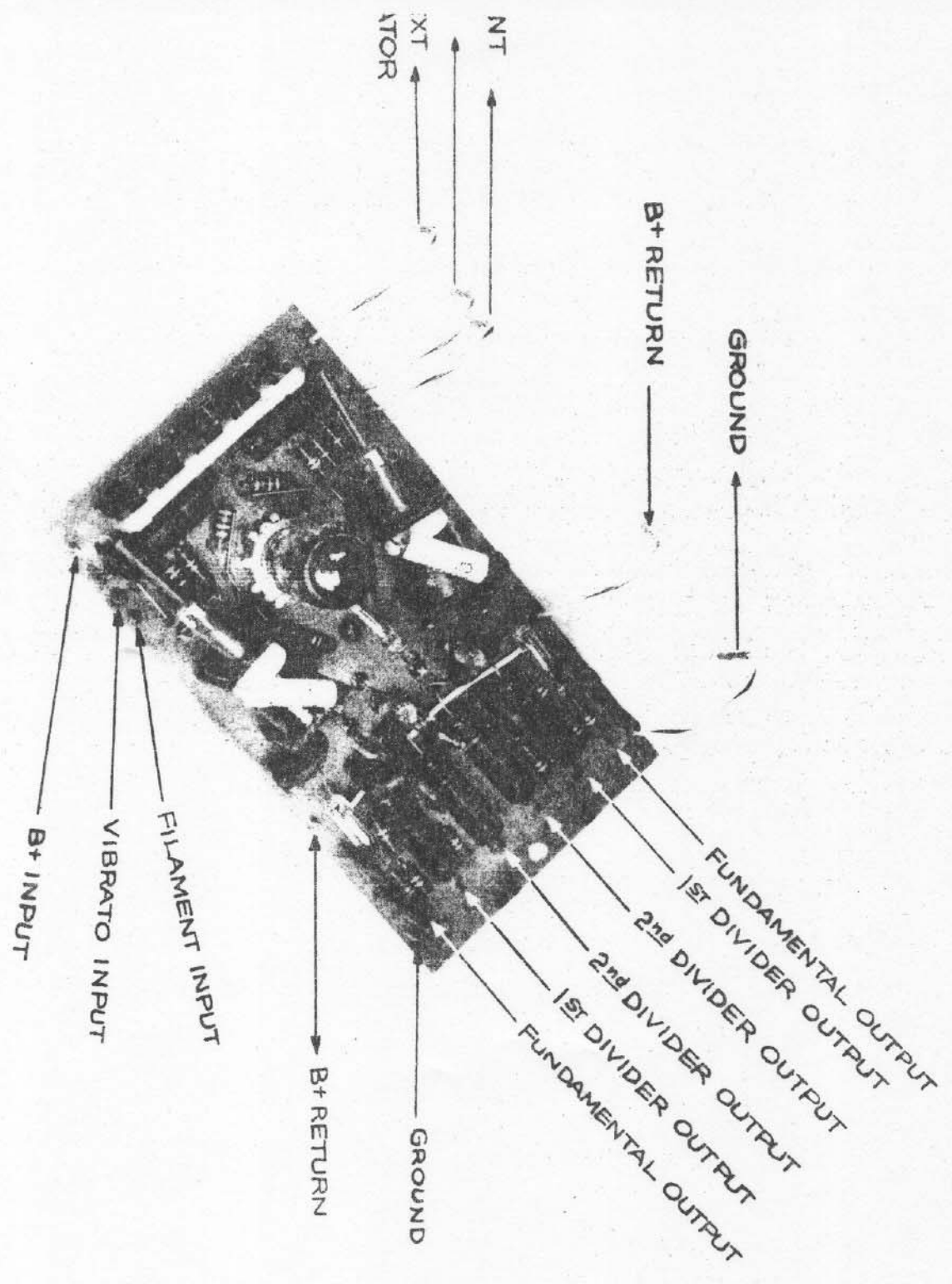


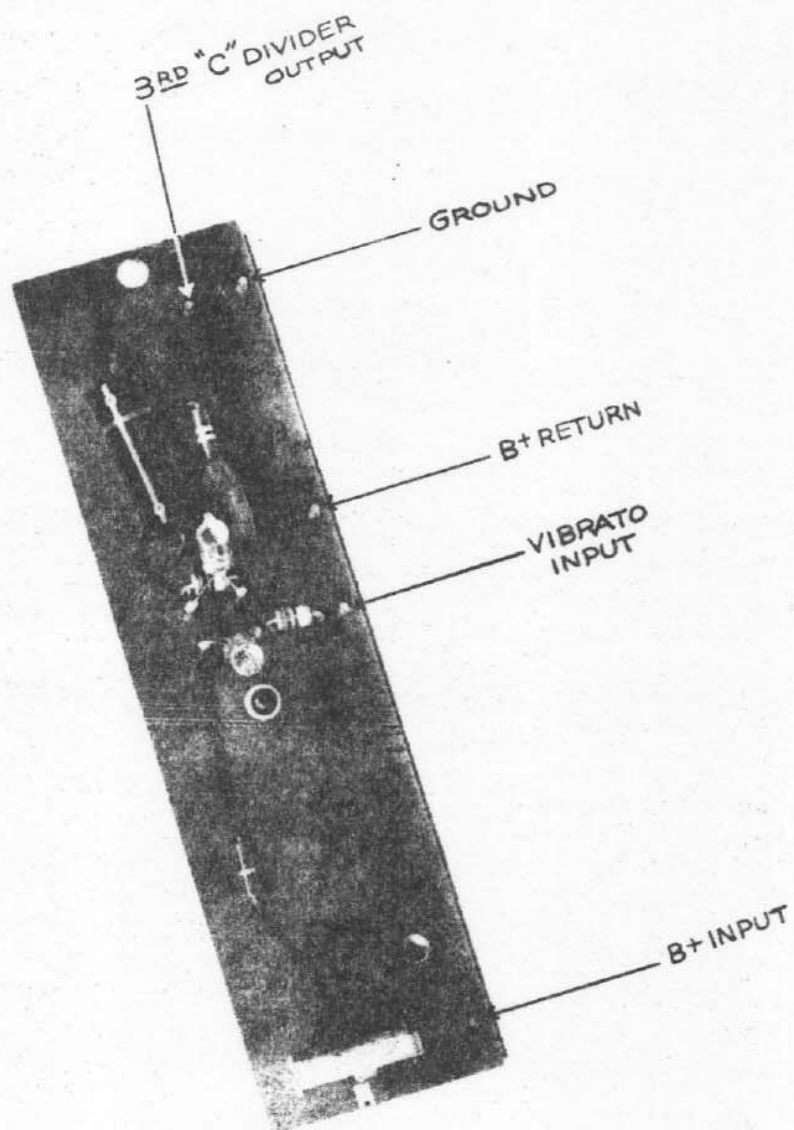
CONTROL PLATE

VOICE SWITCH
ASSY

ORGAN TRAY

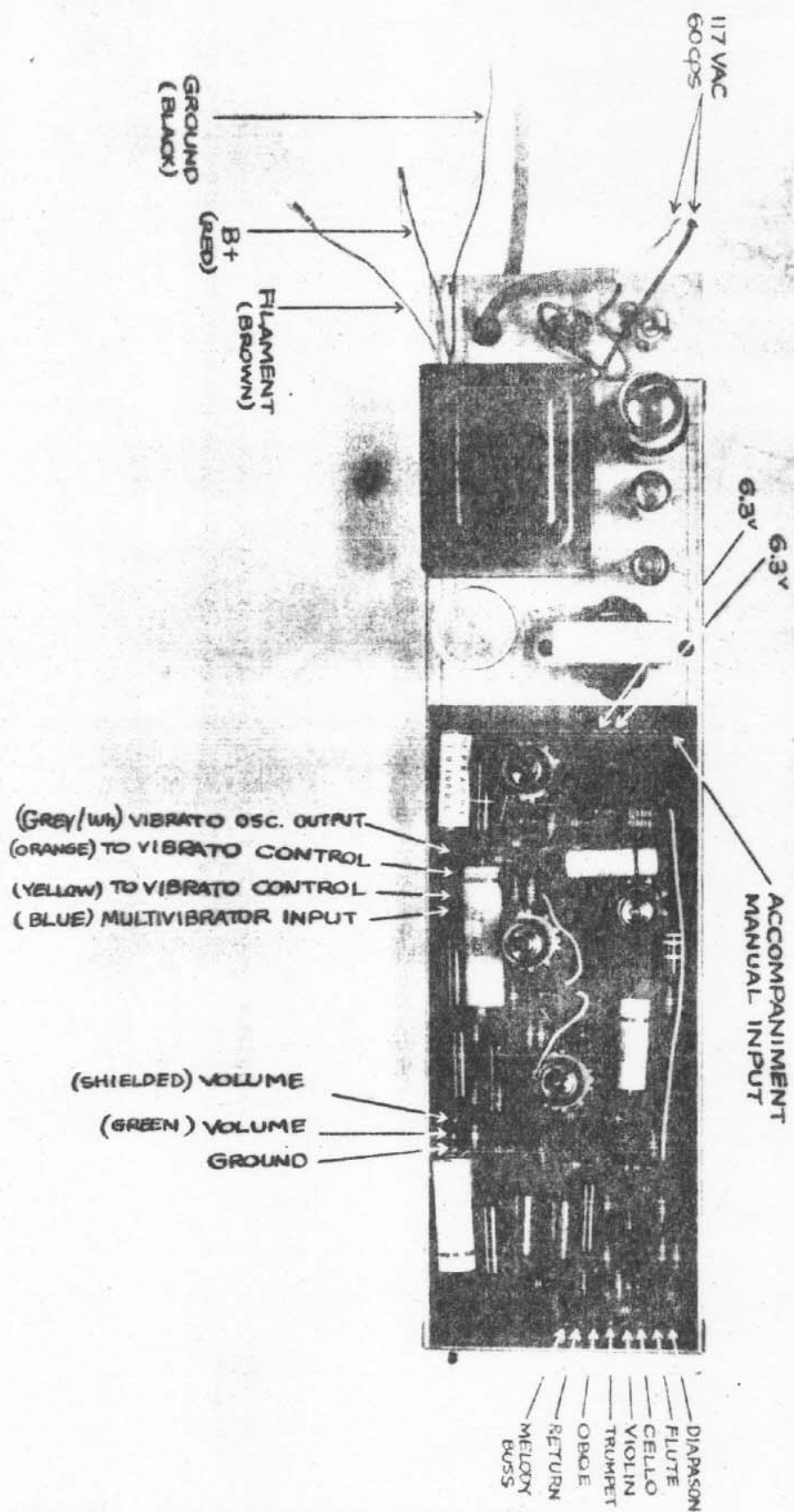
TONE GENERATOR

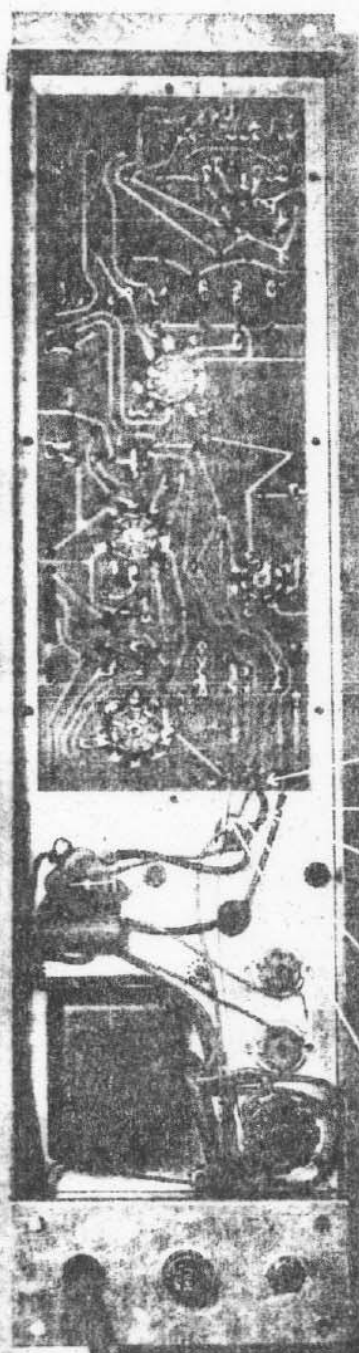




"C" DIVIDER BOARD

POWER SUPPLY AND AMPLIFIER



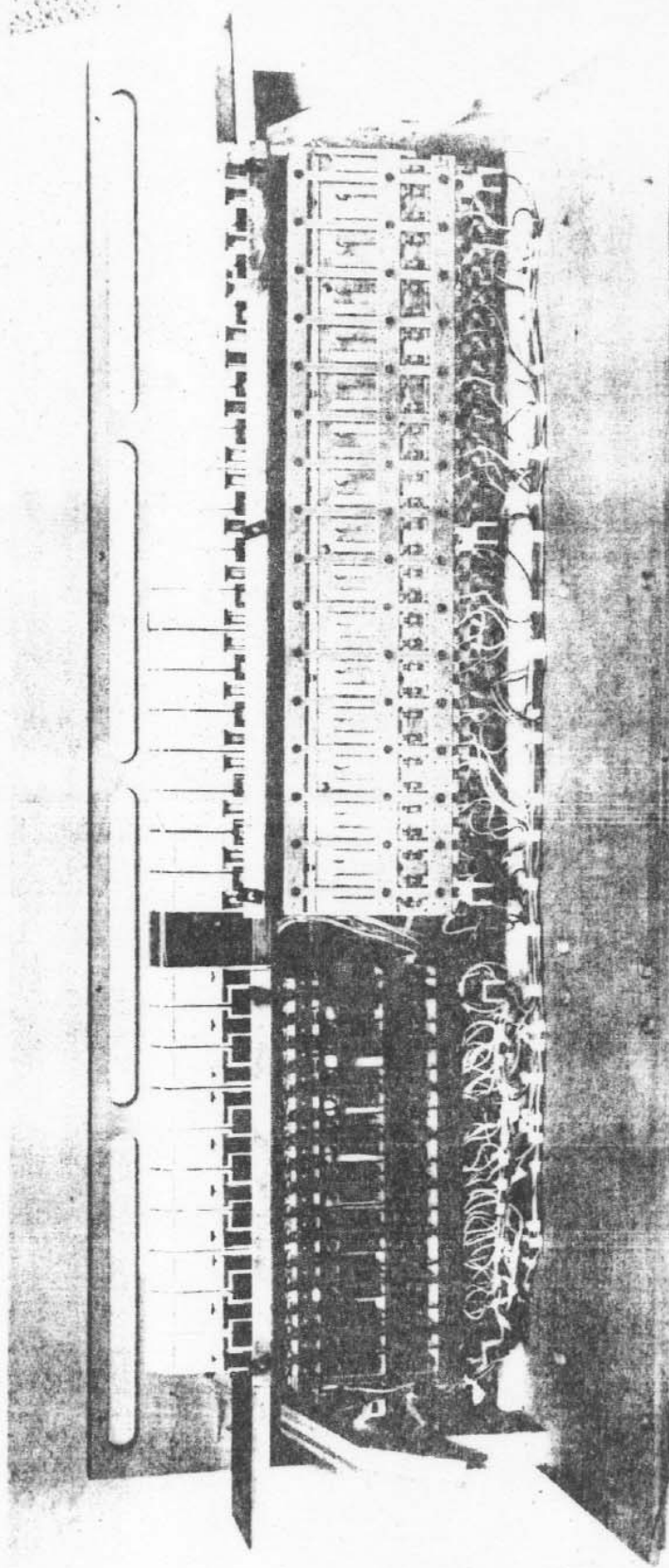


(RED) B+

(BLUE)
OUTPUT TRANSFORMER

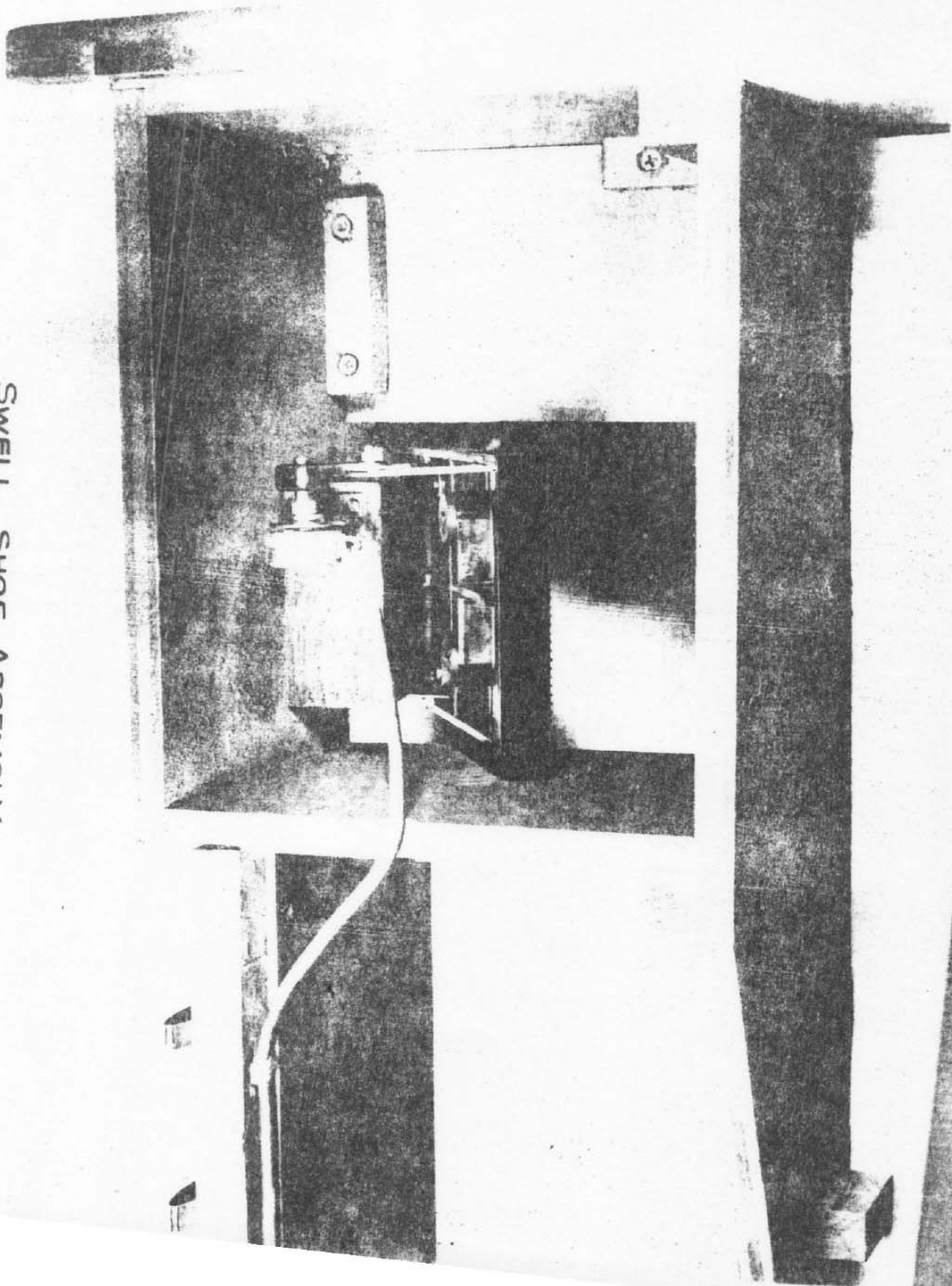
(GREEN)
OUTPUT TRANSFORMER

(GREEN) TO SPEAKER
6.3V FILAMENT

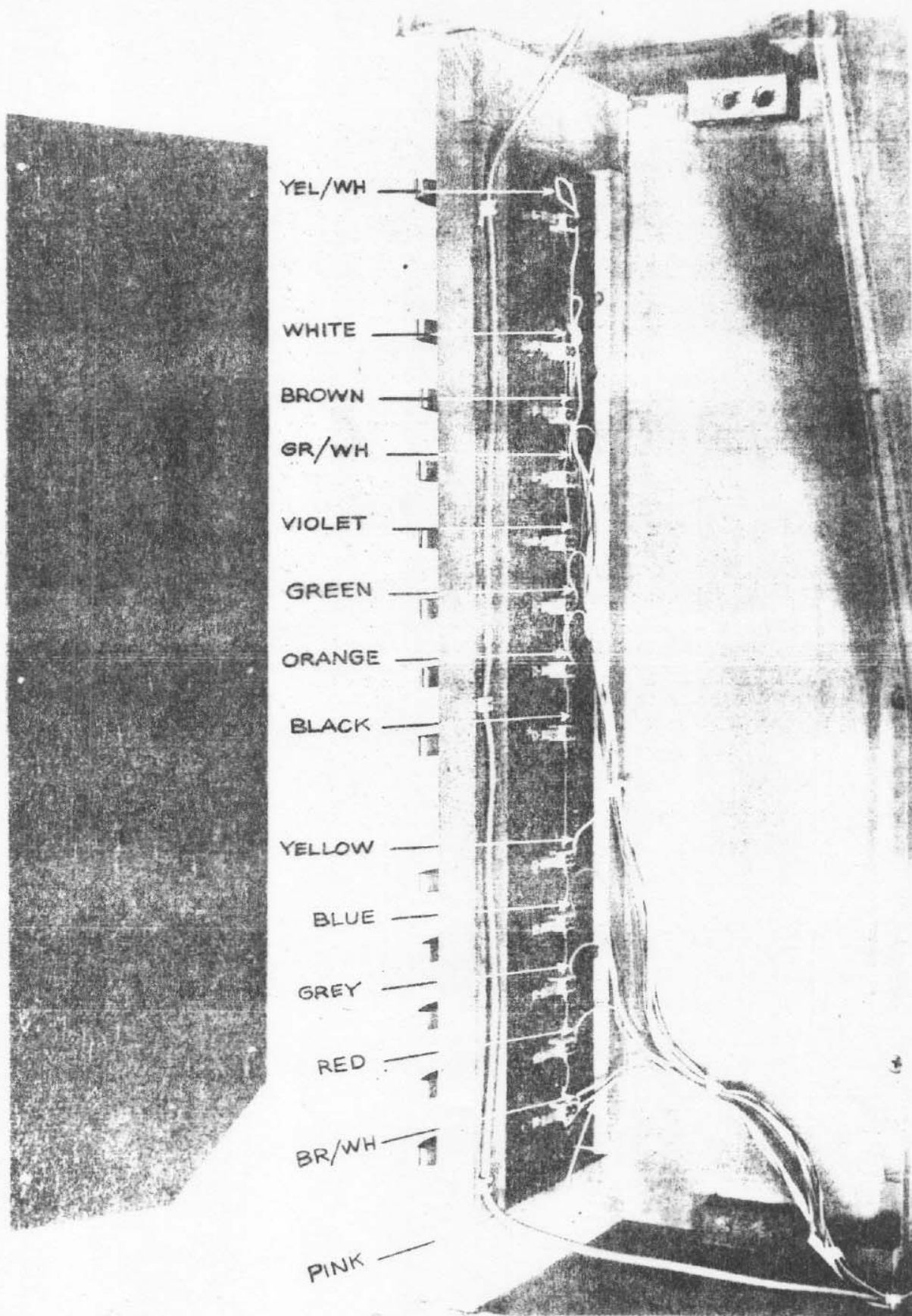


BOTTOM VIEW OF KEY SWITCHES

SWELL SHOE ASSEMBLY



BASS PEDAL ASSY



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SERVICE BULLETIN No.1

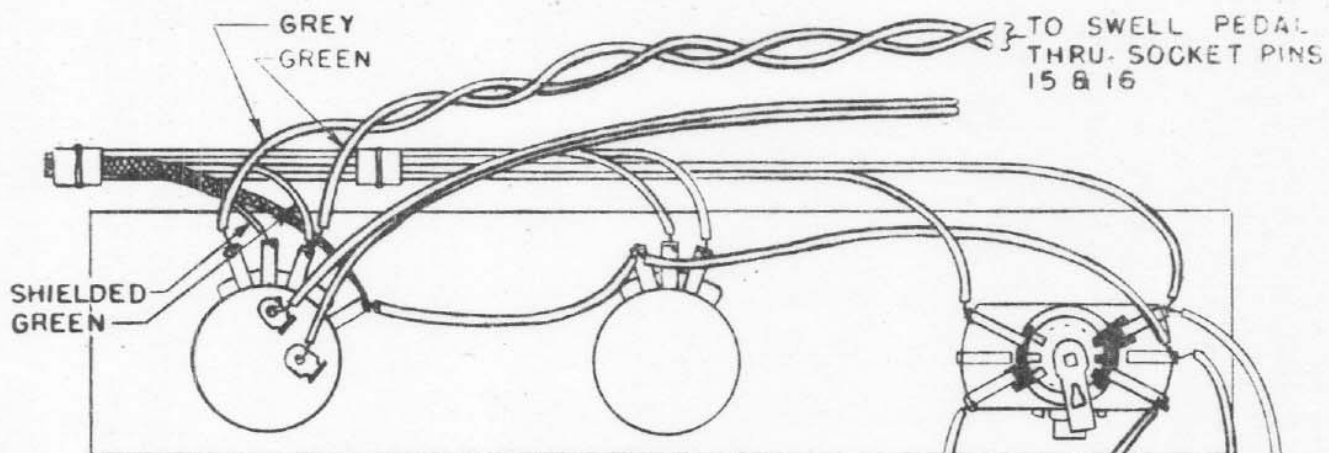
INSTRUCTIONS FOR ADDING BALANCE CONTROL

This bulletin includes instructions and schematic to change volume control on panel to balance control. (Model 6200 only.)

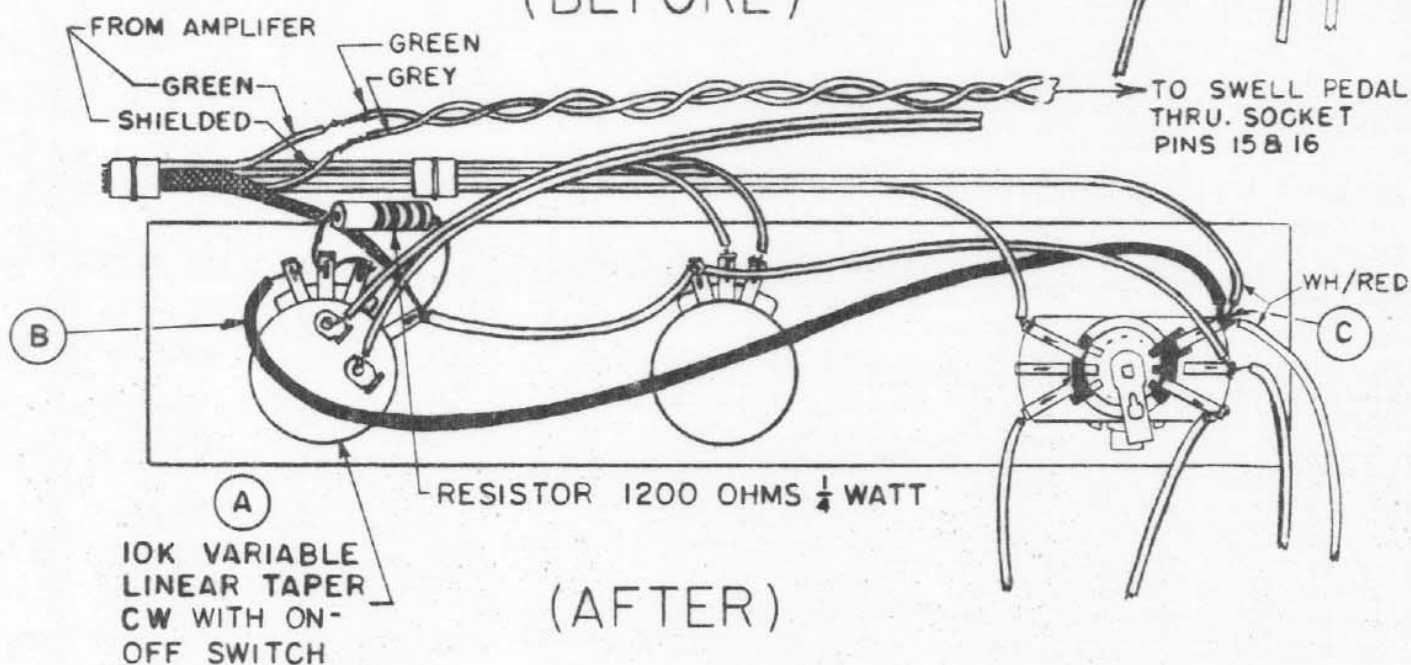
The balance control allows volume of accompaniment manual and pedal notes to be balanced with the solo manual.

- Step 1. Remove all screws from back of tray and one screw under front edge of tray.
- Step 2. Remove plug located in speaker port and carefully pull out tray.
- Step 3. Remove screws from each end of control panel and center brace.
- Step 4. Tilt panel forward using caution at all times to insure some slack in all lead wires.
- Step 5. Remove four (4) wires from volume control tabs and two (2) power leads from the switch.
- Step 6. Remove all three (3) control knobs.
- Step 7. Remove three (3) wood screws holding control plate.
- Step 8. Replace volume control E-V Part #46159 with balance control E-V Part #46165 A.
- Step 9. Add wire B and connect to chord switch C as shown.
- Step 10. Add 1200 ohm 1/4 watt resistor as shown.
- Step 11. Splice wires removed from volume control as shown. Solder and tape. Resolder power leads.
- Step 12. Reassemble control plate, knobs and control panel. Replace screw in control panel brace.
- Step 13. Clip and remove the 10K 1/4 watt resistor indicated in the photo.
- Step 14. Slide tray back into cabinet, replace plug and screws.

NOTE: Always pad keyboard when repairing or reviving the organ to prevent scratches on plastic keyboard.

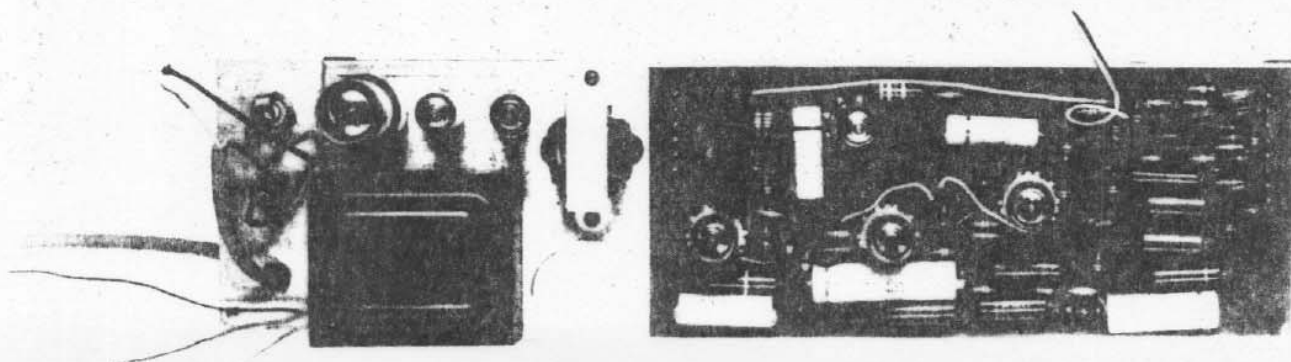


(BEFORE)



(AFTER)

REMOVE 10K $\frac{1}{2}$ WATT RESISTOR



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SERVICE BULLETIN No.2

INSTRUCTIONS FOR CORRECTING NOISY PEDALS

This bulletin includes instructions for replacing rubber stops with felt (Part #3126) (Model 6200 only)

Noisy pedals are caused by rubber up-stop working off metal stop. Using felt (Part #3126) will correct and make permanent installation. This is a production change.

Step 1--Disconnect power cord, remove all items from top of organ and pull far enough from wall to lay organ on its back.

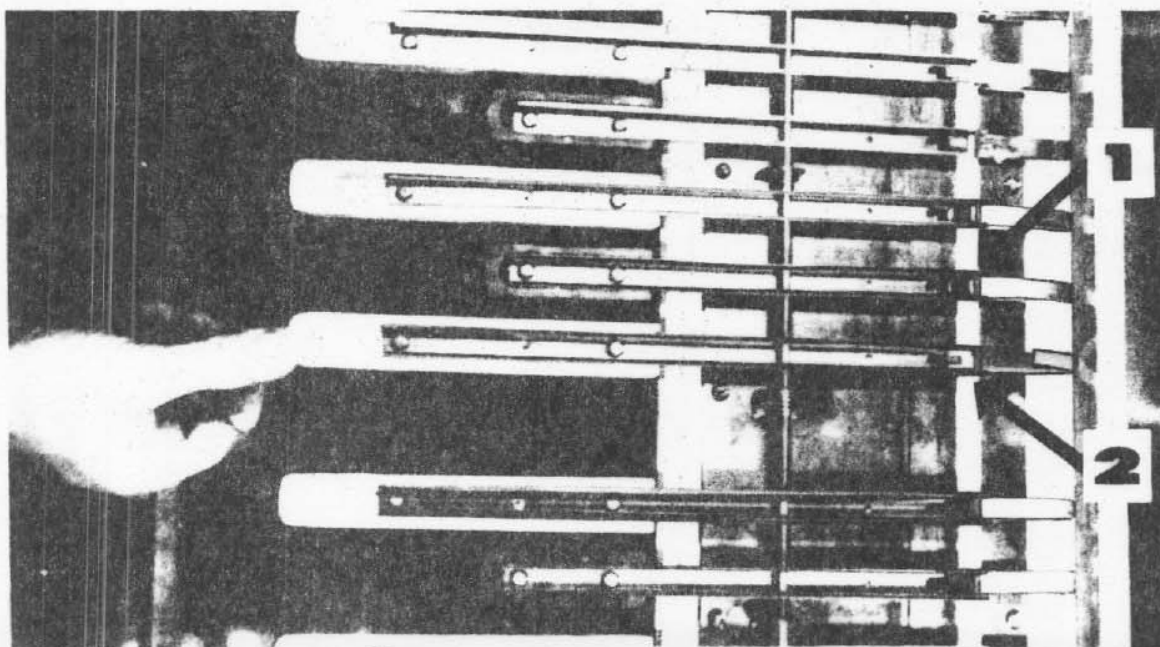
Step 2--Lay organ on its back.

Step 3--Remove rubber stops indicated by Arrow 1.

Step 4--Remove spring from under pin in pedal channel as shown by arrow No. 2 in photo.

Step 5--Cut piece of felt 5/8" long. Remove backing and place in channel with adhesive surface toward channel. Felt should run from metal stop to end of channel under pin. Take screwdriver and press felt against metal.

Step 6--Replace spring.



INSTRUCTIONS FOR REPLACING PLASTIC KEYS

This bulletin includes instructions for replacing keys on Model 6200 and 6210 organs.

Replacement keys are ordered by note designation such as A-B-C-D-E-F-G, top C and black key.

Step 1--Remove tray from console. (Refer to Service Manual, Chapter X, Section A.)

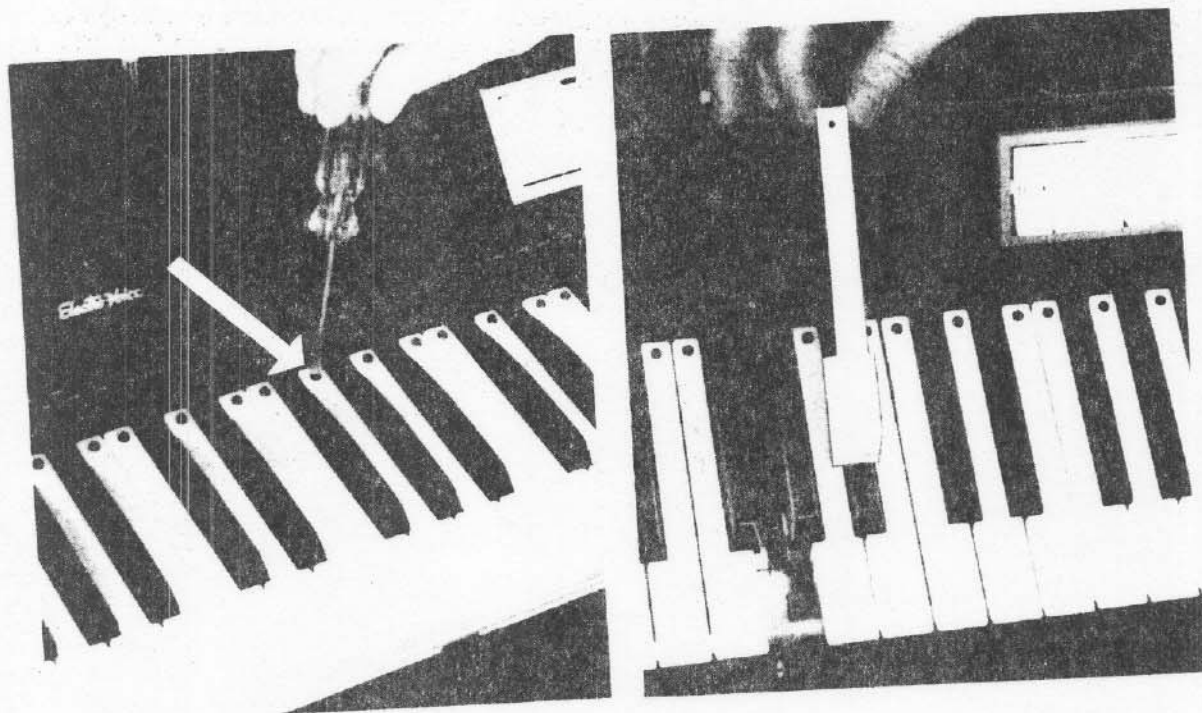
Step 2--Loosen control panel and tilt up exposing screws as shown in Photo 1.

Step 3--Remove screw of key to be replaced as shown in Photo 1.

Step 4--Remove key by sliding forward off and of channel as shown in Photo 2.

Step 5--Reverse procedure to install replacement key.

To Replace Black Keys: Remove two adjacent white keys before removing black key.



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should be $1/32$ to $1/16$ inch above the keys.

To correct:

1. Remove tray and adjust to proper height.
2. Control panel can sometimes be adjusted in console by placing thumbs against the panel and pushing upward.

✓ Sticking keys may be caused by flashing on plastic rubbing on adjacent key.

To correct:

1. Use small pen knife to scrape flashing from plastic key.

✓ Sticking keys may be caused by improper spacing between adjacent keys.

To correct:

1. Remove tray from organ console.
2. Locate up-stop/down-stop tab under incorrectly spaced key. This tab is a vertical metal tab about $1/8$ " wide going up into key channel and can be seen by looking up under the keys from the front.
3. With long-nose pliers, twist tab to left or right to correct spacing of key.

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SERVICE BULLETIN No.5

INSTRUCTIONS FOR DETERMINING OSCILLATOR SUB ASSEMBLY REPLACEMENT

This bulletin is a guide for determining when an oscillator sub-assembly should be replaced.

Refer to Chapter IX, Chapter X section B and Figure 5 of the Service Manual.

VIBRATO MUST BE ON FULL BEFORE SYNCHRONIZING.

When synchronizing, the oscillator sub assembly should be replaced if the following conditions are evident:

1. After checking 12AX7 tube, the note will not sync.
2. If sync range is less than 25 degrees.
3. If note will drop out of sync only in one direction. Reference is to the sync range being to close to the control stop and the sync range is less than 25 degrees.

These precautions will eliminate service problems.

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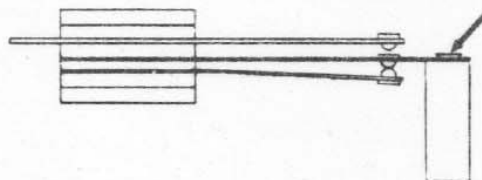
SERVICE BULLETIN No. 6

INSTRUCTIONS FOR STOPPING VIBRATION AND NOISY PEDAL SWITCHES

This bulletin gives instructions for stopping noisy pedal switches.

A buzzing, sympathetic vibration or a pedal up stop noise in the pedal board can be traced to the actuator on the pedal switch.

BASS PEDAL SWITCHES



The arrow indicates fastener holding actuator to switch blade. When the rivet is loose, cement to blade with epoxy or cement.

BE SURE - All wood pedals are tightened to metal channels.

To gain access to pedal switches, remove lower back panel and masonite cover over pedal switch assembly.

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SERVICE BULLETIN No. 7

INSTRUCTIONS FOR ADJUSTING SWELL SHOE

This bulletin gives instructions for adjusting swell shoe that is loose or tight.

- Step 1 - The swell shoe is bolted to wood block with a long bolt inserted through wood block.
- Step 2 - Place organ on its back. Use two small wrenches to loosen bolt and remove friction nut on swell shoe. Remove two wood screws and loosen third screw holding wood block to bottom of cabinet. Turn wood block to remove bolt.
- Step 3 - The two outside nylon washers should be removed and replaced with spring washers. Washer size O.D. 1/2" I.D. 1/4". Available from Organ Division, Service Department. Nylon washers to be used only between wood block and swell shoe bracket. The bolt should be lubricated with powdered or stick graphite.
- Step 4 - Reassemble, making sure there is adequate tension on spring washers. Be sure swell shoe is centered and square in cabinet opening.

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This bulletin includes instructions for replacing key switch.

To determine if key switch is broken:

1. Note does not sound. Example: "B" in top octave does not sound, but all other "B" notes sound.
2. Check solder lead to key switch assembly.
3. Check malco connector to tone generator.

If all these points have been checked the key switch is broken or bent.

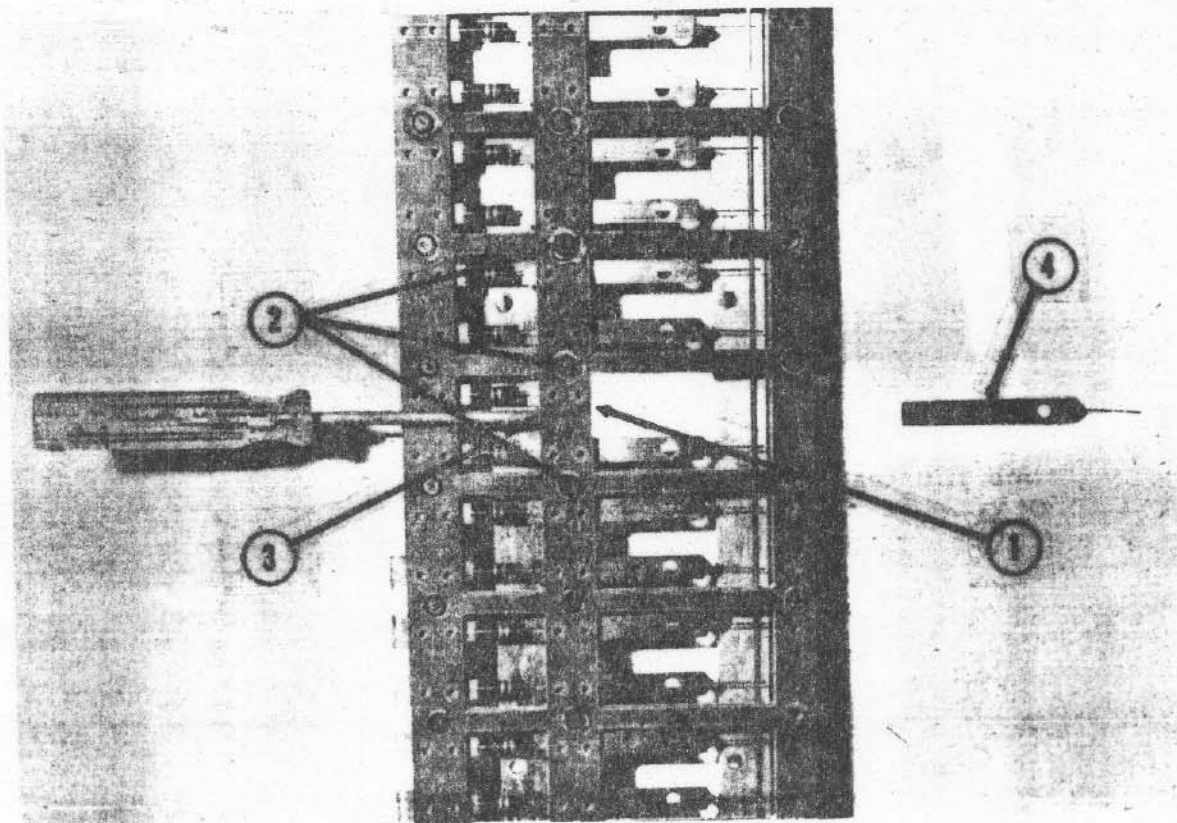
SYMPTOMS:

1. Note does not sound until key is fully depressed.
2. Note sounds if key is depressed down with extreme pressure.

See illustration on other side.

To replace key switch on solo manual.

4. Tilt keyboard up and locate broken key switch.
5. With scissors or side cutters cut off key switch next to lamination as shown in photo. Arrow 1
6. Loosen bolts holding laminations together in area of broken key switch. Photo: Arrow 2
7. Pry open lamination and insert replacement key switch. Photo: Arrow 3
8. Insert replacement key switch. Photo: Arrow 4 and Arrow 1.
9. Line up properly the replacement key switch; BE SURE that replacement is inserted into same location and making contact with blade in lamination.
10. Reverse procedure for assembly.



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Instruction for servicing Electro-Voice organ Model 6200 with
Serial numbers 5000 or over.

This bulletin includes instructions for servicing tray assembly tray
removal, pedal switch adjustment and fuse replacement.

SERVICING TRAY ASSEMBLY IN ORGAN CONSOLE:

- 1 - Remove lower back panel.
- 2 - Remove screws from tray back and one screw below keyboard.
- 3 - Remove staples holding Voicing Cable to cabinet.
- 4 - Slide tray assembly out of the cabinet feeding cable through opening till tray assembly is accessible for servicing.

NOTE: It may be necessary to remove staples on Power cable and
Pedal cable to slide tray out far enough for servicing.
(See Photo)

TO REMOVE TRAY ASSEMBLY FROM CABINET:

- 1 - Remove lower back panel.
- 2 - Remove screws from tray back and one screw below keyboard.
- 3 - Disconnect Power cable from amplifier and speaker leads from
speaker. Remove staples from cabinet. (See Photo)
- 4 - Disconnect two pedal cable plugs from tray assembly. (See Photo)
- 5 - Disconnect Voicing cable from amplifier and remove staples holding
cable to cabinet. (See Photo)
- 6 - Slide tray out of cabinet 2 or 3 inches allowing access to Voicing cable
and pull through cabinet opening into tray assembly.
- 7 - Remove tray from organ.