

# WURLITZER® ELECTRONIC PIANOS

## *Service Manual*

MODELS 200 • 203 • 203W • 206 • 207 & 207V • 214 & 214V



Model 200



Model 203



Model 203W



Model 214 & 214V



Model 206



Model 207 & 207V

THE WURLITZER COMPANY - DEKALB, ILLINOIS 60115

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Find high-res versions of just the schematics (as well as additional service manuals) at [tropicalfishvintage.com/schematics](http://tropicalfishvintage.com/schematics)

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WURLITZER ELECTRONIC PIANOS

MODELS 200, 203, 203W, 206, 207, 207V, 214 & 214V

SPECIFICATIONS AND DESCRIPTION

MODEL 200 (PROFESSIONAL PORTABLE)

|   |                          |
|---|--------------------------|
| Keyboard Range:   | 64 Notes, A-13 thru C-76 |
| Height (From Floor to Top of Keys With Legs):                                   | 28 5/8"                  |
| Height of Case (Less Legs):   | 7 1/8"                   |
| Height (From Floor to Top of Case, Not Including<br>Music Panel):               | 33"                      |
| Overall Width:  | 40"                      |
| Overall Depth:  | 18 9/16"                 |
| Weight: (Less Legs and Pedal)   | 56 lbs.                  |
| Legs: Removable chrome plated steel legs, two of which<br>have leveling glides. |                          |

MODELS 203, 203W, 206, 207, 207V, 214 & 214V

The Models 203 and 203W are home consoles, the 206 is a student's piano for group instruction. The Model 207 is the teacher's console. The Model 214 is a classroom console. The 207V and 214V have the switches, wiring and plugs installed for simple installation of the Model 208 Keynote Visualizer.

|  |                          |
|--|--------------------------|
| Keyboard Range   | 64 Notes, A-13 thru C-76 |
| Height (From Floor to Top of Keys):                    | 28 5/8"                  |
| Overall Height (Not Including Music Panel or Casters): | 32 7/8"                  |
| Overall Width:   | 40"                      |
| Overall Depth:   | 18 9/16"                 |
| Weight:  | Approx. 150 lbs.         |

NOTE: The Following Information Applies to All Models Except  
as Noted.

BENCH:

Wood bench with removable chrome plated steel legs, two of  
which have leveling glides.

KEYBOARD:

Sugar Pine keyboard, naturals are covered with white Implex  
plastic, sharp tops are black molded plastic.

ACTION:

Wurlitzer manufactured action, employing conventional action  
parts such as whips, butts, flies (jacks), dampers, etc.

Regulates Like a Conventional Piano Action.

HAMMERS:

Three ply maple covered with mothproofed felt.

TONE SOURCE:

Hammers strike Swedish Sandvik steel reeds, causing them to  
vibrate in a polarized electrostatic field.

SPEAKERS:

Following is listed the various models showing the description  
and number of speakers used in these instruments:

Model 200 - Two 4" x 8" oval.

Model 203 - Two 4" x 8" oval plus two 8" round or four 8"  
round.

Model 203W - Four 8" round.

Model 206 - Two 4" x 8" oval or two 8" round.

Model 207 - One 6" x 9" oval or one 8" round or two 8" round.

Model 207V - Two 8" round.

Model 214 & 214V - Four 8" round.

(Refer to schematic diagram for matching output impedance to

speaker impedance).

POWER REQUIREMENTS:

Models 200, 203, 203W, 206, 207 and 214: 40 watts.

Models 207V and 214V: 100 watts.

All operate from 117 volt, 50/60 Hertz A.C. Three wire center grounded A.C. cord available.

## AMPLIFIER - DESCRIPTION OF MODELS 200, 203, 206 and 207

The 200 Series Amplifier consists of six basic sections which are as follows: low voltage power supply, low voltage regulator, high voltage polarizing supply, pre-amp vibrato modulator, vibrato oscillator, and power output stage. (Refer to Schematic Drawing #11-0783)(201904-S-1-E-1)

The low voltage power supply is a conventional full wave rectifier design consisting of power transformer step-down winding, rectifier D-2 and D-3, and a filter capacitor C-6. The supply delivers 42 volts positive in respect to ground to both the output stage and the input of the low voltage regulator.

The voltage regulator consists of a limiting transistor TR-6, a voltage sensing transistor TR-5, and associated stage resistors and capacitors. This regulator maintains a 15.5 ( $\pm 20\%$ ) positive voltage output with a minimum amount of voltage fluctuation and AC ripple.

The reed pickups, mounted on the reed bar are 160 to 170 volt DC above ground. This is a polarizing voltage used to develop a capacitive type input signal pickup. A power transformer step-up winding, D-1, R-2, R-3 and R-5, C-3 and C-4, form this high voltage polarizing supply. It is a half wave rectifier followed by a pi filter network and bleeder resistor. Because of R-56, a 560K OHM resistor in series with the output, the supply can deliver only a very small amount of current to the reed bar, minimizing shock hazard.

TR-1, TR-2 and TR-3 form the pre-amp and vibrato modulator section of the amplifier. TR-1, an impedance matching stage, changes the high reed bar impedance into a medium to low impedance, matching the impedance of the gain amplifier TR-2. Little or no gain can be

expected from TR-1. TR-2 and TR-3 is the high gain vibrato modulator. Degenerative feedback from TR-3 is applied to TR-2. This degenerative feedback is shorted to ground at a vibrato oscillator rate via D-5, C-53, and C-46. Because of the alternating level of degenerative feedback applied to TR-2, the signal is amplitude modulated at a vibrato oscillator frequency.

The vibrato oscillator is preset to a frequency of 5.75 cycles per second. TR-4, a Darlington Pair transistor, and a phase shift network make up the component compliment for this phase shift oscillator.

The output stage is a complimentary circuit consisting of TR-7, TR-8, TR-9, TR-10 and D-4. Each transistor is directly coupled therefore, biasing each other. D-4 is a heat compensating sensor, lowering the gain level when the stage is over-driven and forced into a danger heat operating range.

TOP (ALL FOUR MODELS):

ABS (Acrylontrile-Butadiene-Styrene) molded plastic top, hinged at the back. Secured to the keybed with three (3) screws thru the keyslip.

PEDAL SUSTAIN:

Lifts dampers, permitting tone to sustain as in a conventional piano. (Detachable on Model 200 portable, built in on console models)

OPTIONAL EQUIPMENT:

Model 206 - Bench is optional, as well as the special A.C. cable, part #11-1074 (202744), permitting a 206 to be taken out of a lab installation and used as a separate or individual piano.

Models 200 and 203 - Bench and headphones are optional.

CARRYING CASE (FOR MODEL 200 PORTABLE):

A heavy duty carrying case, Model 233A is available thru the Sales Department. See pages 6A and 6B for photos and instructions for use.

PREPARATION OF THE PIANO FOR SERVICING (SEE FIG. 1, PAGE 7)

Unplug the piano from AC outlet. To remove the top assembly, remove the three (3) Phillips head screws that hold the keyslip down to the keybed, take out the two (2) screws that hold the music panel in place, remove the control knobs. (It may be necessary to pull the front of the top slightly forward to clear the shafts which hold the control knobs.) Lift the keyslip portion until nearly vertical and unhook the three hinges at the back side of the top.

If the service needed is to correct a trouble with the amplification, the printed circuit board can now be removed and turned over for checking without unsoldering the leads at each end.

If the service required is regarding the keys or action, the entire chassis assembly should be removed as follows:

NOTE: If any of the four models have a screw that fastens the heat sink on the printed circuit board to the reed bar, remove the screw and discard it.

MODEL 200 (PORTABLE): (SEE FIG. 1, PAGE 7)

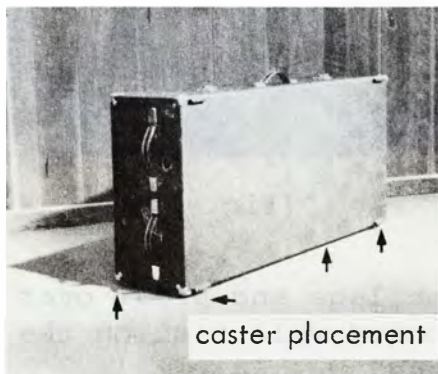
1. Unplug the input cable at the bass end of the printed circuit board.
2. Loosen the six screws that hold the shield to the reed bars and remove the shield by lifting straight up.
3. Unplug the white plastic plug behind the left side of the speaker (AC line).



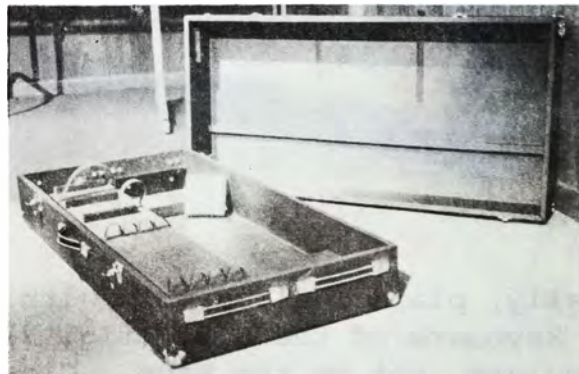
INSTRUCTION SHEET:

CARRYING CASE - MODEL 233A  
for  
WURLITZER ELECTRONIC PIANO - MODEL 200

- A. Remove the case from the shipping carton (fig. 1). To open, lay case flat on floor and unlatch the four locks. (Note: the locks are placed in different positions on each side of the case to avoid improper closing.)
- B. Inside the case is a box containing four 1½" chrome casters to be attached on the bottom or end of the case, as you see fit. These casters are designed primarily for use indoors on floors or carpet; if the case is to be moved on sidewalks or on any rough ground, it is suggested that you purchase 2" (or larger) rubber casters.

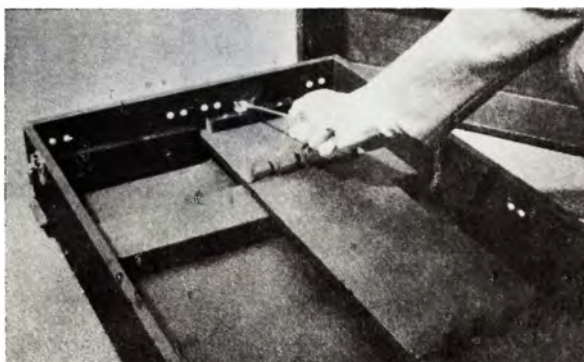


(fig. 1)

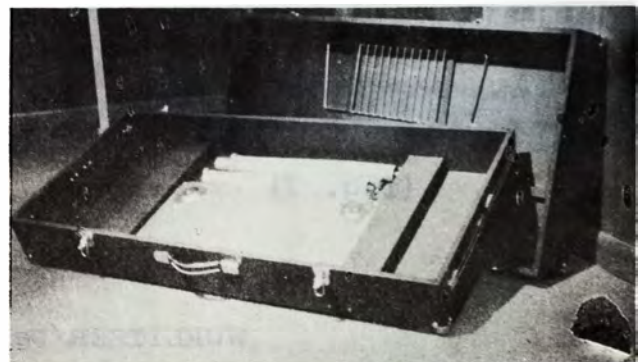


(fig. 2)

- C. Inside the case you will find a covered board with elastic straps designed to hold the piano legs and the expression pedal (fig. 2). During initial shipment of the empty case, this board is secured by two metal clamps located at each end. Using a Phillips screwdriver, remove these clamps (fig. 3) and dispose of them. Now take the board out of the case.
- D. Place the piano bench in the bottom of the case (fig. 4) with the bench legs alternated alongside. Slip the music panel under the elastic straps in the top as shown . . . be sure the rack lies in flat with screw arms facing you.



(fig. 3)

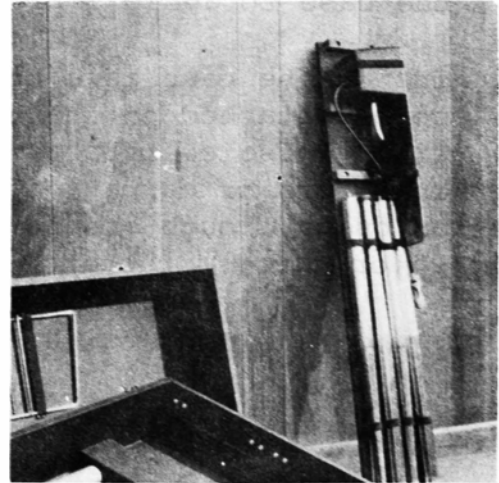


(fig. 4)

- E. Place the Electronic Piano over the bench parts in the carrying case with keybed toward the front handle (fig. 5).
- F. Alternate the piano legs through the elastic straps on the board (fig. 6). Then, place the expression pedal into position through the straps provided.



(fig. 5)

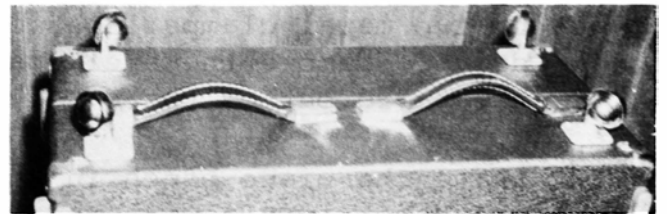


(fig. 6)

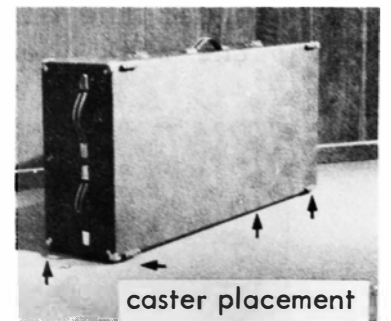
- G. Finally, place the assembly with the piano legs and pedal over the keyboard of the E.P. (fig. 7). The board will rest on the piano arm, not on the keys. Close the case.
- H. Fig. 8 shows ways to install the casters on the end of the case for upright mobility or on the bottom.



(fig. 7)



(fig. 8)



THE WURLITZER COMPANY

DE KALB, ILLINOIS

(2) 4" x 8" Speakers  
Pt. #202243

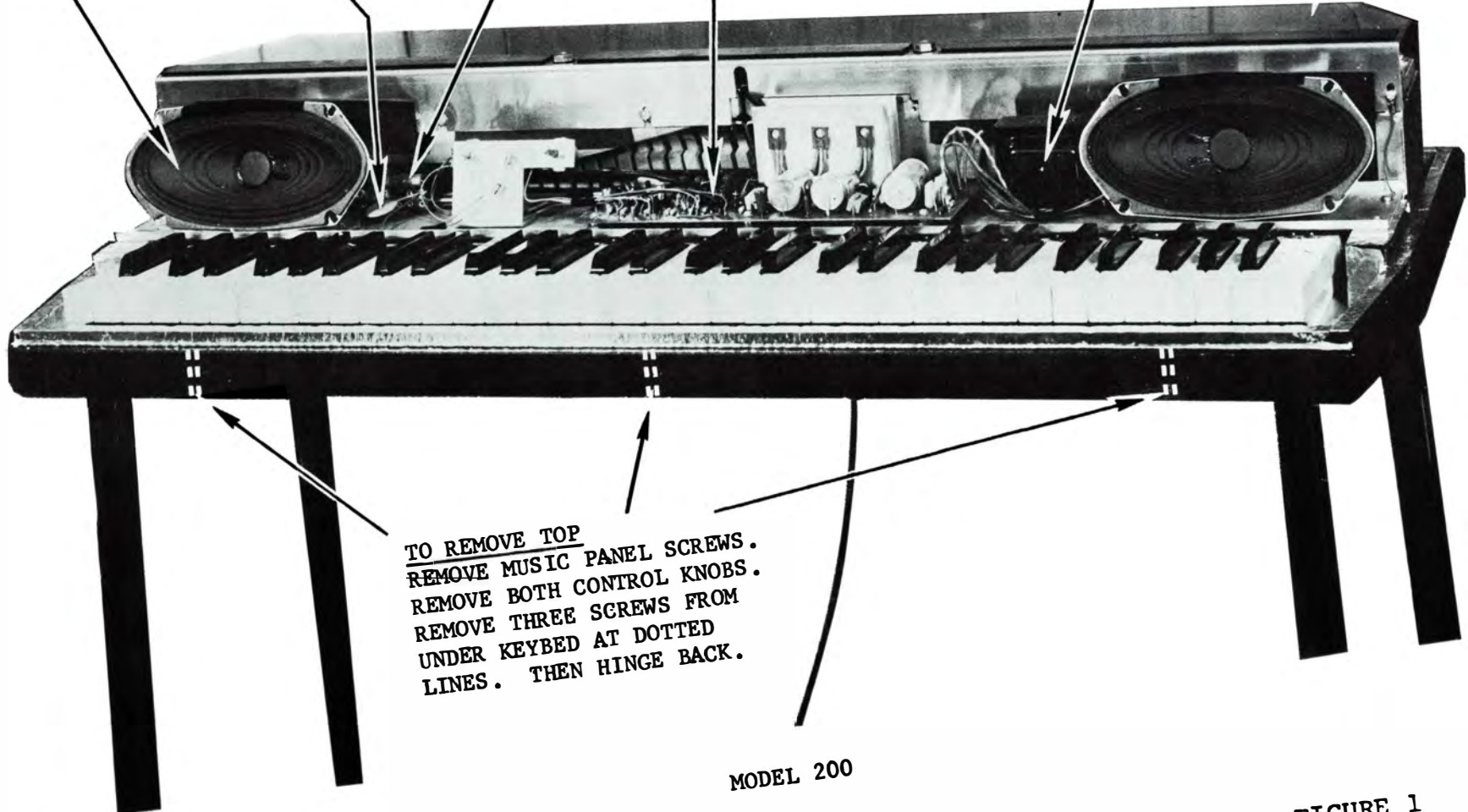
Capacitor  
Pt. #501181

Fuse  
Pt. #77055-12

P.C. Board Complete  
Pt. #201808

Power Transformer  
Pt. #201807

Shield Assembly  
Pt. #201838



TO REMOVE TOP  
REMOVE MUSIC PANEL SCREWS.  
REMOVE BOTH CONTROL KNOBS.  
REMOVE THREE SCREWS FROM  
UNDER KEYBED AT DOTTED  
LINES. THEN HINGE BACK.

MODEL 200

FIGURE 1

4. Remove the two screws at each end of the chassis that secure it to the mounting blocks.
5. Lift up the entire chassis assembly, being careful not to damage the two phone jacks mounted on a bracket at the bass end.
6. Replace the front mounting screw in bass action bracket.

The keys and action are now exposed for any necessary regulation.

MODELS 203, 203W and 214 (HOME CONSOLES):

Follow the same procedure as for the Model 200 for steps (1) thru (4).

If there is a square white plastic nine-pin plug and socket located above the printed circuit board, unplug and remove the chassis assembly.

If there is no plug at this location, remove the three screws that hold the round mounting plates for the headphone sockets at each end of the keybed. Also remove all cable clamps used to dress the wires leading to these jacks.

Remove the lower front panel by removing the four wood screws across the top of the panel. Unplug or unsolder all cables going to the lower front panel.

MODEL 206 (STUDENT CONSOLE):

Follow steps (1) thru (4) as described for the Model 200. If there is a square white plastic nine-pin plug and socket located above the printed circuit board, unplug it and remove the entire chassis assembly.

If there is no plug at this location, remove the three screws that hold the round mounting plate for the auxiliary headphone

socket at the bass end of the keybed and the cable clamp that dresses the wires leading to this socket. The chassis assembly can then be removed.

MODEL 207 (TEACHER'S CONSOLE) :

Follow steps one, three and four as described for the Model 200. Disconnect the thirty-six pin plug and socket located near the treble end of the chassis. Disconnect all the nine-pin plugs and sockets on the chassis assembly. The entire chassis assembly can now be removed.

The five or six screws on the shield over the reed bars can now be loosened and the shield removed.

| NO. | DESCRIPTION                | NO. | DESCRIPTION           |
|-----|----------------------------|-----|-----------------------|
| 1   | NATURAL KEYFACE            | 26  | WHIP STOP RAIL        |
| 2   | FRONT RAIL PIN             | 27  | JACK SPRING           |
| 3   | SHARP CAP                  | 28  | KEY CLOTH             |
| 4   | BALANCE PIN                | 29  | CAPSTAN SCREW         |
| 5   | REED BAR                   | 30  | BALANCE RAIL          |
| 6   | HAMMER                     | 31  | BALANCE RAIL PUNCHING |
| 7   | BUTT                       | 32  | FRONT RAIL PUNCHING   |
| 8   | HAMMER REGULATING RAIL     | 33  | FRONT RAIL            |
| 9   | DAMPER                     |     |                       |
| 10  | REED                       |     |                       |
| 11  | DAMPER LEVER               |     |                       |
| 12  | DAMPER RAIL                |     |                       |
| 13  | DAMPER FLANGE              |     |                       |
| 14  | DAMPER REGULATING SCREW    |     |                       |
| 15  | GROMMET                    |     |                       |
| 16  | DAMPER LEVER CLIP          |     |                       |
| 17  | DAMPER RAIL LIFT ARM       |     |                       |
| 18  | BUTT FLANGE                |     |                       |
| 19  | DAMPER CONNECTING ROD      |     |                       |
| 20  | MAIN RAIL                  |     |                       |
| 21  | FLY                        |     |                       |
| 22  | WHIP FLANGE                |     |                       |
| 23  | SUSTAIN SPRING             |     |                       |
| 24  | WHIP                       |     |                       |
| 25  | REGULATING (LET-OFF) SCREW |     |                       |

# WURLITZER ELECTRONIC PIANOS

## MODEL 200 SERIES

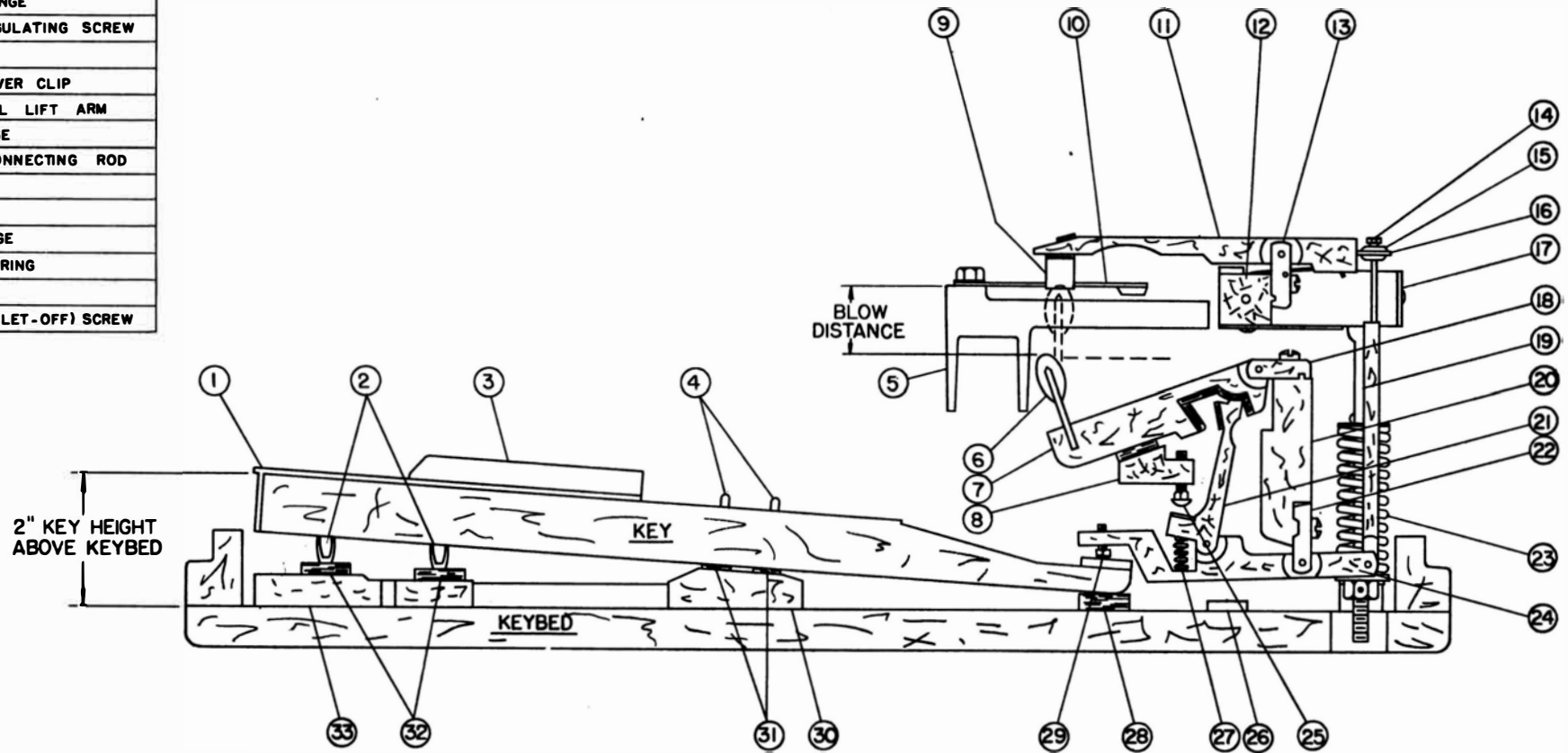


FIGURE 2

## REGULATING PROCEDURE

Refer to Fig. 2, Page 10 for Regulation of Action

In the keys and action of the Wurlitzer electronic piano there are approximately 3,200 parts made mostly of wood, metal and felt. These materials are specially selected and manufactured for use in piano keys and actions, but the normal wear from playing the piano, packing of the felts, and changing atmospheric conditions will probably necessitate some periodic re-regulation of the instrument.

The following pages outline the procedure for complete regulation of the Wurlitzer electronic piano. Before proceeding with a complete regulation, however, the instrument should be analyzed to determine the extent of regulation required.

### 1. KEYBOARD INSPECTION (SEE FIG. 2, PAGE 10)

First, check the felt punchings on both the balance and front pin lines and the felt on the keybed at the back of the keys, replacing these felts if they are moth-eaten or packed excessively.

Next, inspect the entire keyboard for free movement of each key at both the balance and front pin lines. When the fronts of the keys are raised approximately 1/4" they should fall without hesitation.

### 2. EASE KEYS

When a piano keyboard is found to be sticking or sluggish, the cause often is due to the felt swelling either at the balance key bushing or at the front key bushing, or both. Even if just one or two keys are sticking, it is advisable to check the entire keyboard. Key easing is done by using a pair of key easing pliers which can be obtained from any reputable tuners' supply house.

Easing is executed by inserting one lip of the pliers into the opening in the key and positioning the other lip of the pliers on the outside of the key, and squeezing firmly but carefully. Wood and felt are thereby compressed to obtain a proper clearance at the pin.

When easing keys, caution should be exercised so keys are not overeased. Overeased balance pin bushings will cause the keys to tip, and overeased front pin bushings will cause excessive side play, and in extreme cases, adjacent keys touching at the fronts. Overeased keys will not stay properly spaced.

Sometimes sticking keys may be due to the hole at the bottom of the key (at balance point) swelling and tightening around the balance pin. The clearance should not be excessive but the key should drop freely over the pin. Although a reamer may be used at this point to enlarge the hole, a #21 drill (.159" dia.) gives the ideal size hole with less danger of making the hole too large.

### 3. INSPECT ACTION FOR FREE CENTERS

First, check the butt centers by raising the butts from the hammer-regulating rail and allowing them to fall abruptly, observing the movement of the butts. If the butt centers are free, the butts will fall back to the rail without any hesitation.

Whip centers are checked by depressing the full sustaining pedal to remove all damper spring tension from the whip assembly. Fully depress each key and release it slowly. If the key does not completely return, or if it returns very slowly, the whip centers are probably sluggish. Keys must, of course, be properly



eased before this inspection is performed.

If the action centers are sluggish, they must be shrunk according to the procedure which follows.

#### 4. SHRINKING ACTION CENTERS

If the action centers become sluggish due to excessive moisture, they must be shrunk to restore the proper amount of freedom. If shrinking is necessary, all flange centers should be treated.

The shrinking solution consists of eight (8) parts of V. M. & P. Naphtha and one (1) part of light mineral oil. V. M. & P.

Naphtha can be purchased at most paint stores.

Apply a few drops at each center so it will soak into the bushing cloth. The response to the shrink solution should be immediately apparent. Caution should be used when applying. Key caps can be damaged.

NOTE: Shrinking solution should be applied before regulation for best results.

#### 5. INSPECT ACTION

- A. Tighten all screws.
- B. Check the damper levers for squeaks. Apply graphite to the damper spring punchings located under the damper lever clip to eliminate any squeak.
- C. Check the action completely for any broken parts, loose flanges, moth-eaten or loose felts, etc., and repair or replace as necessary.
- D. Reface the hammers if necessary.

## 6. SET KEY HEIGHT

The proper key height is 2" measured from the keybed to the underside of the projecting lip on the front of the natural keys. The key height is adjusted by adding or removing hard paper shims between the balance rail of the keyframe and the keybed.

## 7. SQUARE AND LEVEL

When the keys have been set to the proper height, the keys are squared to a straightedge by lightly tapping the tops of the balance rail pins toward the bass or treble as required.

The natural keys are leveled to the proper height above the keybed. The sharp keys are then leveled to the natural keys so the plastic surface on the back of the sharp cap is even with, or very slightly below, the corresponding surface of the natural key.

## 8. SPACE KEYS

Keys are spaced with a forked key spacing tool by bending the front rail pin toward the bass or treble as necessary.

The natural keys are adjusted so the spaces between the keys are uniform. The sharp keys are then spaced so they are centered between the adjacent natural keys.

As the keys are spaced, "brush" forward on the keys with the palm of the hand so the keys fall in their natural position.

A Word of Caution: After the keys are spaced, check the backs of the keys to make certain adjacent keys are not touching each other. It may be necessary to sand some keys slightly to insure the proper clearance between them.

## 9. REMOVING ACTION PARTS

It is not necessary to remove the action from the piano to replace

a butt assembly or a damper lever.

It is necessary to remove the action to replace a whip assembly.

A. Butt Assembly (SEE FIG. 2, PAGE 10)

Disconnect the damper regulating screw from the related damper lever and one on each side of it by pulling the grommets out of the wire clips. Remove the butt flange screw with a slim screwdriver between the backs of the damper levers (or remove the related damper lever for better accessibility), rotate the back side between the main rail and the damper rail.

B. Damper Assembly (SEE FIG. 2, PAGE 10)

Disconnect the damper regulating screw from the damper lever by pulling the grommet out of the wire clip. Remove the damper flange screw and lift the damper lever up and out of the action.

The action must be removed from the piano to replace a whip assembly.

C. Action Removal

Unplug the 3 wire A.C. plug located at the bass end. Remove the two screws that secure the extreme bass and treble ends of the amplifier chassis to the mounting blocks. Unplug the input cable from the printed circuit board. Lift the chassis slightly and pull it forward approximately one inch. Remove the shoulder screw that connects the damper connecting rod to the damper rail lift arm, noting the location of the felt washer and the spring washer. Remove the two screws behind the damper rod sustain spring that secures the main rail support bracket to the main rail. Remove the two screws (one in front and one in back) that fasten the end action brackets

to the mounting blocks. If there are cable clamps fastened to the front of the reed bars, remove them.

The whole action-reed bar assembly should now be free to be lifted out of the piano. If the action is still being held down in the center, take a long (6" blade, 3/16" diameter) Phillips head screwdriver and remove the screw that secures the bottom right side of the center action bracket to the whip stop and keybed. The screwdriver must be inserted at the back left or bass corner of the treble reed bar just in front of the treble damper rail.

D. Remove Whip Assembly

Turn the action upside down so it rests on the damper levers. Remove the screw at each end of the whip stop and turn it approximately 90°.

Slide the damper regulating screw and grommet out of the clip in the damper lever. Remove the whip flange screw and the entire whip assembly comes out.

IMPORTANT: When installing the new whip, be sure the tip of the jack (or fly) is placed properly in the butt before screwing the whip stop back in place.

10. STRIKING POINT

The striking point is properly set at the factory and should require little or no adjustment in the field.

If there are one or two treble notes that do not sound properly because of improper striking point, the hammers can be burned either forward or back by applying heat, with a soldering iron, to the shank, or molding of the hammer and at the same time,

forcing the hammer in the desired direction.

11. HAMMER BLOW DISTANCE

The hammer blow distance is factory-set and normally will not require adjustment.

The correct blow distance is  $1 \frac{5}{64}$ " measured from the tip of the hammer to the under surface of the reed. (See Fig. 2, Page 10)

12. ADJUST LOST MOTION

Lost motion is adjusted by turning the capstan screw up or down in the front of the whips. When lost motion is correctly adjusted, the hammers will move immediately as the keys are depressed, and will rest on the hammer rail without any downward movement when downward pressure is applied to the backs of the keys.

13. ADJUST LET-OFF

The hammer let-off (fly escapement) is adjusted by turning the capstan-type regulating screw up or down in the hammer-regulating rail. The hammer should let off when it is  $1/8$ " from the reed.

14. HAMMER CHECK-BACK

The hammer check-back is accomplished by the wedge-shaped surface near the tip of the fly and the mating surface of the butt.

The hammer check-back will be correctly adjusted when the "Touch-Laying" operation is performed.

15. TOUCH LAYING

The touch lay operation consists of establishing the proper key dip, or movement of the front of the keys, for the instrument.

The key dip, measured at the front of the natural keys, should be approximately  $3/8$ ". (See Fig. 2, Page 10) This measurement will vary slightly depending upon the accuracy of the preceding

regulation which has been performed.

Touch is layed by adding or removing paper punchings beneath the felt punchings on the front rail pins. (See Fig. 2, Page 10)

It is very important that the proper amount of after touch is maintained during regulation of the action. If too little after touch is obtained, the hammer will tend to "bobble" and may double strike the reed. If there is too much after touch, this additional movement of the key will cause the hammer to raise up toward the reed after checking and may cause it to block on the reed.

The correct amount of after touch can be checked by striking the key with a light, medium, and hard blow, and observing the check-back of the hammer. When properly regulated, the hammer will check back essentially the same distance from the reed regardless of the type of blow struck.

In laying touch, begin by regulating keys nos. 3, 30, 35, and 63, as described in the preceding paragraph. These keys become the "setters" for regulating the piano. Starting at the bass end of the keyboard, strike three (3) adjacent keys with a medium blow and observe the check-back of the hammers. The three (3) hammers should check back an equal distance from the reeds. If necessary, add paper punchings beneath the felt front rail punching to obtain equal hammer check back. Repeat this procedure for the entire keyboard.

Proper touch laying provides about 1/32" after touch, or downward movement of the key after fly escapement occurs. This after touch is necessary to "lock" the butt in the check-back position.

## 16. DAMPER SUSTAIN ADJUSTMENT

The nut on the bottom of the damper connecting rod, shown in Fig. 2, Page 10, is a stop to limit the upward movement of the damper connecting rod. This nut should be adjusted so that a space of approximately 1/32" exists between the bottom of the damper levers and the felt on the damper rail. This will insure proper damping of the reeds.

The following conditions are characteristic of an improperly adjusted damper connecting rod nut:

### A. Nut Too Low

If the nut is set too low a greater space remains between the damper rail and damper lever, and as the sustaining pedal is depressed to rotate the damper rail, all of the dampers may not lift off the reeds. This results in a "dull" tone of extremely short duration.

### B. Nut Too High

When the nut is adjusted too high there will be insufficient space between the damper rail and the damper levers, and some of the dampers may be held off the reeds. This results in failure to dampen some reeds.

The adjustment of the damper connecting rod nut must be performed before proceeding with the regulation of the individual dampers.

## 17. DAMPER LEVELING

When the damper connecting rod nut has been properly adjusted, the dampers themselves should be inspected for uniform lift.

Depress the full sustaining pedal and observe the lift of the

dampers. If some of the dampers are "slow", that is, they lift off the reeds somewhat later than the majority of the dampers, they must be adjusted by gluing a thin paper shim on the bottom surface of the damper lever where it contacts the felt on the top of the damper rail.

The shim compensates for uneven wear or packing of the damper rail felt and provides a uniform damper lift.

18. DAMPER REGULATION

The dampers are adjusted by turning the damper regulating screws which pass through the neoprene grommets at the back of the damper levers. The dampers are properly regulated when a gap of approximately .035" exists between the top of the grommet and the bottom of the screw head. The damper regulating screw has a slotted hexagonal head, and either a screwdriver or a socket tool (nut driver) may be used to adjust this screw.

19. PEDAL INSTRUCTIONS (SEE FIG. 3, PAGE 22)

To attach the sustain pedal to the Model 200 portable piano, thread the knurled cable nut inside the aluminum housing onto the damper connecting rod through the hole in the bottom of the instrument. Turn until it bottoms against the nut on the rod. There should be a very small amount (about 1/32" to 1/16") lost motion in the pedal before it starts pushing harder and lifting the dampers. This assures that the pedal is not holding some dampers off the reeds. To adjust the pedal, loosen the two round head Phillips head screws that secure the top of the cable to the aluminum housing. Pull down on the cable to remove lost motion or push up to get more lost motion. The pedals are set at the factory and generally will not need adjustment unless



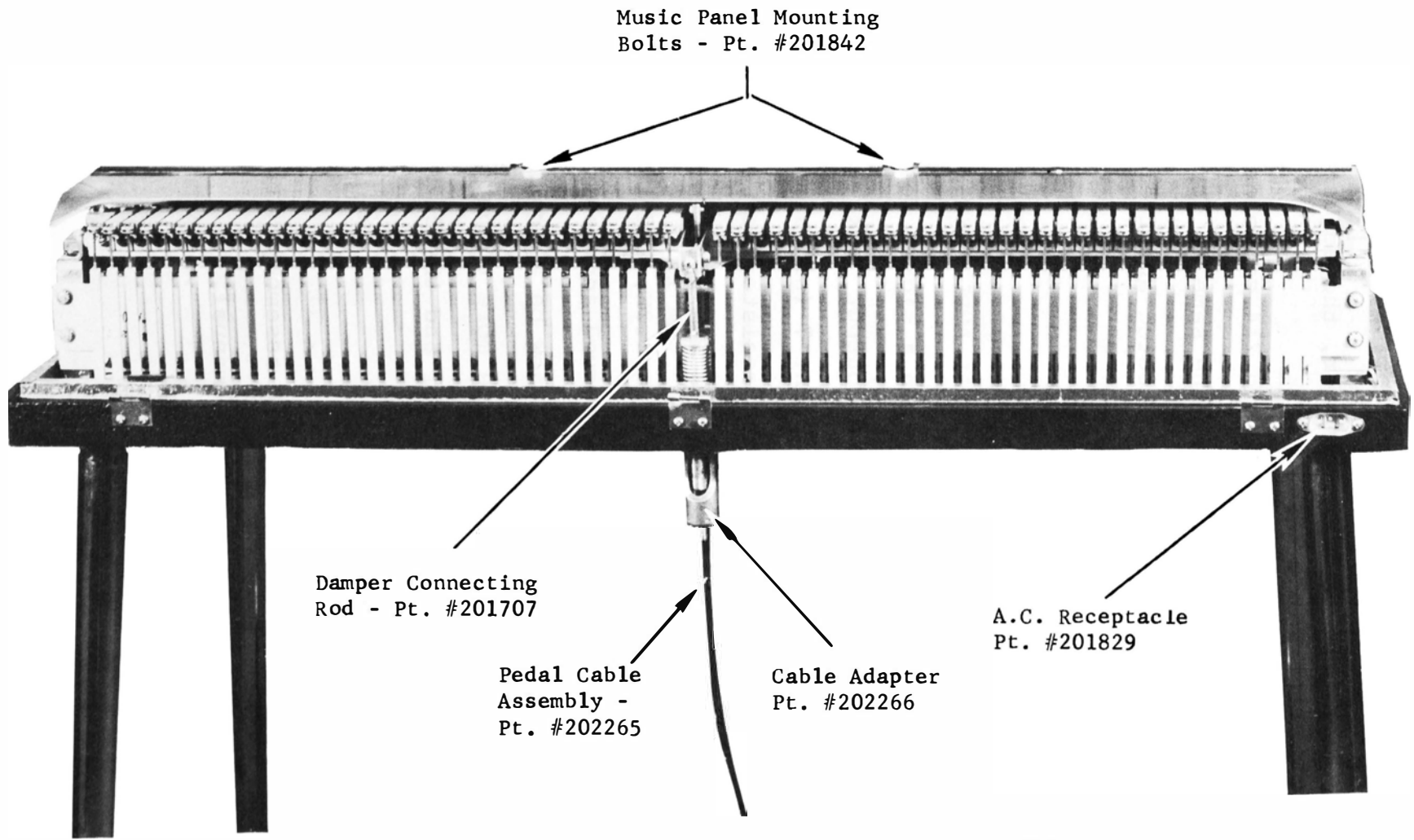
the cable has slipped through the clamp. Some pedals have two (2) Allen head set screws that clamp the cable as it enters the bottom of the housing, however, the adjustment is the same.

On Models 203, 203W, 206, 207 and 214 consoles, the pedal is built in but the adjustment is the same as covered on the 200 portable. The cable clamp is located about eight inches below the knurled nut.

#### CONNECTING EXTERNAL AMPLIFIERS

The most satisfactory point to obtain a signal for driving any external amplifier is at the external output jack. As the piano is wired, this signal is taken from point 7 (signal) and point 1 (ground). In early production amplifiers, the resistor between points 6 and 7 (R 75) should be changed to a 6.8K, the resistor between points 1 and 7 (R 76) should be changed to a 2.2K, and the 5mfd. capacitor between points 5 and 6 should be removed and replaced with a jumper wire. The signal output level will now be approximately 0.5 volts. Should the external amplifier require more output signal to drive it, the position of the 6.8K resistor and the 2.2K resistor may be reversed.

Refer to "amplifier-piano-P.C. board assembly" drawing #201808-S-1-E-1 in the back portion of this service manual.



Music Panel Mounting  
Bolts - Pt. #201842

Damper Connecting  
Rod - Pt. #201707

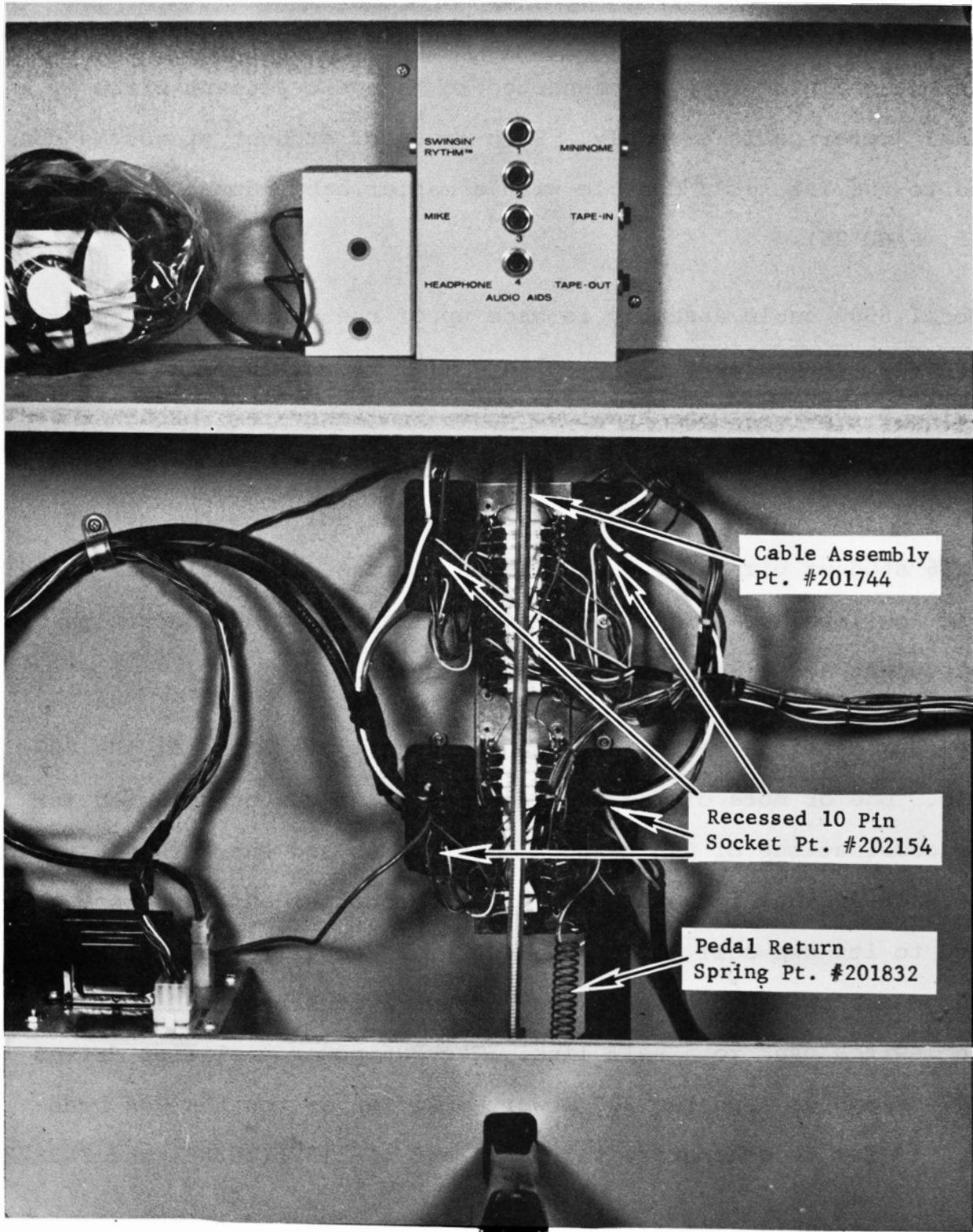
Pedal Cable  
Assembly -  
Pt. #202265

Cable Adapter  
Pt. #202266

A.C. Receptacle  
Pt. #201829

MODEL 200

FIGURE 3



MODEL 207 with Lower Front Panel Removed. Note New Junction Box.

FIGURE 4

## DESCRIPTION OF THE 207 TEACHER'S CONSOLE

Four groups of from one to six Model 206 student pianos in a group can be connected to a Model 207 Teacher's Console Piano. Each Model 206 student piano in a group is connected to the next student piano by an external jumper cable assembly. Each group of student pianos is connected to the Teacher's Console with a master cable assembly. (SEE FIG. 5, PAGE 26)

The Model 8309 cable assembly is made up of the master cable and five jumper cable assemblies. Line voltage (117 VAC) is applied to the 207, (SEE FIG. 5, PAGE 26) and supplies power to the system through the master cable and jumper cables. There is a shielded high impedance common line for ensemble. This ensemble line collects the output of each 206 student piano for group communications. In addition, there are six low impedance lines for self. Self permits communication between student and teacher for private practice.

Twenty-four possible self line connections are available at the 207 console. One or more of these self connections can be selected for use by combinations of the "group" switch bank and the "piano" switch bank. Each 206 has its own power amplifier output and headphone coupled to its own self line. The 207 power amplifier output and headphone are switched through the "group" switch bank and the "piano" switch bank to a self line. The 206 power amplifier drives the 207 headphone, and the 207 power amplifier drives the 206 headphone. (Refer to schematics #11-0783A and 11-1137) (202821 and 202822)

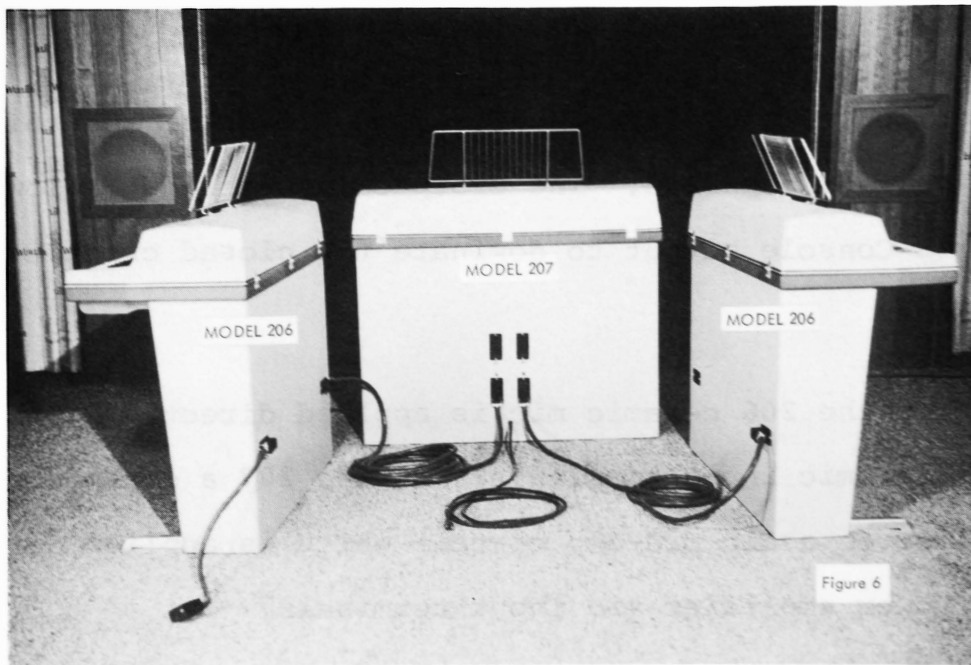
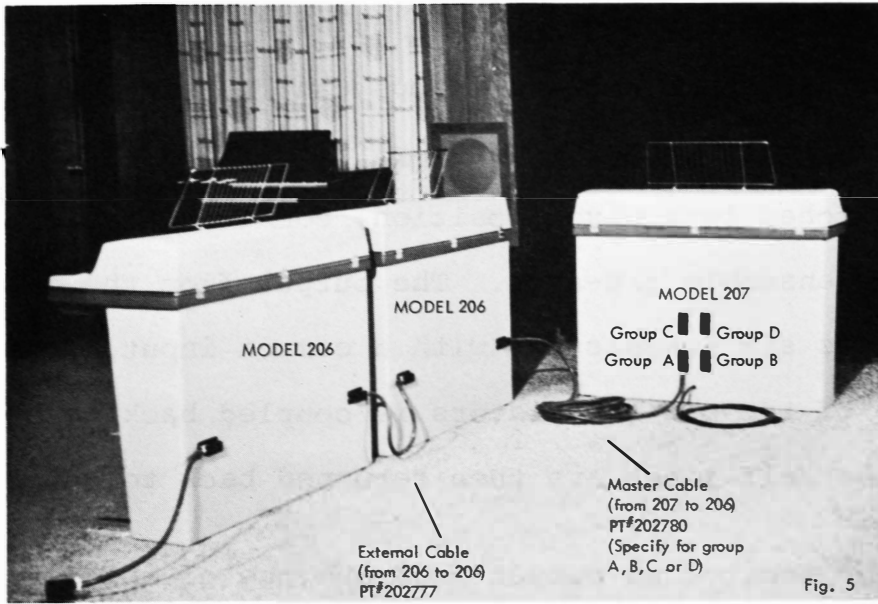
A separate ensemble line from each group is connected to the Teacher's Console. The collected 206 ensemble signals on the ensemble line, and output signal from the Teacher's Console amplifier drive a

corresponding group ensemble pre-amp, (TR-32, TR-33, TR-34 and TR-35). By use of one of the lighted ensemble selector tabs, the output from any of the four group ensemble pre-amps can be switched off, switched to a corresponding ensemble driver amplifier (TR-4, TR-11, TR-18 and TR-25), or switched to a mixed position, combining the outputs of more than one group ensemble pre-amps. The output from the ensemble driver amplifier drives six transistors with a common input. The output from each one of the six transistors is coupled back to an individual self line. The self lines are then returned back to the 206 headphones.

The teacher can monitor an output from any one of the four Group Pre-amps by actuating one of the group switch bank tabs. This signal is then coupled to the 207 headphone driver amplifier. The output of this 207 headphone driver amplifier is then coupled to the 207 headphone output jacks.

The Group Call Switch decreases the 206 output drive level and increases the 207 output drive level. These modified levels of drive are then applied to the circuitry for the particular mode of operation, self or ensemble. The Group Call override allows the 207 Teacher's Console output to dominate the closed circuit communications.

An output from the 206 ceramic mic is applied directly to the 206 power amplifier mic input terminals. In the 207 a dynamic mic output is applied to a mic pre-amp circuit which is applied directly to the 207 power amplifier mic input terminals.



Knobs 207 (only)  
Pt. #202140

Teacher's Headset  
and Microphone.  
Pt. #202181

Power Supply  
Pt. #202158 (Fuses  
under power supply).

Foot (Same on 206).  
Pt. #202079

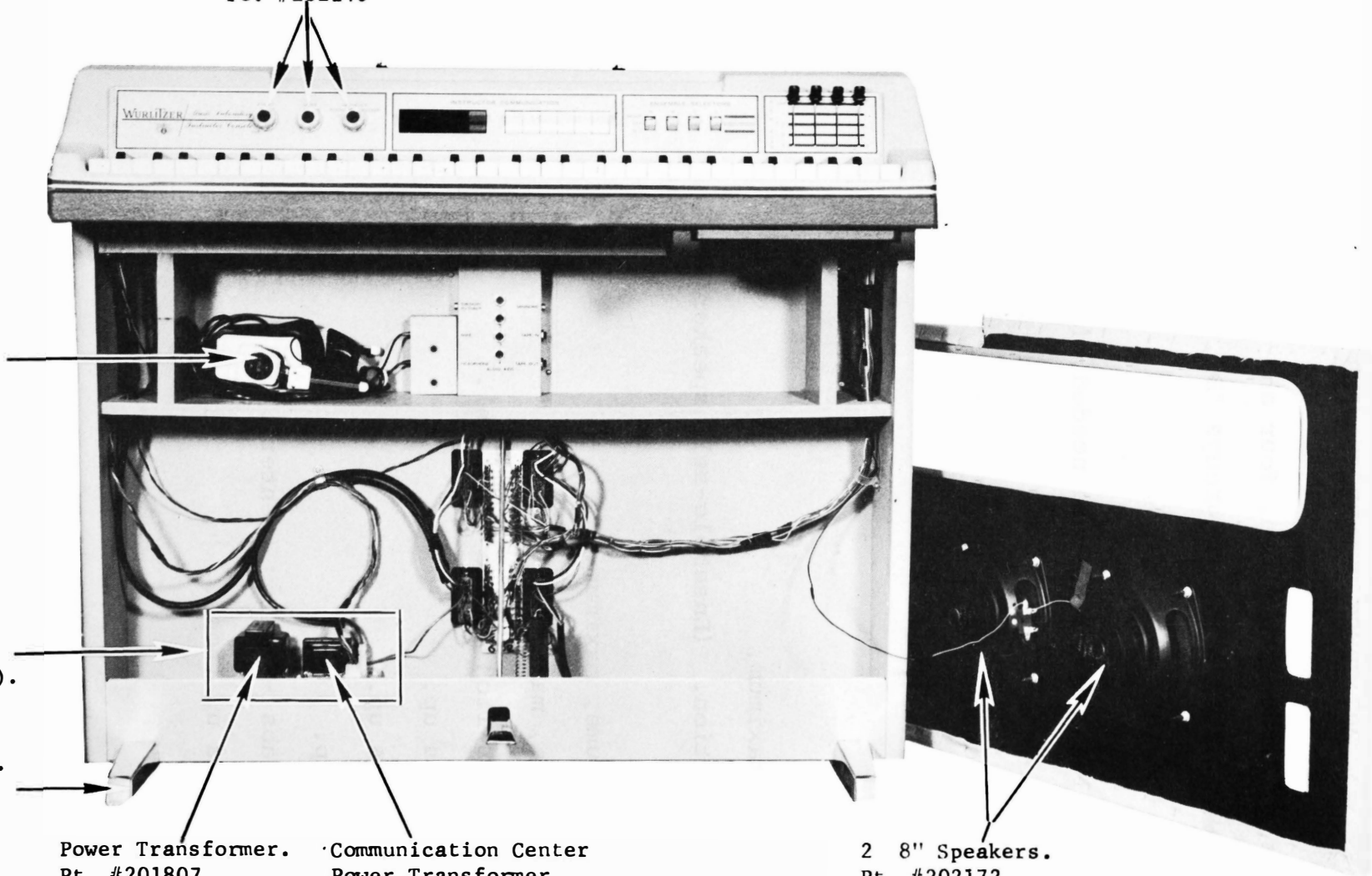
Power Transformer.  
Pt. #201807

Communication Center  
Power Transformer.  
Pt. #202162

2 8" Speakers.  
Pt. #202172

MODEL 207

FIGURE 7



## 207 CHECK OUT PROCEDURES

The instructions in paragraphs three, four and five are for checking "A" group. They will also apply to groups "B", "C" and "D" in paragraphs eight thru fifteen.

To check a 207, at least two 206's are needed. (SEE FIG. 5 & 6, PAGE 26)

### 1. Connect groups to 207.

- A) One group on connector "A".
- B) One group on connector "B".

### 2. Start position.

- A) 206
  - a) Volume, maximum.
  - b) Self position. (Ensemble-self speaker sw)
- B) 207
  - a) Piano volume, maximum.
  - b) Mic volume, maximum.
  - c) Instruct switch (phone position).
  - d) Black tabs up.
  - e) White tabs up.
  - f) Red tab up.
  - g) Lighted tabs - yellow (center).
  - h) Audio Aids up (top).

### 3. First Check (Self)

- A) 207
  - a) Black tab "A" down.
  - b) White tab "1" down.
- B) 206 - "A" group set to #1 position. (piano select switch)
- C) Two-way communication should be heard.



- D) Check remaining 207 piano tabs and student selector switch position (2 thru 6).
- E) Two-way communication on all like settings. No communication on unlike settings.

NOTE: DAD COMMUNICATION ON "LIKE" SETTINGS

- 1. If the teacher cannot hear her 207, it has a wiring problem between the power amplifier and the headphone. (Refer to Schematic Part #11-1137) (202822)
- 2. If the student cannot hear his own 206, it has a wiring problem between the power amplifier and the headphone. (Refer to Schematic Part #11-0783A) (202821)
- 3. If the students and teacher can hear their own piano but cannot hear each other, there is a wiring problem between the 207 switching and the 206 switching.

COMMUNICATION ON "UNLIKE" SETTINGS

- 1. This is commonly called "cross talk". This can be caused by improper or no audio ground anywhere in the system. Check piano select switch (SEE FIG. 8, PAGE 33) making sure it is selected to the respective piano. Check for shorted leads.

4. Second Check (Ensemble)

A) 207

- a) Black tab "A" down.
- b) White tabs up.
- c) Lighted tab group "A" up (red).

B) 206 - "A" Group.

- a) Ensemble position. (self-speaker switch)
- b) Slowly rotate piano select switch from #6 thru #1 position.

c) Two-way communication should be heard on all positions.

NOTE: 2A

If the teacher cannot hear her piano, there is a problem between her power amplifier and her headphone amplifier or between her headphone and the associated amplifier (TR-2, TR-3 Schematic Part #11-1139) (202520), which could also be defective. If the teacher cannot hear the student, the problem lies between the student's piano and its associated switching and the teacher's console and its switching mechanism.

If the teacher can hear the student's piano but the student cannot hear his own piano or the teacher's, the problem lies in the teacher's switching or the associated Group ensemble amplifiers and/or headphone amplifiers located on the communication center circuit board.

C) 207

- a) Red tab down. (Group Call)
- b) Very little or no communication from 206 to 207.
- c) Communication from 207 to 206.

NOTE: 2B

A malfunction found in this check indicates the problem lies in the vicinity of the "group-call" switch.

Check TR-4 thru TR-10.

5. Third Check (Ensemble-Mix)

A) 207

- a) Black tab "A" down.
- b) Lighted tab group "A" down (green).
- c) Lighted tab group "B" down (green).

- B) 206 (Ensemble Self-speaker sw)
  - a) Group "A" piano in ensemble position.
  - b) Group "B" piano in ensemble position.
  - c) Play on piano group "A".
  - d) Listen to piano group "B".
  - e) Piano "A" should be heard in "B's" headphones.

NOTE: 3

If piano "A" cannot be heard in "B's" headphone, the lighted ensemble select switch "A" or "B" has misaligned contact, or a jumper wire connecting the two switches has a bad connection. This is assuming that the piano in group "B" has no malfunctions.

- 6. Change cable from 207 receptacle "A" to receptacle "C".
- 7. Repeat Steps 2 thru 5 (Pages 28 to 31). Use corresponding Groups B-C.
- 8. Change cable from 207 receptacle "B" to receptacle "D". Repeat Steps 2 thru 5 (Pages 28 to 31). Use corresponding Groups C-D.

NOTE: Refer to comments on third check, paragraph 5. Repeat Steps 2 thru 4 (Pages 28 to 30). Use corresponding Group D.

- 9. Check (Audio Aid) 207. (SEE FIG. 9, PAGE 34)
  - A) Black tab "D" up.
  - B) Black tab "A" down.
  - C) White tab "1" down.
  - D) Audio Aid lever group "A" to position #1.
  - E) Audio Aid (tape player, radio, sig. generator, etc.) connected to Audio Aid #1 jack.
  - F) Audio Aid should be heard in teacher's phones.
  - G) Black tab "A" up.

- H) Black tab "B" down.
- I) Audio Aid lever "B" to position #1.
- J) Audio Aid lever group "A" off.
- K) Audio Aid should be heard in teacher's phone.
- L) Repeat for "C" and "D".
- M) Repeat for Audio Aid 2 thru 4.

NOTE: If an audio aid cannot be heard by the teacher in any of the positions stated above, the trouble will lie in either the audio aid jack or between this and the lighted switches.

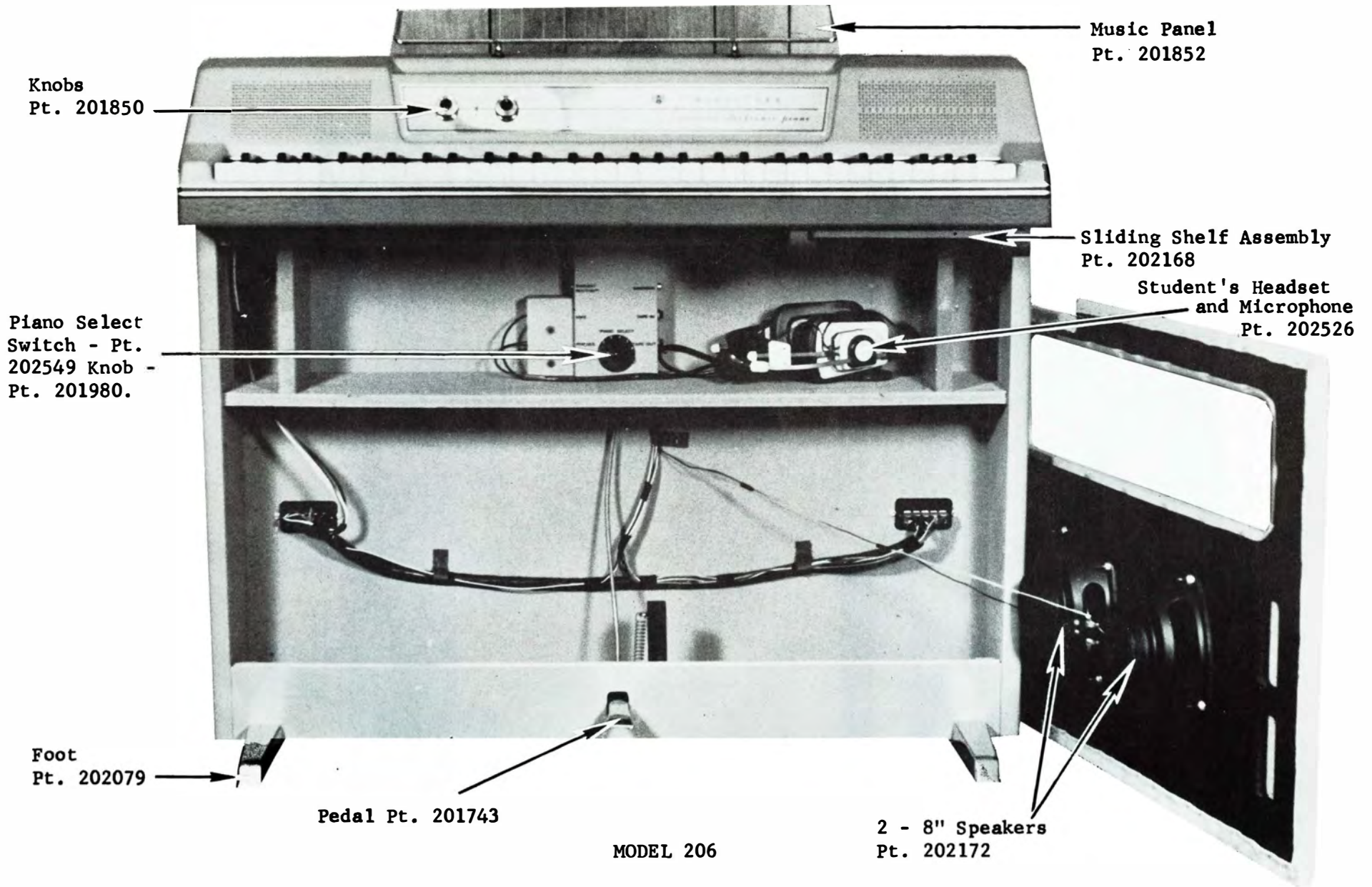
#### MISCELLANEOUS

The 36 conductor plug at the treble end of the chassis on the Model 207 should be carefully checked and cleaned, inspected for broken or shorted wires, and be sure it is well seated and locked in position.

Make sure all external cable heads are well seated in their receptacles.

If a lab has all ensembles and audio aids inoperative, check the communication center power supply for proper voltages, located on bottom of piano.

Some Model 207's have 6.3 volts on the indicator lamps while others have 4.8 volts. A resistor 2.2 ohm 2 watt was added to drop the voltage from 6.3 V to 4.8 V, which gives added life to bulb.



Music Panel  
Pt. 201852

Knobs  
Pt. 201850

Sliding Shelf Assembly  
Pt. 202168

Piano Select  
Switch - Pt.  
202549 Knob -  
Pt. 201980.

Student's Headset  
and Microphone  
Pt. 202526

Foot  
Pt. 202079

Pedal Pt. 201743

2 - 8" Speakers  
Pt. 202172

MODEL 206

FIGURE 8

THESE PHOTOGRAPHS ARE FOR IDENTIFICATION ONLY

To service Communication Center PC Board remove the screws at arrows and hinge back as shown.

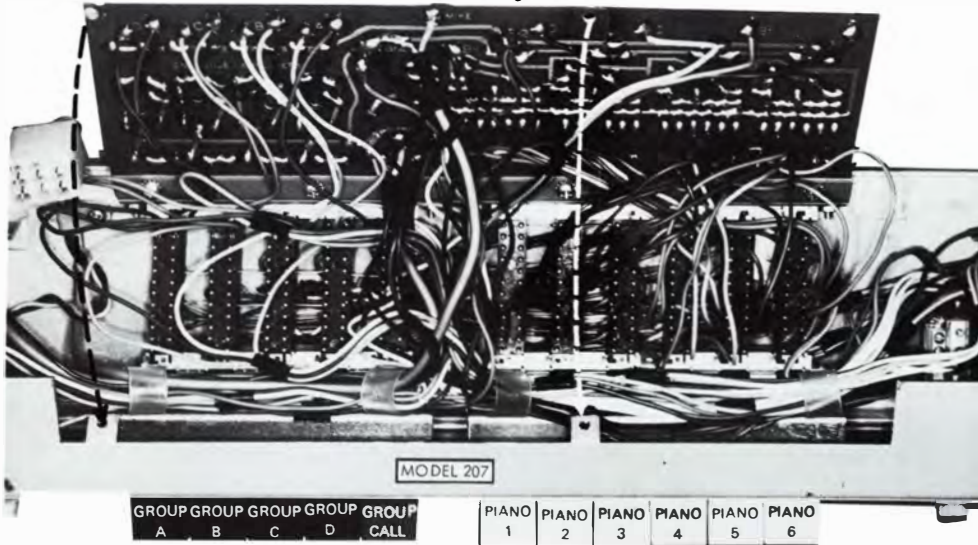


Figure 9

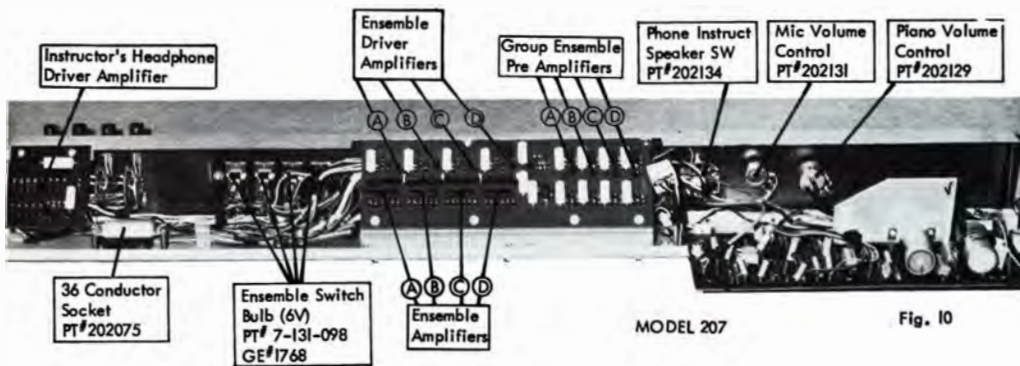


Fig. 10

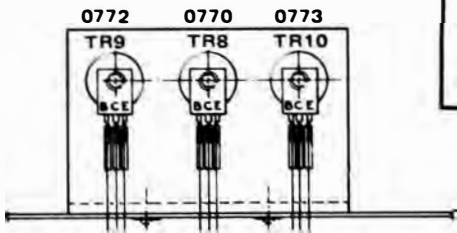
## REPLACING PLASTIC POWER TRANSISTORS

1. Remove defective transistor.
2. Clean off old compound with solvent from:
  - A) Screw,
  - B) Face of heat sink,
  - C) Transistor mounting hole in heat sink,
  - D) Be sure the heat sink has no burrs that could puncture the mica.
3. Bend center lead of new transistor.
  - A) Use two (2) long nose pliers.
  - B) Grip transistor leads.
  - C) Bend center lead.
  - D) Grip center lead.
  - E) Bend center lead.
4. Use new heat sink compound:
  - A) On face of heat sink,
  - B) On back (copper side) of new transistor.
5. Using a new mica washer and a new conic washer, stack and secure parts as shown.
6. Tighten screw with about six inch lbs. of torque (hand tight).
7. Now solder leads to p.c. board.

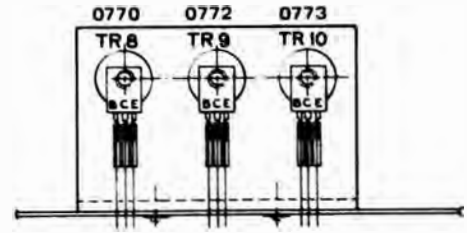
**YOU WILL NOTE THERE HAS BEEN A CHANGE OF PART NUMBERS AND TRANSISTORS WHICH MAY TEND TO BE CONFUSING UPON REPLACEMENT. BELOW IS A LISTING OF PARTS, PART NUMBERS AND THEIR REPLACEMENTS. IN ADDITION, PLEASE NOTE LOCATION OF TRANSISTORS BEFORE REPLACEMENT.**

| NEW PART NUMBERS<br>MODEL & STARTING<br>SERIAL NUMBERS | "OLD" PART NUMBER<br>MODEL & STARTING<br>SERIAL NUMBERS                     | MANUFACTURER'S<br>EQUIVALENT | "OLD" PART NUMBERS<br>MODELS AND APPROX.<br>STARTING SERIAL NO. | MANUFACTURER'S<br>EQUIVALENT |
|--|---|------------------------------|---|------------------------------|
| 200-73257<br>203-73414<br>214-73397                    | 200-58050<br>203-56403<br>203W-56491<br>206-57144<br>207-55921<br>214-57776 |                              | 200-55900<br>203-55256<br>206-56501<br>207-54029<br>214-57777   |                              |
| TR-1 202051  | 11-0778   | 2N2926                       | 11-1667*  | 2N6008                       |
| TR-2 202052  | 11-0778   | 2N2926                       | 11-1668*  | 2N5998                       |
| TR-3 202073  | 11-0778   | 2N2926                       | 11-0778   | 2N2924                       |
| TR-4 202053  | 11-0775   | 2N5306                       | 11-0775   | 2N5306                       |
| TR-5 202073  | 11-0778   | 2N2926                       | 11-0778   | 2N2924                       |
| TR-6 202073  | 11-0778   | 2N2926                       | 11-0778   | 2N2924                       |
| TR-7 202054  | 11-0774   | 2N3859A                      | 11-0774   | 2N3859A                      |
| TR-8 202055  | 11-0770   | 2N4919                       | 11-1502*  | MJE2371                      |
| TR-9 202056  | 11-0772   | 2N5191                       | 11-1501*  | MJE2021                      |
| TR-10 202057   | 11-0773   | 2N5194                       | 11-1503*  | MJE2011                      |
|  |   |                              |   | (*CHANGED)                   |
| <u>ITEM</u>  | <u>NEW<br/>PART NUMBERS</u>   |                              |   |                              |
| D-1, D-2,<br>D-3, D-4                                  | 202050  | 11-0769<br>11-0771           | GE-A13, 1N4005<br>GE-A13, 1N4005                                | 11-1500 (11-0769)            |
| D-5, D-6   | 202049  | 11-0781                      | 1N4148  | 11-0781                      |

**NOTE: Printed Board Part #11-1258 TR arrangement as shown. PC Board Part #11-0765 TR placement left to right TR 9= 202056, TR 8= 202055, TR 10= 202057.**

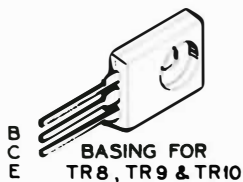


SEE PRINTED CIRCUIT BOARD PRINT 11-0764  
PRINTED BOARD P/N 11-0765

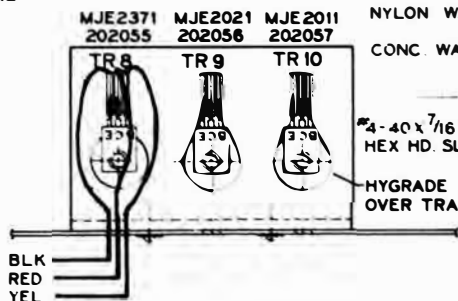


SEE PRINTED CIRCUIT BOARD PRINT 11-1306  
PRINTED BOARD P/N 11-1258

**TORQUE** - USE NO MORE THAN 6 IN. LBS. TO SECURE TR8, TR9 & TR10

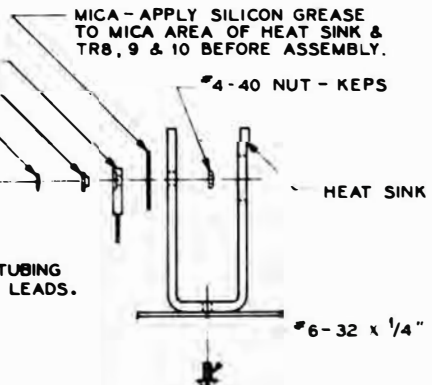


2 1/2" LG. EACH #22 A.W.G. COPPER STRANDED



VIEW "A-A"

TRANSISTOR INSTALLATION TO HEAT SINK  
VIEWED FROM TRANSISTOR SIDE

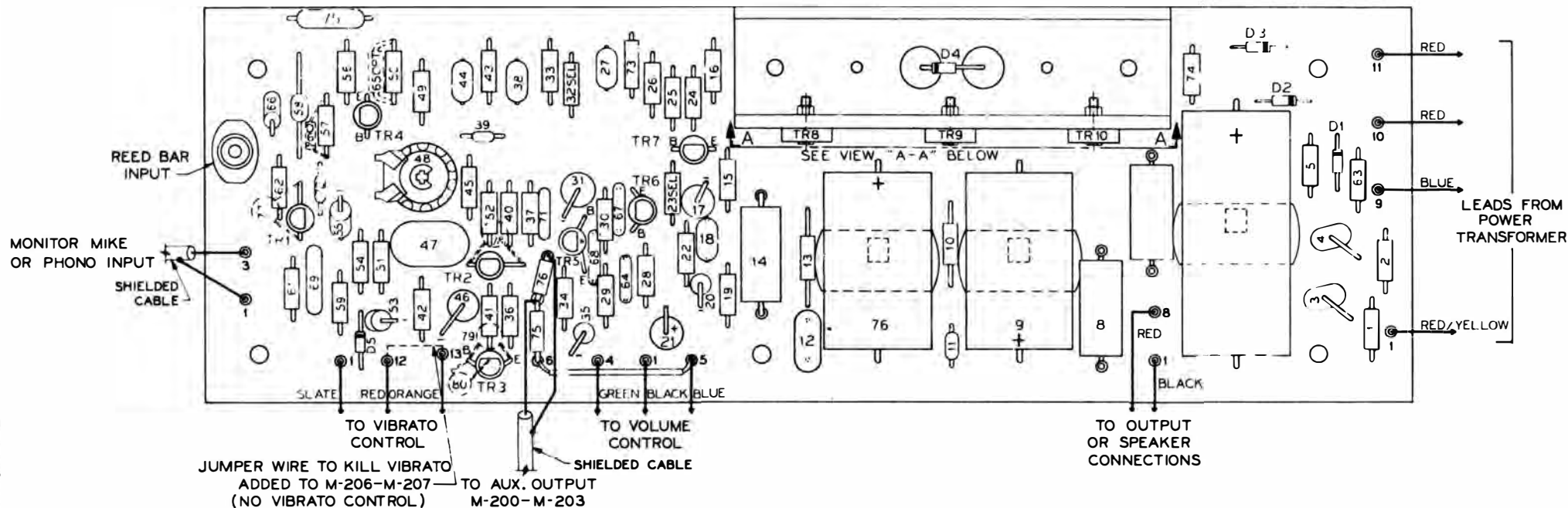




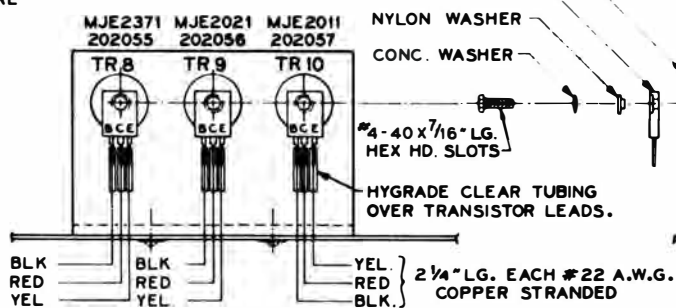
# INSTRUCTIONS FOR CHANGING THE ELECTRONIC PIANO AMPLIFIER

THE PRINTED CIRCUIT BOARD DIAGRAM WILL HELP TO IDENTIFY COLOR CODING OF WIRES

THIS DIAGRAM WILL ALSO SERVE AS AN AID TO REPLACEMENT OF THE OUTPUT TRANSISTORS.



TORQUE - USE NO MORE THAN 6 IN. LBS. TO SECURE TR8, TR9 & TR10



MICA - APPLY SILICON GREASE TO MICA AREA OF HEAT SINK & TR8, 9 & 10 BEFORE ASSEMBLY.

VIEW "A-A"

TRANSISTOR INSTALLATION TO HEAT SINK  
VIEWED FROM TRANSISTOR SIDE

MODELS 206 AND 207

TROUBLE SHOOTING CHART

Following is a complete check out procedure with trouble shooting hints.

NOTE: Useful service tools for making these checks are:

1. A 2000 ohm headphone with a 5 MFD, 35 volt (or greater) capacitor in series for D.C. blocking.
2. A small tape recorder with programmed music or a small transistor radio. These should have an appropriate patch cord to connect the tape recorder or radio in a phone jack or phono jack.

The headphone assembly will be used as a signal tracer.

The tape recorder or radio will be a second "helper" providing an audio signal from a second piano. The signal from the sound source will be inserted into the microphone input. This will simulate a person playing the piano for signal tracing purposes.

For trouble shooting of 207 teacher's lab console and 206 student pianos, see 207 check out procedures starting on Page 28.

NOTE: The following complaints could happen on all six models. These are followed by a section strictly applicable to 206's and a 207 in a lab installation.

Complaint: Piano Dead - No Sound.

Make sure AC power is available at wall outlet.

Cause: 1. No AC power (Pilot light will not light).

Correction: 1.1 Check wall outlet for 120 V.A.C.

1.2 Check the line fuse in the piano.

1.3 Defective line cord and/or connectors.

Cause: 2. Defective transistor.

Correction: 2.1 Check all transistor voltages (collector-base-emitter).

Cause: 3. Shorted filter or open diodes in power supply.

Correction: 3.1 Check for low voltage and high voltage and replace shorted filter.

3.2 Check diode for resistive front to back ratio.

Cause: 4. Cracked printed circuit.

Correction: 4.1 Solder cracks in printed circuit.

Cause: 5. Defective transformer.

Correction: 5.1 Replace transformer.

Cause: 6. Reed shorted against pickup.

Correction: 6.1 With volume turned down, strike all keys several times with palm of hand. This will shake loose any foreign matter between the reed and the pick-up. Check to be sure reeds are centered in pick-up slots.

Cause: 7. Input Transistor (shorted or open).

Correction: 7.1 Replace TR-1.

Complaint: Distorted Tone.

Symptom: Raspy or harsh tone.

Cause: 1. Blown fuse on printed circuit board.

Correction: 1.1 Replace only the blown fuse on the circuit board with a short piece of wire. (Fuse has been eliminated on later models)

Cause: 2. Voltage regulation bad (higher or lower than 15.5 volts  $\pm$  10%)

Correction: 2.1 Replace TR-5 and/or TR-6 (voltage regulator transistors).

Cause: 3. Final transistors (#11-0772, 11-0773) (202056, 202057) and driver transistor (#11-0770) (202055) defective.

Correction: 3.1 Replace all three transistors and check D-4 and R-10. Replace if defective.

Note: After removing all three transistors from the P.C. board and heat sink, follow procedure found on Pages 35 and 36.

Cause: 4. Weak input transistor TR-1 (#11-0778, green or yellow dot only) (202051)

Correction: 4.1 Replace TR-1.

Complaint: Excessive "Hiss" in Amplifier:

Cause: 1. Voltage regulator oscillating.

Correction: 1.1 Place a .01 MFD. capacitor from the collector of TR-5 to ground.

Cause: 2. Transistor TR-2 and TR-3 noisy.

Correction: 2.1 Change capacitor #18 which is a .01 MFD. to a .1 MFD.

Cause: 3. Transistor TR-1 noisy.

Correction: 3.1 Place a 470 PF capacitor from the base to the collector of TR-1.

Complaint: R. F. Interference (Radio, T.V., Etc.)

Correction: 1. Place a .01 MFD. capacitor from the emitter of TR-1 to ground.

2. Place a .01 MFD. capacitor from the base of TR-2

- to ground.
3. Put an R.F. choke in series with R-66.
  4. Make sure all grounds and shielded cables are properly connected.

Complaint: Excessive Hum or Buzz.

Cause: 1. Reed bar input cable not fully inseted into socket on P.C. board.

Correction: 1.1 Insert plug fully.

Cause: 2. A.C. power wires too close to amplifier input.

Correction: 2.1 Redress A.C. cabling for minimum A.C. hum.

Cause: 3. Filter capacitors in both low voltage and polarizing voltage power supplies broken loose from printed circuit board through vibration.

Correction: 3.1 Resolder joints and/or cracked printed circuit.

Cause: 4. Neon pilot light wires dressed too close to input of amplifier or volume control wires.

Correction: 4.1 Redress all cables or wires away from pilot light assembly.

Cause: 5. Light dimmer control in a room can cause noise in A.C. power lines.

Correction: 5.1 Turn lights to full brightness. Put a .01 MFD. bypass capacitor rated at 3000 to 5000 volts across the A.C. line inside the piano.

Complaint: Excessive Hum That Normal Grounding Does Not Eliminate.

Cause: 1. Some water pipe and electrical grounds are located so far from the actual grounding point, they end

up being above ground electrically, and lose their effectiveness.

Correction: 1.1 Find a suitable ground as near the installation as possible and connect the lab ground system to it.

Complaint: Vibrato "On" All the Time When Piano is Turned On.

Symptom: 1. Vibrato on a Model 206 or 207 (no vibrato normally on these two models).

2. On all models, if vibrato cannot be turned off.

Cause: 1. Shorting wire from pin #1 and #12 on printed circuit board improperly soldered or missing (206 and 207 only).

Correction: 1.1 Properly solder or add a jumper wire from pin #1 to pin #12 on the printed circuit board.

Cause: 2. Voltage regulator oscillating and going out of regulation in time with the vibrato oscillator.

Correction: 2.1 Add a .01 MFD. capacitor from the collector of TR-5 to ground.

Complaint: Keys "Clicking".

Cause: 1. Back of the sharp caps hitting the aluminum strip behind them.

Correction: 1.1 Remove the top and unscrew the two hex headed bolts that receive the music panel screws one or two turns. Be sure to tighten lock nuts after adjusting.

Complaint: "Cross Talk" in Lab.

Cause: 1. This can be caused by improper or no audio ground

anywhere in the system.

Correction: 1.1 Correct faulty audio ground.

Complaint: A Squeak When the Sustain Pedal is Used.

Correction: Place a small amount of thin grease or "Lubriplate" at the point where the bottom of the damper connecting rod passes through the felt washer and rubber grommet.

Complaint: A "Click" or Noticeable "Snap" When the Sustain Pedal is Depressed.

Correction: Squeeze the equivalent of four or five drops of an adhesive sealer such as Dow Corning's Clear Seal, or a white bathtub calking compound into the hole on top of the sustain pedal where the cable enters. (Allow three (3) hours to dry before using.) This material never hardens but gets rubbery and acts as a cushion or gasket for the steel ball on the end of the cable. The material is available at most hardware stores.

Complaint: Sticky Keys or Sluggish Action.

Correction: Refer to page 6, "Preparation of the Piano for Servicing" for information on how to dismantle the piano, and following this, it describes easing keys and shrinking action centers.

Complaint: One or More Notes That Are Extra Loud or Harsh.

Correction: Check to see if the reed involved is slightly off center in the pickup or electrode. If so, loosen the reed mounting screw, center reed, and retighten screw. If the reed is centered and still too loud, bend the ends of the pickup up slightly (1/32" to 1/16").

(Do not bend the reeds, this makes them go flat in pitch).

Complaint: "Duds" or Reeds that Ring A Very Short Time and "Die Out".

Correction: This can generally be corrected, or at least helped, by loosening (one at a time) the four screws that mount the reed bar to the action brackets. If it can be determined which screw, when loosened, helped the most, remove the screw and place a paper front rail punching .010" to .025" thick under the reed bar at that hole and put the screw back in and tighten. It is generally a very slight twist to the reed bar when fully tightened down that causes "short ringers" or "duds".



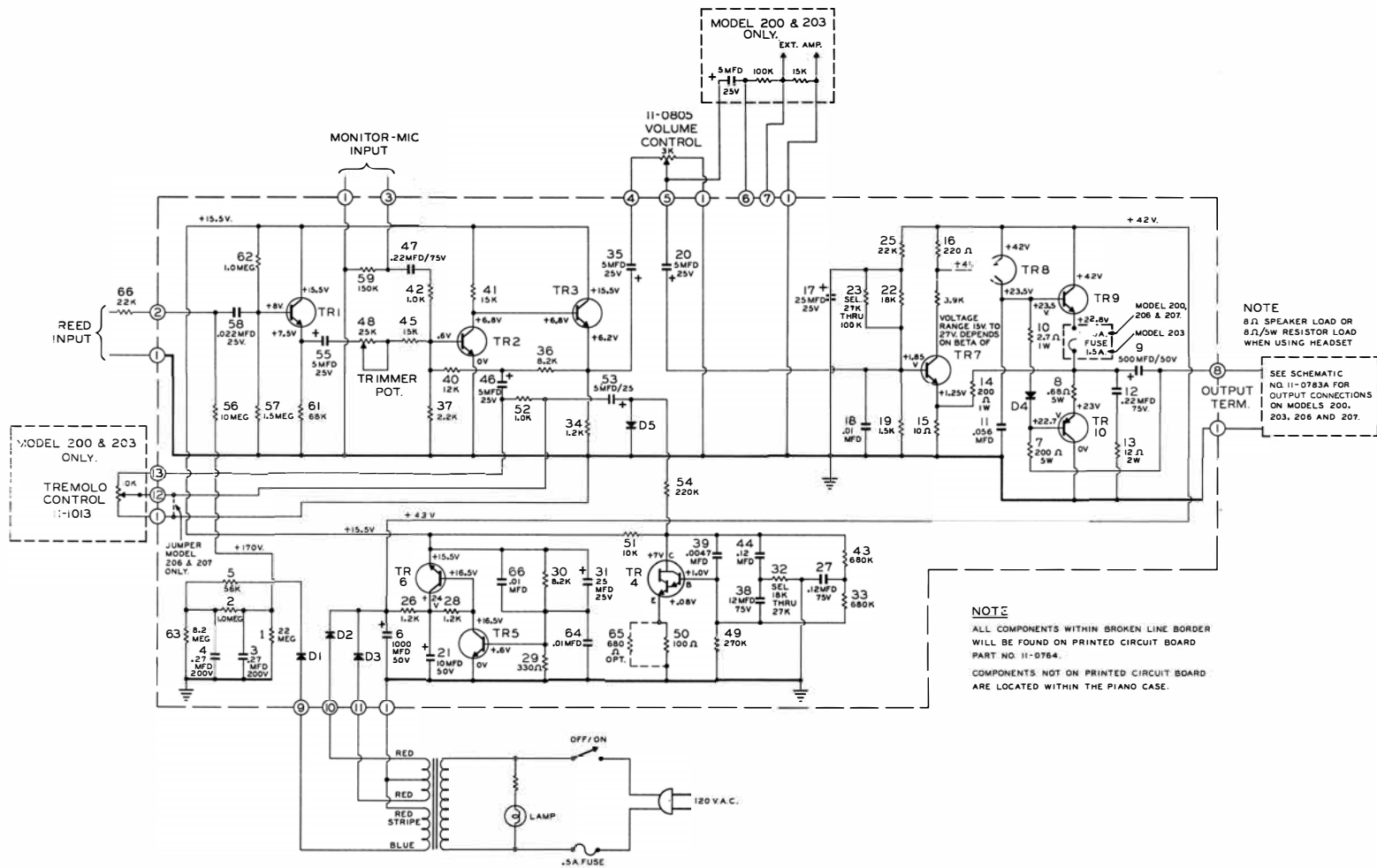
INDEX OF SCHEMATICS FOR SERIES 200  
ELECTRONIC PIANO SERVICE MANUAL

For your convenience we suggest you number the following schematic pages #1 thru #24 as shown in the index.

1. 11-0783-S-1-E-2      Sept. 1, 1968      Schematic-Amplifier  
Models and starting serial numbers:  
200-#48001, 203-#48451, 206-#48601, 207-#49151
2. 11-0783-S-2-E-10      Sept. 1, 1969      Schematic-Amplifier  
Models and starting serial numbers:  
200-#48001, 203-#48451, 206-#48601, 207-#49151
3. 11-0764-S-2-E-9      Sept. 1, 1969      P.C. Board-Amplifier  
Models and starting serial numbers:  
200-#48001, 203-#48451, 206-#48601, 207-#49151
4. 11-1305-S-1-E-3      June 1, 1971      Schematic-Amplifier  
Models and starting serial numbers:  
200-#58050, 203-#56403, 203W-#56491, 206-#57144  
207-#55921, 214-#57776
5. 11-1306-S-1-E-1      June 1, 1971      P.C. Board-E.P. Amplifier  
Models and starting serial numbers:  
200-#58050, 203-#56403, 203W-#56491, 206-#57144  
207-#55921, 214-#57776
6. 201904-S-1-E-1      June 1, 1973      Electronic Piano-Amp. Schematic  
Models and starting serial numbers:  
200-#73257, 203-#73414, 214-#73397
7. 201808-S-1-E-1      June 1, 1973      Amplifier-Piano P.C. Board Assy.  
Models and starting serial numbers:  
200-#73257, 203-#73414, 214-#73397
8. 11-0783A      Sept. 1, 1968      Output Signal Connections  
Models and starting serial numbers:  
200-#48001, 206-#48601, 203-#48451, 207-#49151
9. 11-0783A-S-2      Sept. 1, 1969      Output Signal Connections  
Models and starting serial numbers:  
200-#48001, 206-#48601, 203-#48451, 207-#49151
10. 11-1305A-S-1      June 1, 1971      Output Signal Connections  
Models and starting serial numbers:  
200-#58050, 203W-#56491, 207-#55921, 203-#56043  
206-#57144, 214-#57776
11. 202821-S-1-E-5      June 1, 1973      Wiring Diagram-Speaker System  
Models and starting serial numbers:  
All 200 Series

12. 11-1136-S-2-E-6 Sept. 1, 1969 Communication Center Schematic Model 207 - Starting serial number 49151
13. 202520-S-1-E-9 June 1, 1973 Communication Center Schematic-Complete System
14. 11-1134-S-1-E-3 Sept. 1, 1969 Printed Circuit Board Model 207- Starting serial number 49151
15. 11-1025-S-2-E-3 Sept. 1, 1969 P.C. Board-Instructor's Headphone Driver  
Starting serial number 49151
16. 11-1120-S-1-E-1 Sept. 1, 1969 D.C. Isolation Terminal Model 207 - Starting serial number 49151
17. 202158-S-1-E-8 June 1, 1973 Chassis Assy. Complete Power Supply
18. 202146-S-1-E-5 June 1, 1973 Audio Distribution Panel Assy. Model 207
19. 11-1137-S-2 Sept. 1, 1969 Communication Center Schematic Model 207 - Starting serial number 49151. (Overlay-communication between instructor and A-1 student only).
20. 11-1138-S-2 Sept. 1, 1969 Communication Center Schematic Model 207 - Starting serial number 49151 (Communication between instructor and A-6 student only).
21. 11-1139-S-2 Sept. 1, 1969 Communication Center Schematic' Model 207 - Starting serial number 49151 (Ensemble-Group A and instructor-Group C, no instructor).
22. 11-1140-S-2 Sept. 1, 1969 Communication Center Schematic Model 207 - Starting serial number 49151 (Instructor to Group A, mix Group C and D).
23. 11-1141-S-2 Sept. 1, 1969 Communication Center Schematic Model 207 - Starting serial number 49151 (Instructor to Group A, Audio Aid 1 to Group A, Audio Aid 3 to Group C).
24. 202822-S-1-E-5 June 1, 1973 Communication Center Schematic Model 207 (Overlay- Instructor to Group A, Audio Aid 1 to Group A, Audio Aid 3 to Group C).

# SCHEMATIC - ELECTRONIC PIANO AMPLIFIER MODELS 200-203-206 & 207

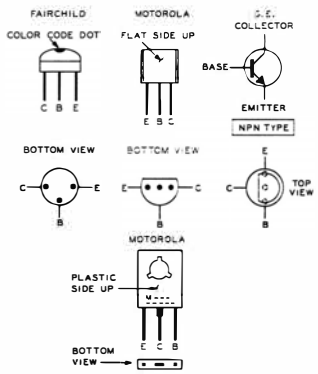


| PART NUMBER   | WURLITZER PART NUMBER |
|---|-----------------------|
| TRANSISTOR TR 1                                     | 202051                |
| TR 2  | 202052                |
| SPECIFY DOT COLOR CODE FOR SERVICE REPLACEMENT TR 3 | 202073                |
| TR 4  | 202053                |
| TR 5  | 202073                |
| TR 6  | 202073                |
| TR 7  | 202054                |
| TR 8  | 202055                |
| TR 9  | 202056                |
| TR 10   | 202057                |
| DIODE D 1   | 202050                |
| D 2   | 202050                |
| D 3   | 202050                |
| D 4   | 202050                |
| D 5   | 202049                |

NOTE  
8 Ω SPEAKER LOAD OR  
8 Ω/SW RESISTOR LOAD  
WHEN USING HEADSET

SEE SCHEMATIC  
NO. 11-0783A FOR  
OUTPUT CONNECTIONS  
ON MODELS 200,  
203, 206 AND 207.

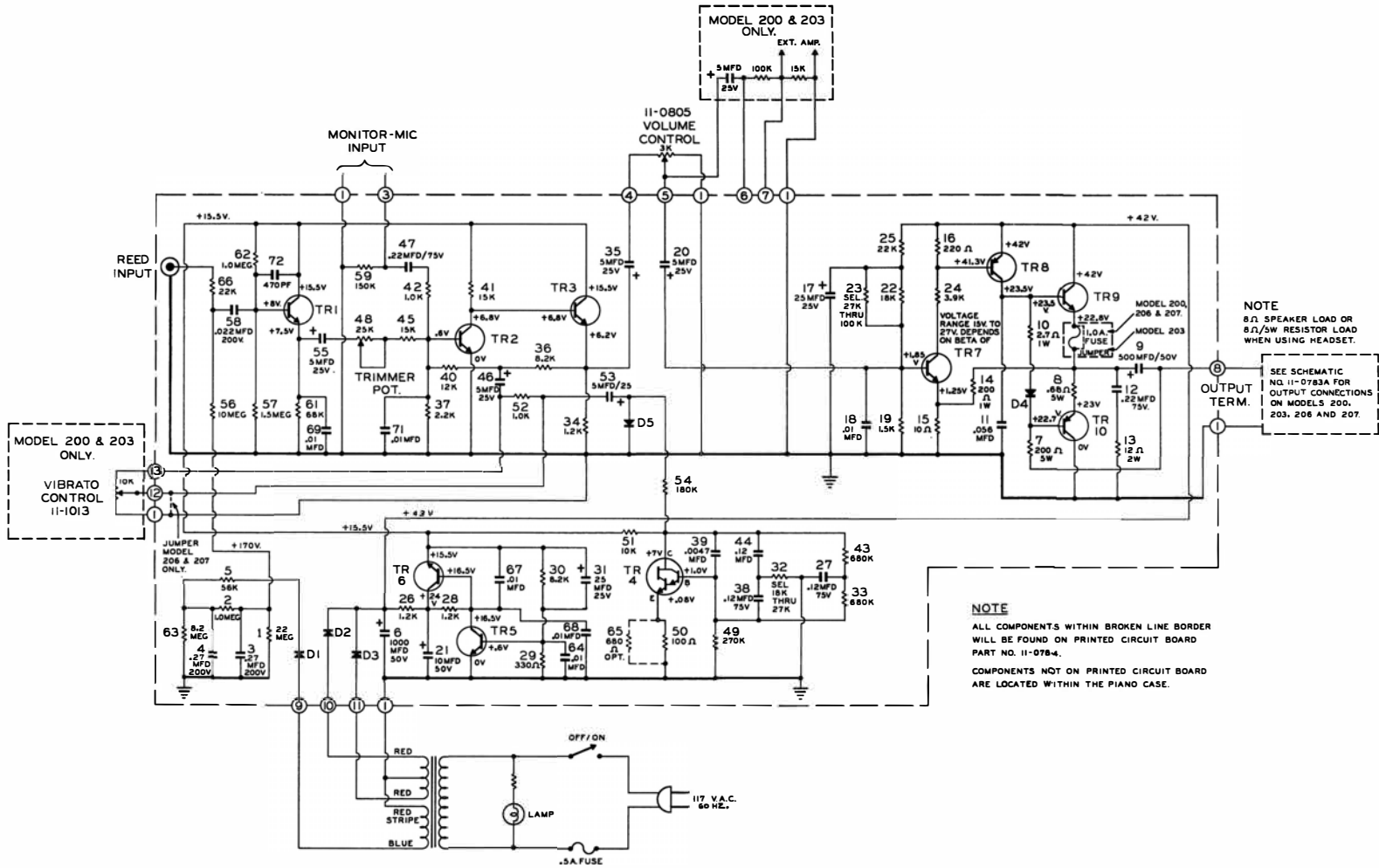
NOTE  
ALL COMPONENTS WITHIN BROKEN LINE BORDER  
WILL BE FOUND ON PRINTED CIRCUIT BOARD  
PART NO 11-0784.  
COMPONENTS NOT ON PRINTED CIRCUIT BOARD  
ARE LOCATED WITHIN THE PIANO CASE.



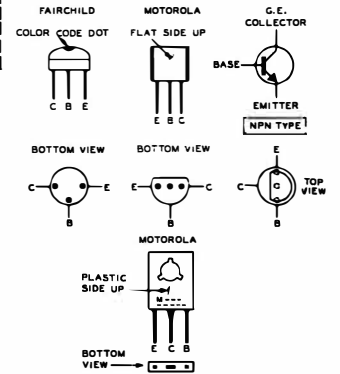
NOTE  
ALL D.C. VOLTAGES MEASURED WITH A VACUUM  
TUBE VOLTMETER, TOL. ±10% EXCEPT AS NOTED.  
LINE VOLTAGE 120 VOLTS, NO INPUT SIGNAL.  
ALL ELECTRONIC COMPONENTS SUCH AS RESISTORS,  
CAPACITORS ETC. ARE IDENTIFIED WITH A NUMBER.  
EXAMPLE  
26 IDENTIFYING NUMBER  
1.2K

THE WURLITZER COMPANY - DEKALB DIVISION - DEKALB, ILLINOIS.  
MODEL - 200 - 203 - 206 - 207  
TITLE - SCHEMATIC - AMPLIFIER  
STARTING SERIAL NO. 200-48001 206-48601 207-49151  
PART NO 11-0783-S-1-E-2  
DATE - SEPT. 1, 1968

# SCHEMATIC - ELECTRONIC PIANO AMPLIFIER MODELS 200-203-206 & 207



| PART       | NUMBER | WURLITZER PART NUMBER |
|------------|--------|-----------------------|
| TRANSISTOR | TR 1   | 202051                |
|            | TR 2   | 202052                |
|            | TR 3   | 202073                |
|            | TR 4   | 202053                |
|            | TR 5   | 202073                |
|            | TR 6   | 202073                |
|            | TR 7   | 202054                |
|            | TR 8   | 202055                |
|            | TR 9   | 202056                |
|            | TR 10  | 202057                |
| DIODE      | D 1    | 202050                |
|            | D 2    | 202050                |
|            | D 3    | 202050                |
|            | D 4    | 202050                |
|            | D 5    | 202049                |



**THE WURLITZER COMPANY - DEKALB DIVISION - DEKALB, ILLINOIS.**

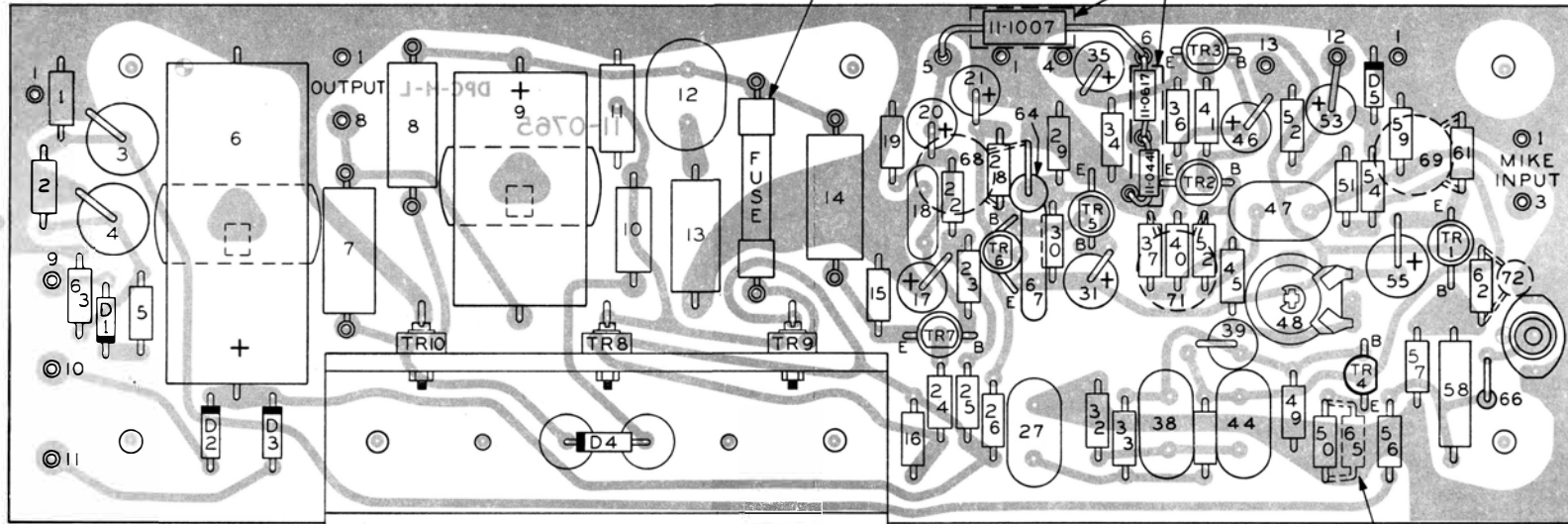
MODEL - 200 - 203 - 206 - 207.  
TITLE - SCHEMATIC - AMPLIFIER  
STARTING SERIAL NO. 200-48001 203-48451

PART NO. 11-0783-S-2-E-10  
DATE - SEPT. 1, 1969.

# ELECTRONIC PIANO AMPLIFIER P.C. BOARD MODELS 200-203-206 AND 207

1A.- MODELS 200 206 & 207.  
JUMPER WIRE - MODEL 203  
ONLY.

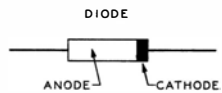
COMPONENTS 11-1007, 11-0617 & 11-0441  
WITHIN DOTTED OUTLINES ARE USED  
ON MODELS 200 AND 203 ONLY.



OPTIONAL

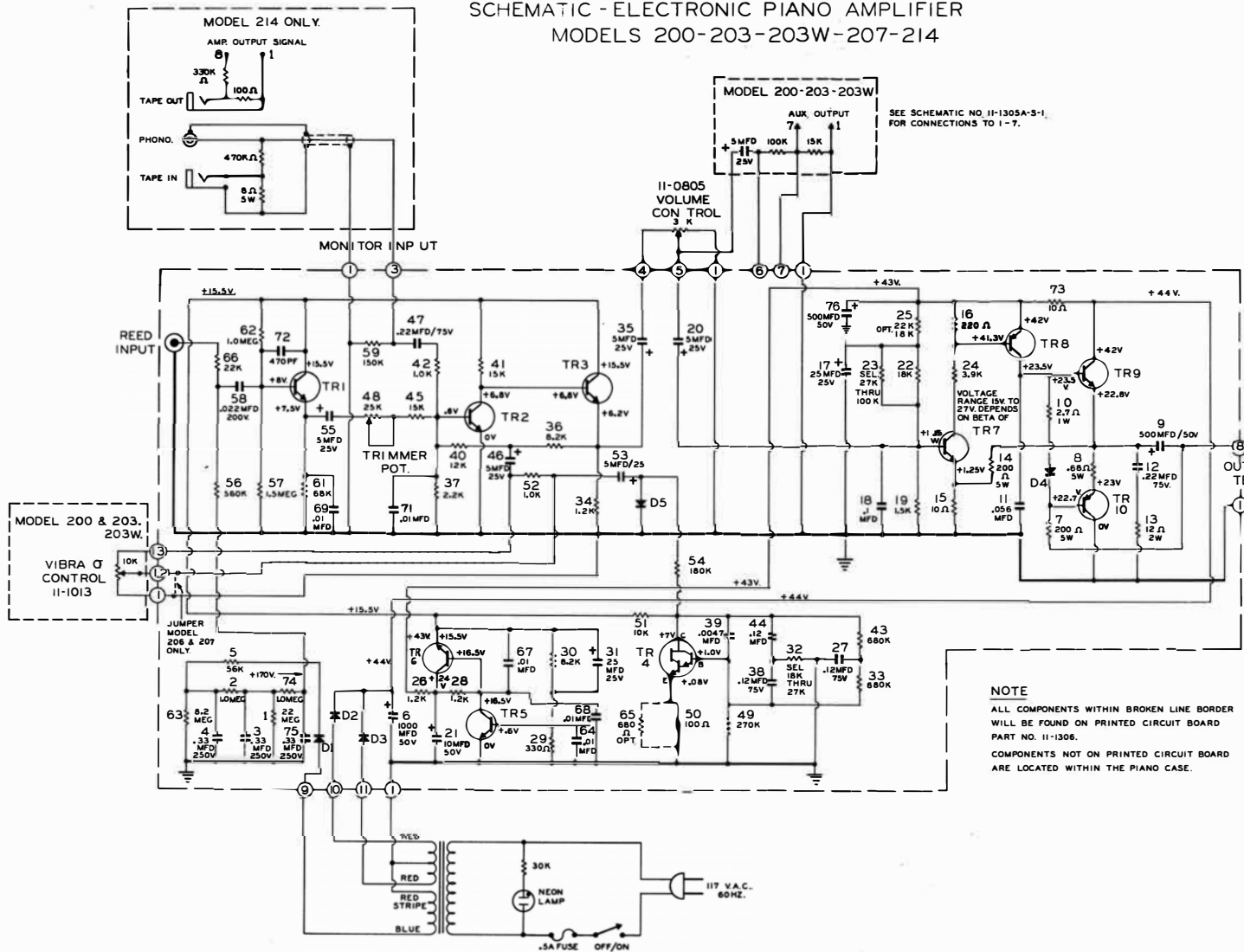
**NOTE**

SEE SCHEMATIC PART NO. 11-0783 FOR CONNECTIONS AND COMPLETE CIRCUIT.  
NUMBERS ON COMPONENTS CORRESPOND TO NUMBERS ON SCHEMATIC 11-0783.



THE WURLITZER COMPANY - DEKALB DIVISION, DEKALB, ILL.  
MODEL - 200 - 203 - 206 - 207  
TITLE - P.C. BOARD - AMPLIFIER  
STARTING SERIAL NO. 200-48001, 206-48601, 203-48451, 207-49151. PART NO. 11-0764-S 2E-9  
DATE - SEPT. 1, 1969.

**SCHEMATIC - ELECTRONIC PIANO AMPLIFIER**  
**MODELS 200-203-203W-207-214**



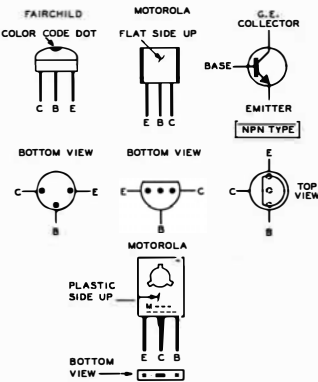
SEE SCHEMATIC NO. 11-1305A-5-1 FOR CONNECTIONS TO 1-7.

**NOTE**  
 4.0 TO 8.0 SPEAKER LOAD OR  
 8.0/5W RESISTOR LOAD  
 WHEN USING HEADSETS.

SEE SCHEMATIC NO. 11-0783A FOR  
 OUTPUT CONNECTIONS  
 ON MODELS 200, 203W,  
 203, 206, 207 AND 214.

**NOTE**  
 ALL COMPONENTS WITHIN BROKEN LINE BORDER  
 WILL BE FOUND ON PRINTED CIRCUIT BOARD  
 PART NO. 11-1306.  
 COMPONENTS NOT ON PRINTED CIRCUIT BOARD  
 ARE LOCATED WITHIN THE PIANO CASE.

| PART       | NUMBER | WURLITZER PART NUMBER |
|------------|--------|-----------------------|
| TRANSISTOR | TR 1   | 11-0778               |
|            | TR 2   | 11-0778               |
|            | TR 3   | 11-0778               |
|            | TR 4   | 11-0775               |
|            | TR 5   | 11-0778               |
|            | TR 6   | 11-0778               |
|            | TR 7   | 11-0774               |
|            | TR 8   | 11-0770               |
|            | TR 9   | 11-0772               |
|            | TR 10  | 11-0773               |
| DIODE      | D 1    | 11-0769               |
|            | D 2    | 11-0771               |
|            | D 3    | 11-0771               |
|            | D 4    | 11-0771               |
|            | D 5    | 11-0781               |



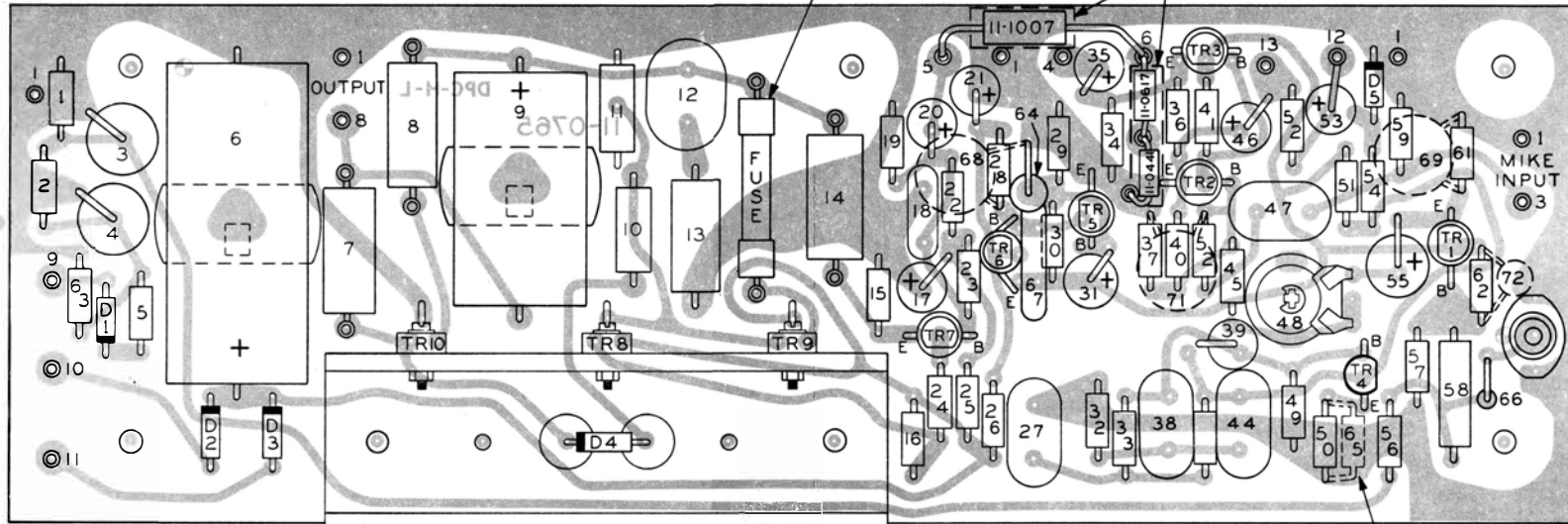
**NOTE**  
 ALL D.C. VOLTAGES MEASURED WITH A VACUUM  
 TUBE VOLTMETER, TOL. ±10% EXCEPT AS NOTED.  
 LINE VOLTAGE 117 VOLTS, NO INPUT SIGNAL.  
 ALL ELECTRONIC COMPONENTS SUCH AS RESISTORS,  
 CAPACITORS ETC. ARE IDENTIFIED WITH A NUMBER.  
 EXAMPLE  $\frac{26}{1.2K}$  IDENTIFYING NUMBER  
 1.2K

**THE WURLITZER COMPANY - DEKALB DIVISION - DEKALB, ILLINOIS**  
 MODEL - 200 - 203 - 203W - 206 - 207 - 214.  
 TITLE - SCHEMATIC - AMPLIFIER  
 STARTING SERIAL NO. 200-58050 | 203W-5649 | 207-5921 | 203-56403 | 206-57144 | 214-57776  
 PART NO. 11-1305-S-1-E-3  
 DATE - JUNE 1, 1971.

# ELECTRONIC PIANO AMPLIFIER P.C. BOARD MODELS 200-203-206 AND 207

1A.- MODELS 200 206 & 207.  
JUMPER WIRE - MODEL 203  
ONLY.

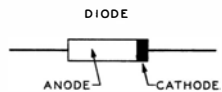
COMPONENTS 11-1007, 11-0617 & 11-0441  
WITHIN DOTTED OUTLINES ARE USED  
ON MODELS 200 AND 203 ONLY.



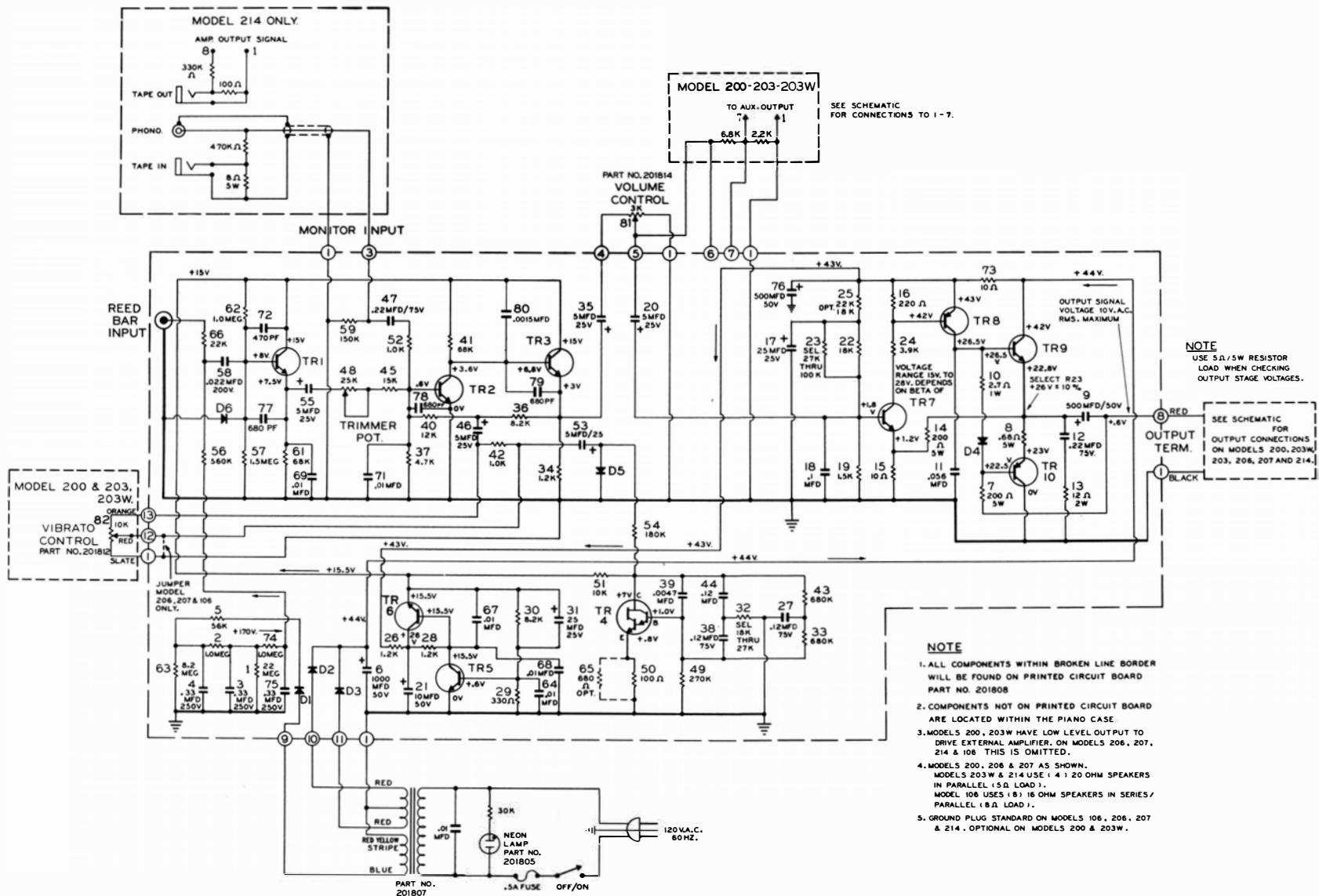
OPTIONAL

**NOTE**

SEE SCHEMATIC PART NO. 11-0783 FOR CONNECTIONS AND COMPLETE CIRCUIT.  
NUMBERS ON COMPONENTS CORRESPOND TO NUMBERS ON SCHEMATIC 11-0783.



THE WURLITZER COMPANY - DEKALB DIVISION, DEKALB, ILL.  
MODEL - 200 - 203 - 206 - 207  
TITLE - P.C. BOARD - AMPLIFIER  
STARTING SERIAL NO. 200-48001, 206-48601, 203-48451, 207-49151. PART NO. 11-0764-S 2E-9  
DATE - SEPT. 1, 1969.



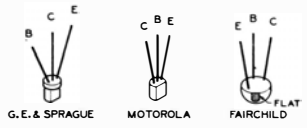
SEE SCHEMATIC FOR CONNECTIONS TO 1 - 7.

| PART  | NUMBER | WURLITZER PART NUMBER |
|---|--------|-----------------------|
| TRANSISTOR<br>SPECIFY DOT<br>COLOR CODE<br>FOR SERVICE<br>REPLACEMENT | TR 1   | 202051                |
|   | TR 2   | 202052                |
|   | TR 3   | 202073                |
|   | TR 4   | 202053                |
|   | TR 5   | 202073                |
|   | TR 6   | 202073                |
|   | TR 7   | 202054                |
|   | TR 8   | 202055                |
|   | TR 9   | 202056                |
| TR 10   | 202057 |                       |
| DIODE   | D 1    | 202050                |
|   | D 2    | 202050                |
|   | D 3    | 202050                |
|   | D 4    | 202050                |
|   | D 5    | 202049                |
|   | D 6    | 202049                |

NOTE  
USE 5Ω/5W RESISTOR  
LOAD WHEN CHECKING  
OUTPUT STAGE VOLTAGES.

SEE SCHEMATIC FOR  
OUTPUT CONNECTIONS  
ON MODELS 200, 203W,  
203, 206, 207 AND 214.

**TRANSISTOR BASING**

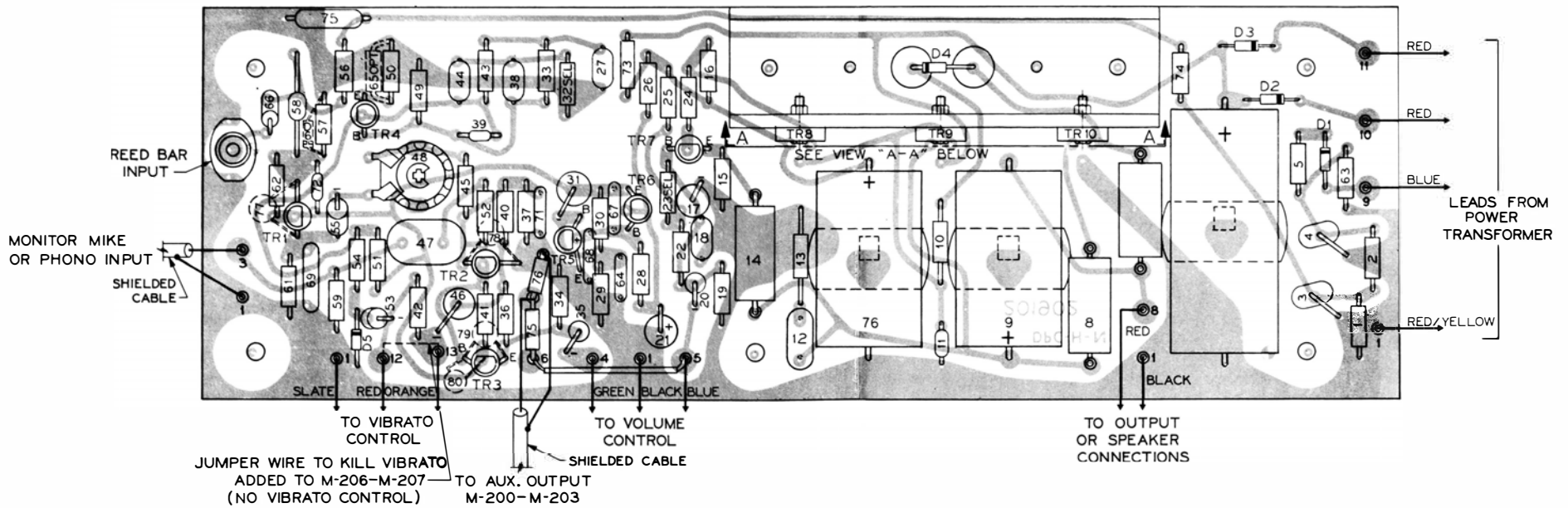


- NOTE**
- ALL COMPONENTS WITHIN BROKEN LINE BORDER WILL BE FOUND ON PRINTED CIRCUIT BOARD PART NO. 201808
  - COMPONENTS NOT ON PRINTED CIRCUIT BOARD ARE LOCATED WITHIN THE PIANO CASE
  - MODELS 200, 203W HAVE LOW LEVEL OUTPUT TO DRIVE EXTERNAL AMPLIFIER, ON MODELS 206, 207, 214 & 106 THIS IS OMITTED.
  - MODELS 200, 206 & 207 AS SHOWN. MODELS 203W & 214 USE ( 4 ) 20 OHM SPEAKERS IN PARALLEL (5Ω LOAD). MODEL 106 USES ( 1 ) 16 OHM SPEAKERS IN SERIES / PARALLEL (8Ω LOAD).
  - GROUND PLUG STANDARD ON MODELS 106, 206, 207 & 214. OPTIONAL ON MODELS 200 & 203W.

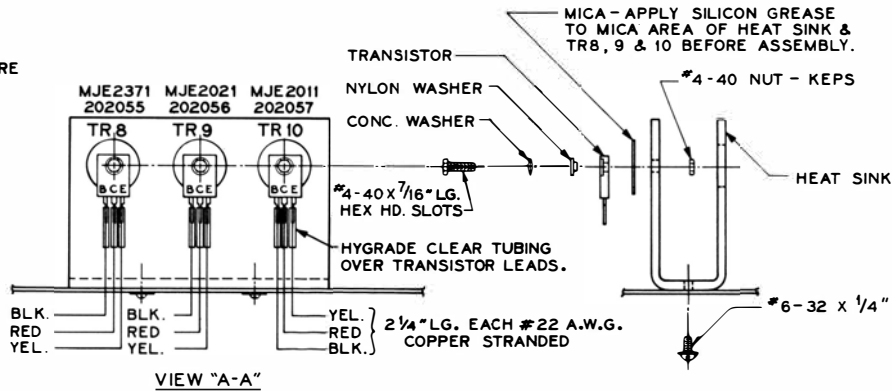
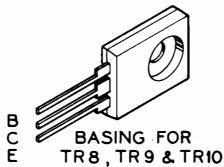
**NOTE**  
ALL O.C. VOLTAGES MEASURED WITH A HIGH IMPEDANCE  
VOLTMETER, TOL. ±10% EXCEPT AS NOTED.  
LINE VOLTAGE 120V. 60HZ. NO INPUT SIGNAL  
ALL ELECTRONIC COMPONENTS SUCH AS RESISTORS,  
CAPACITORS ETC. ARE IDENTIFIED WITH A NUMBER.  
EXAMPLE IDENTIFYING NUMBER  
1.2K

MODEL - 200 SERIES PART NO. 201904-5-1-E-1  
TITLE - ELECTRONIC PIANO AMPLIFIER SCHEMATIC  
M-200-73257  
STARTING SERIAL NO. M-203-73414 M-214-73397 DATE 6-1-73  
THE WURLITZER COMPANY - DEKALB DIVISION - DEKALB, ILL.





**TORQUE** - USE NO MORE THAN 6 IN. LBS. TO SECURE TR8, TR9 & TR10



**VIEW "A-A"**  
**TRANSISTOR INSTALLATION TO HEAT SINK**  
**VIEWED FROM TRANSISTOR SIDE**

**NOTES -**

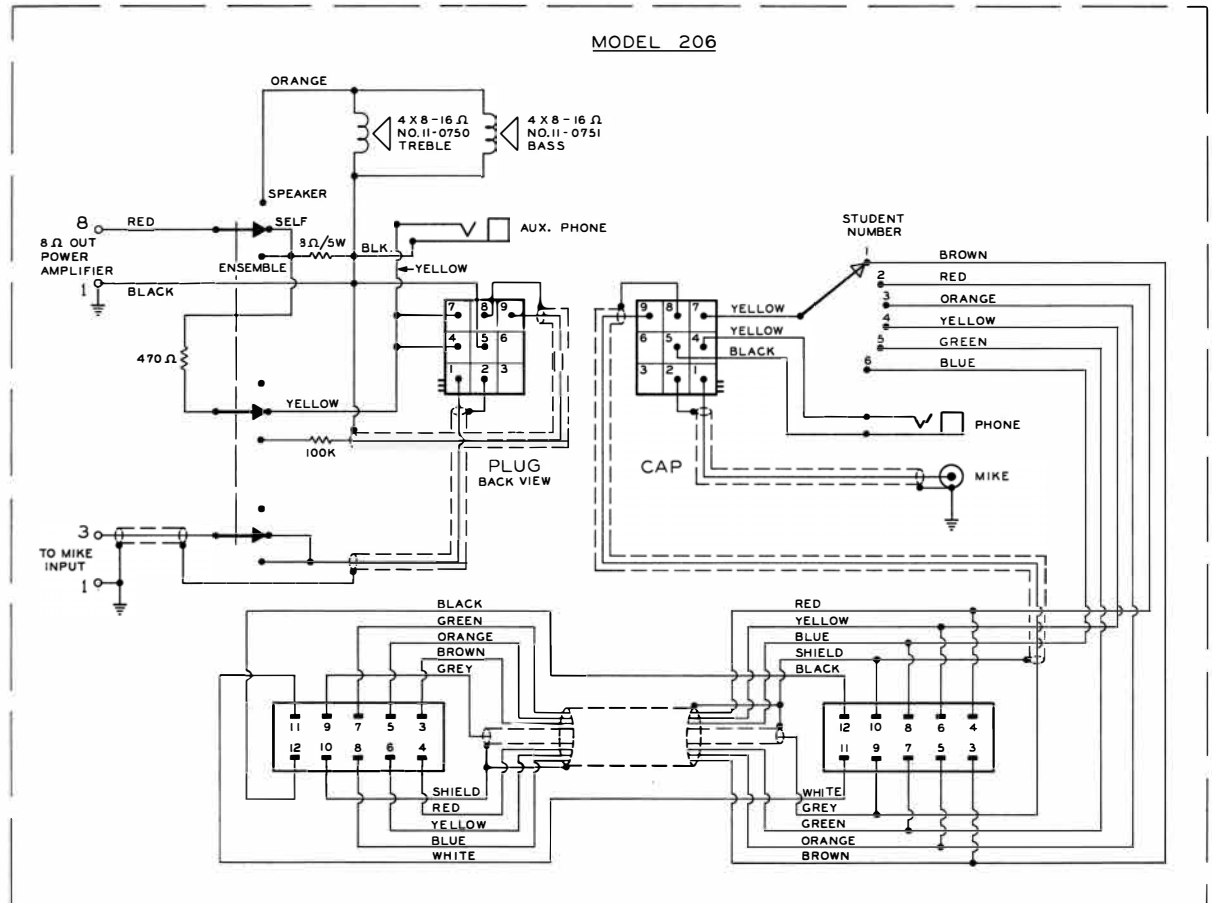
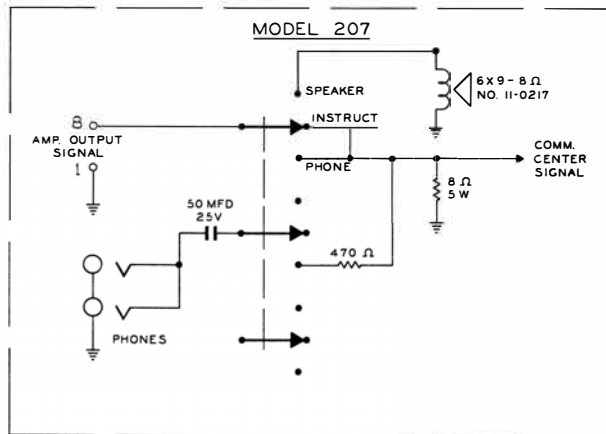
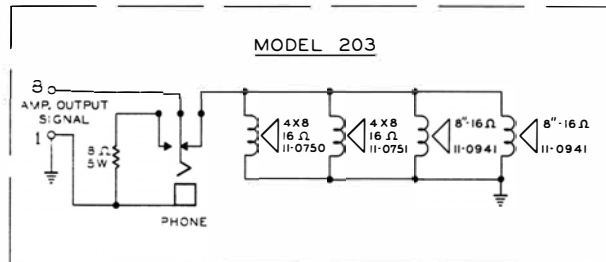
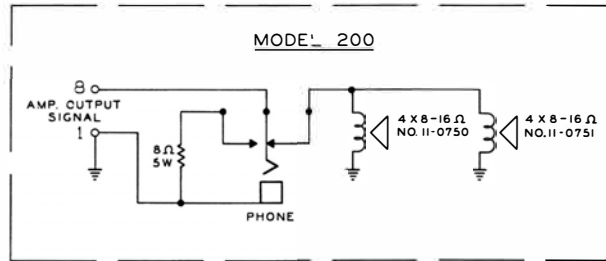
SEE SCHEMATIC 201904D FOR CONNECTIONS AND COMPLETE CIRCUITS.

NUMBERS ON COMPONENTS CORRESPOND TO NUMBERS ON SCHEMATIC 201904D.

BAND INDICATES CATHODE END OF DIODE.

PARTS # 75 (6.8K - 1/2 W) & # 76 (2.2K 1/2 W) TO BE ASSEMBLED ON MODELS 200 & 203W FOR LOW LEVEL OUTPUT TO DRIVE EXTERNAL AMPLIFIER FROM AUX. OUTPUT

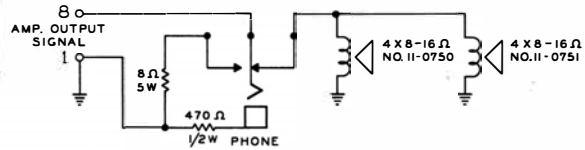
# OUTPUT SIGNAL CONNECTIONS ELECTRONIC PIANO



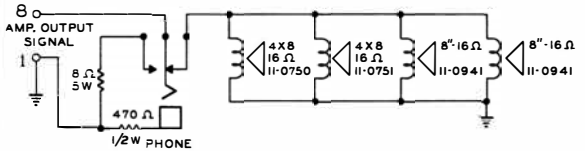
THE WURLITZER COMPANY - DEKALB DIVISION, DEKALB ILL.  
 MODEL - 200, 203, 206, 207.  
 TITLE - OUTPUT SIGNAL CONNECTIONS  
 STARTING SERIAL NO. 200-48001 206-48601 203-48451 207-49151  
 PART NO. 11-0783A  
 DATE - SEPT. 1, 1968

# OUTPUT SIGNAL CONNECTIONS ELECTRONIC PIANO

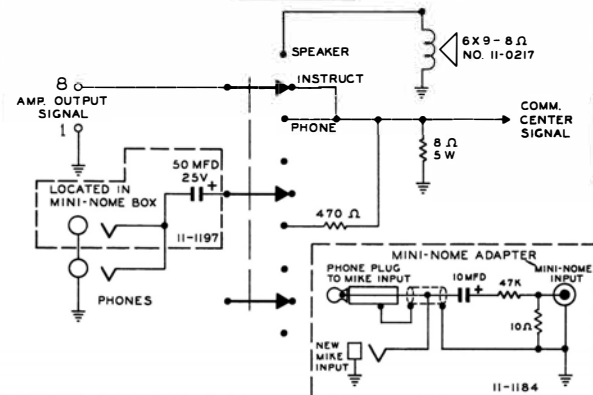
**MODEL 200 - PORTABLE**



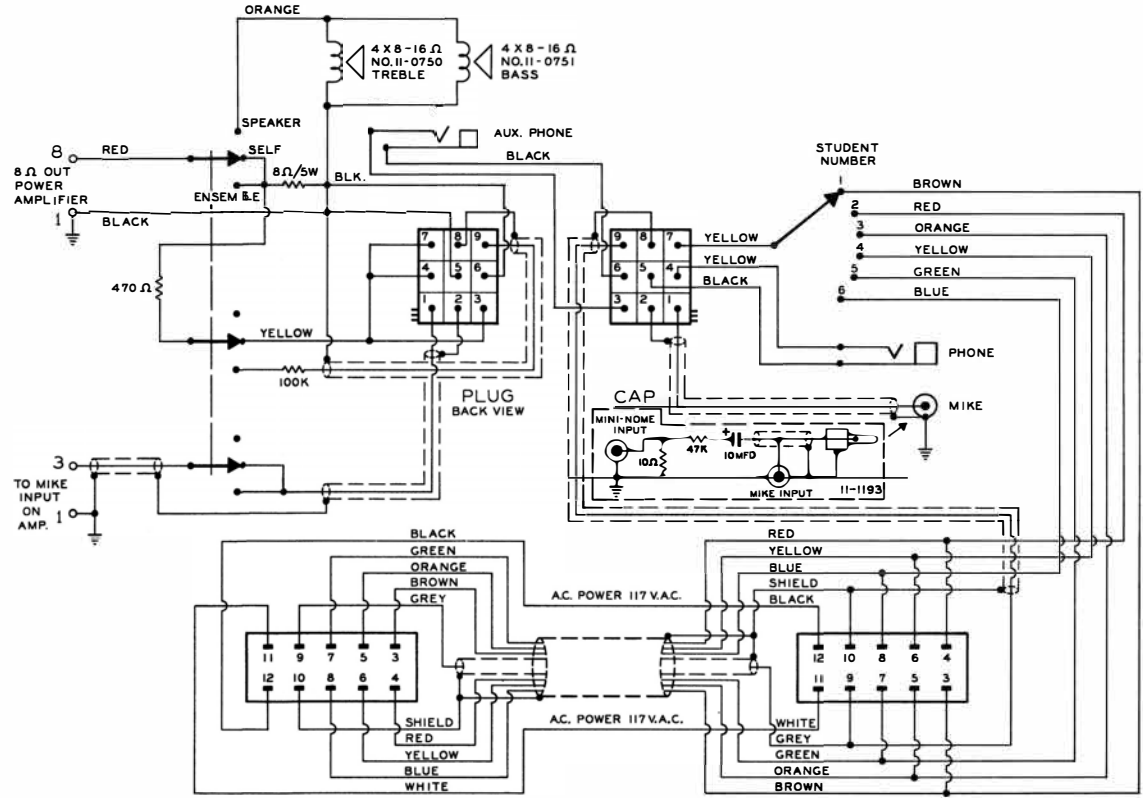
**MODEL 203 - CONSOLE**



**MODEL 207 - TEACHER**

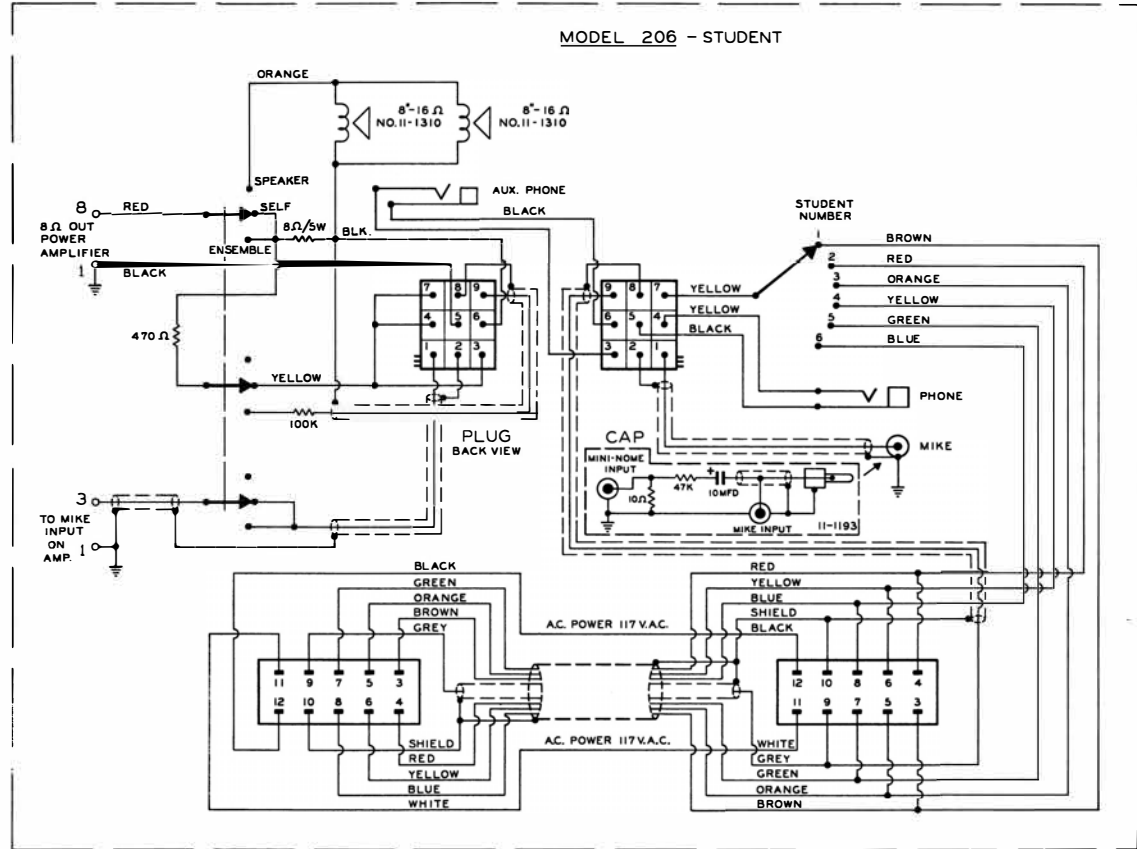
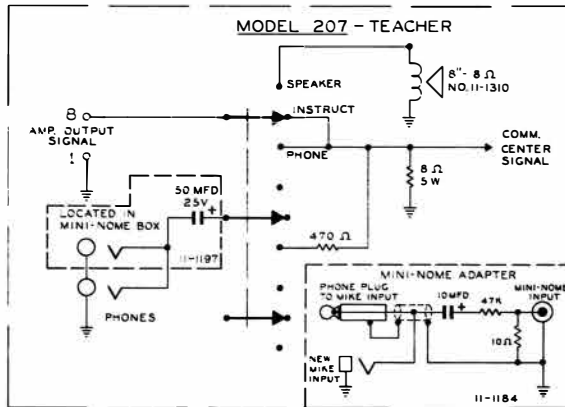
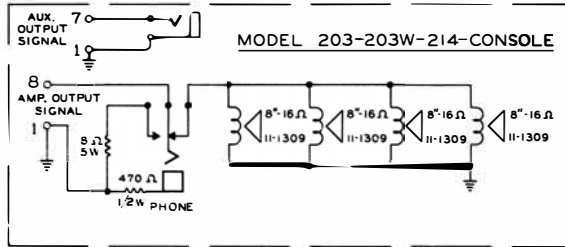
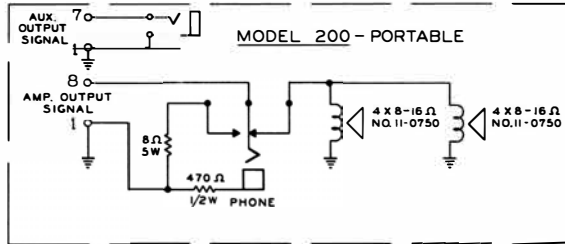


**MODEL 206 - STUDENT**

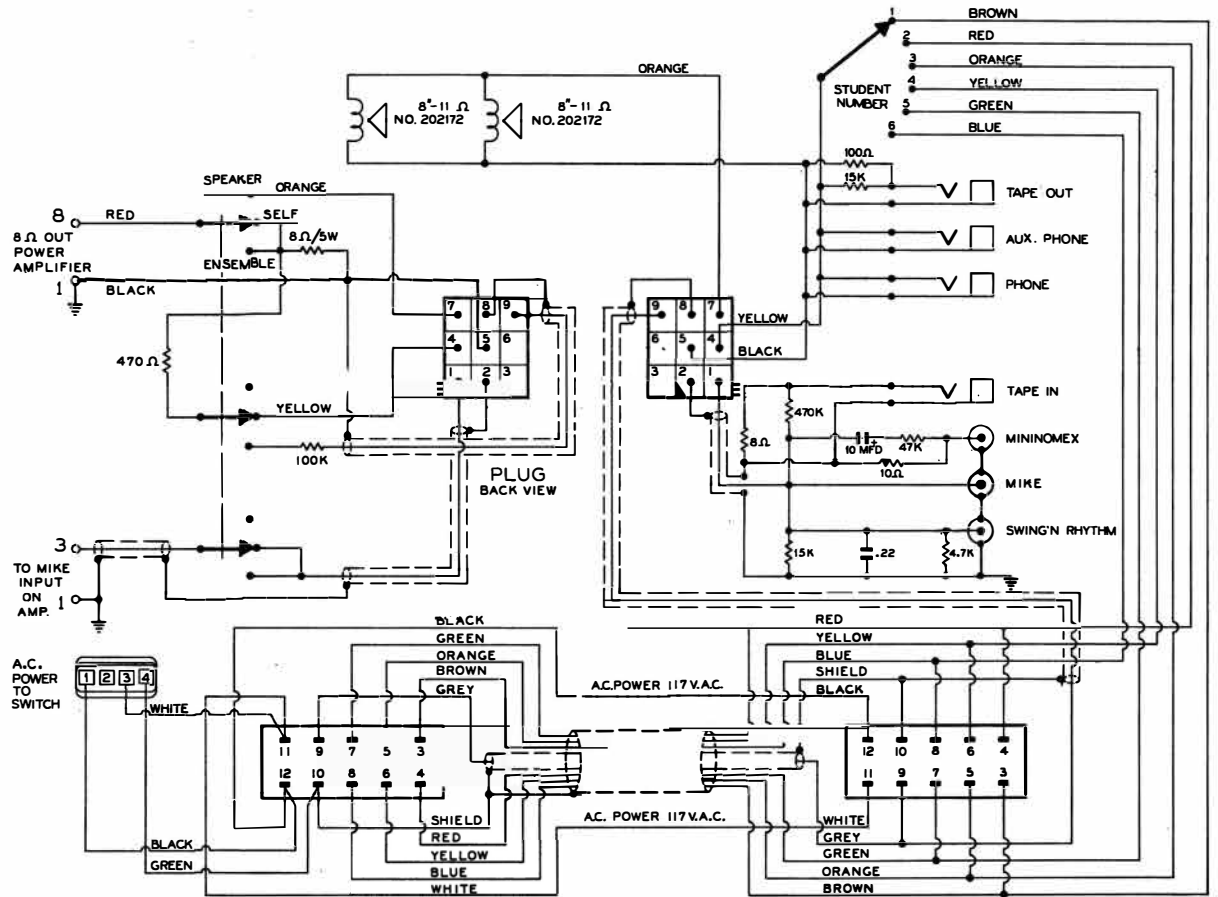
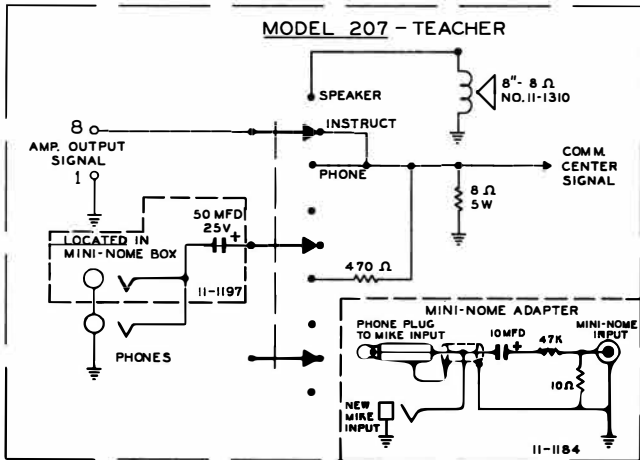
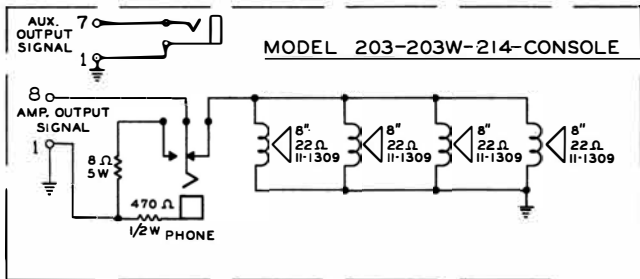
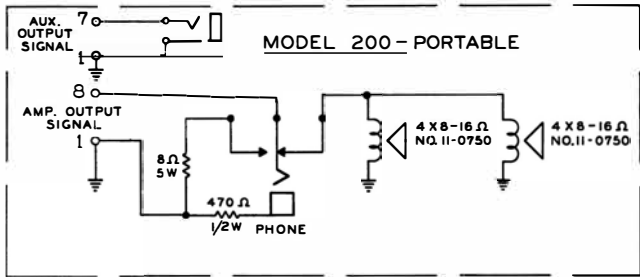


**THE WURLITZER COMPANY - DEKALB DIVISION, DEKALB ILL.**  
 MODEL - 200, 203, 206, 207.  
 TITLE - OUTPUT SIGNAL CONNECTIONS  
 STARTING SERIAL NO. 200-48001 206-48601  
 203-48451 207-49151  
 PART NO. II-0783A-S-2  
 DATE - SEPT. 1, 1969.

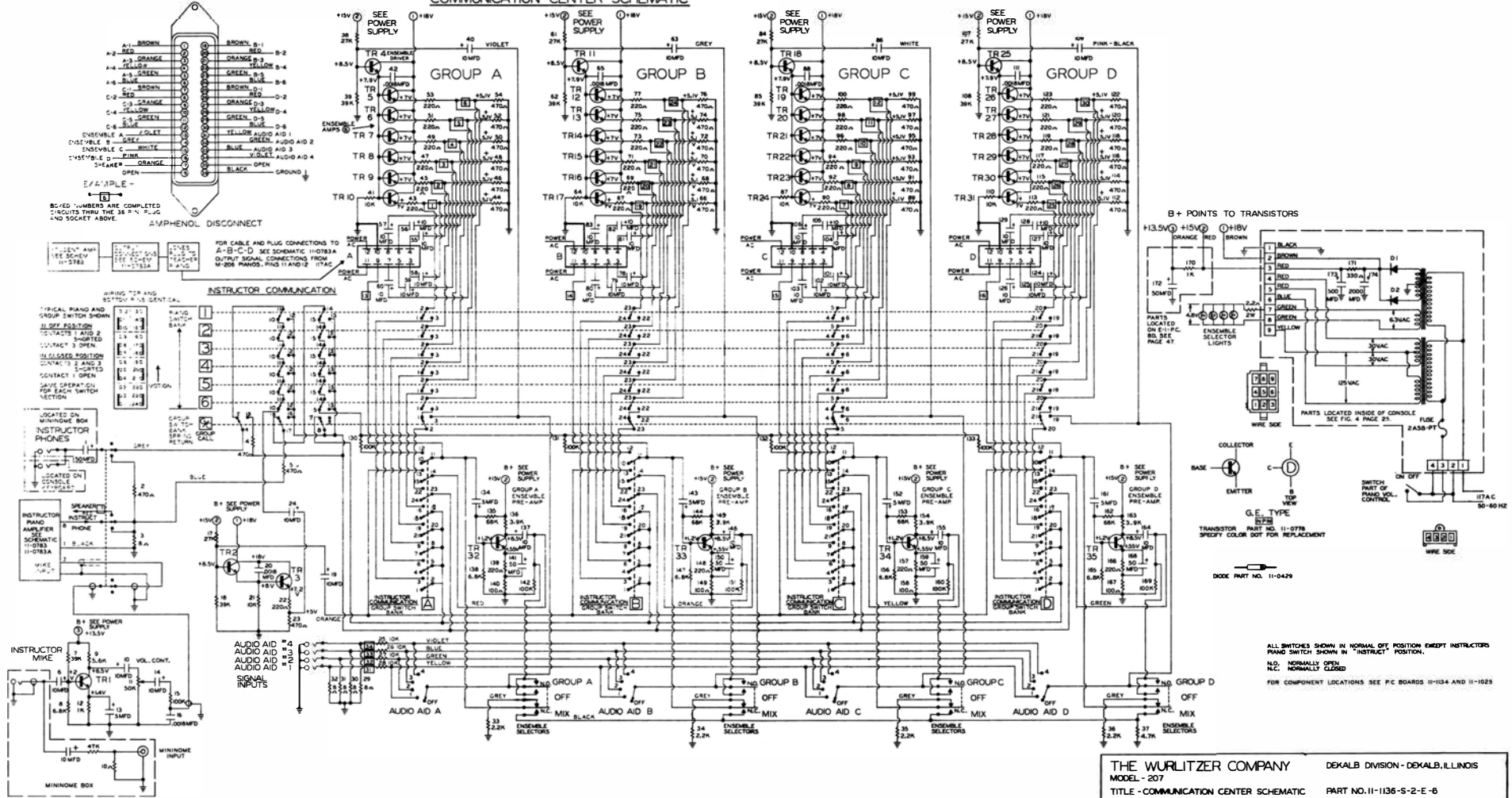
# OUTPUT SIGNAL CONNECTIONS ELECTRONIC PIANO 200 SERIES



THE WURLITZER COMPANY - DEKALB DIVISION, DEKALB ILL.  
 MODEL - 200, 203, 203W, 206, 207, 214.  
 TITLE - OUTPUT SIGNAL CONNECTIONS  
 STARTING SERIAL NO. 200-58050 | 203W-56491 | 207-55921 | PART NO. 11-1305A-S-1  
 203-56043 | 206-57144 | 214-57776 | DATE - JUNE 1, 1971.

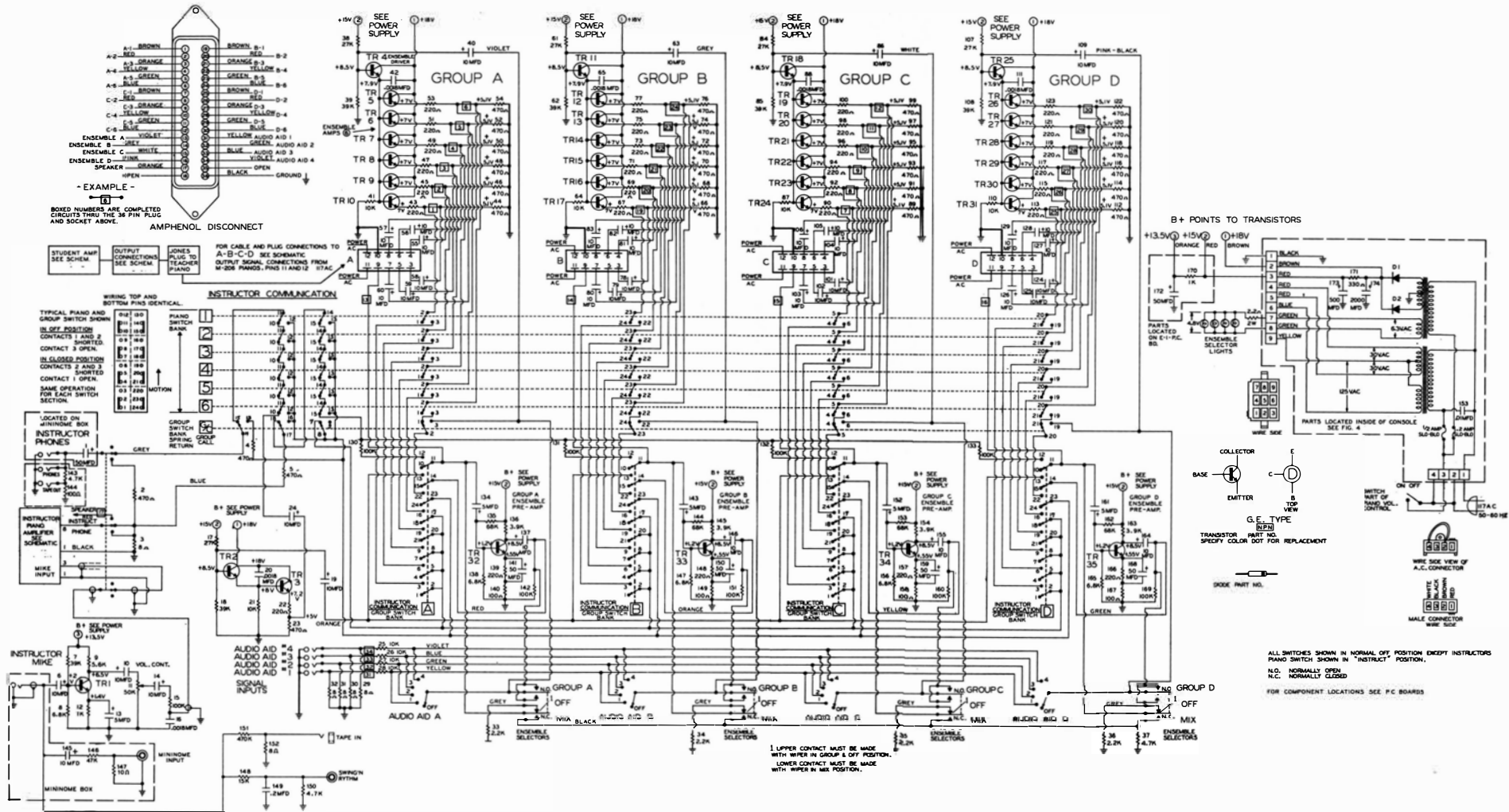


# COMMUNICATION CENTER SCHEMATIC



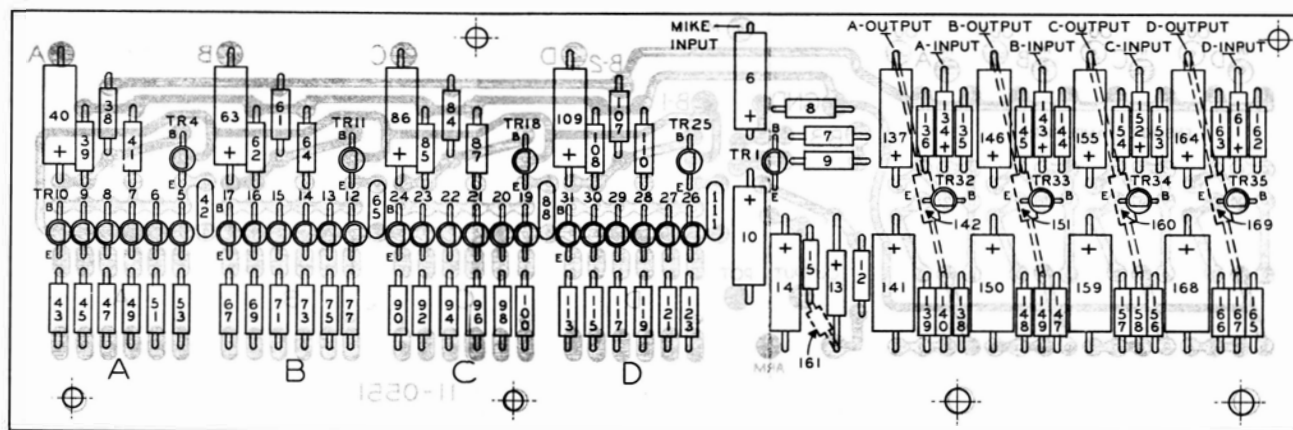
THE WURLITZER COMPANY  
 MODEL - 207  
 TITLE - COMMUNICATION CENTER SCHEMATIC  
 STARTING SERIAL NO. 49151

DEKALB DIVISION - DEKALB, ILLINOIS  
 PART NO. 11-136-S-2-E-6  
 DATE - SEPT. 1, 1969



MODEL - 207 PART NO. 202520-5-1-E-9  
 TITLE - COMMUNICATION CENTER SCHEM. COMPLETE SYSTEM  
 STARTING SERIAL NO. DATE: 6-1-73  
 THE WURLITZER COMPANY - DEKALB DIVISION - DEKALB, ILL.

# P.C. BOARD - COMMUNICATION CENTER



**NOTE**

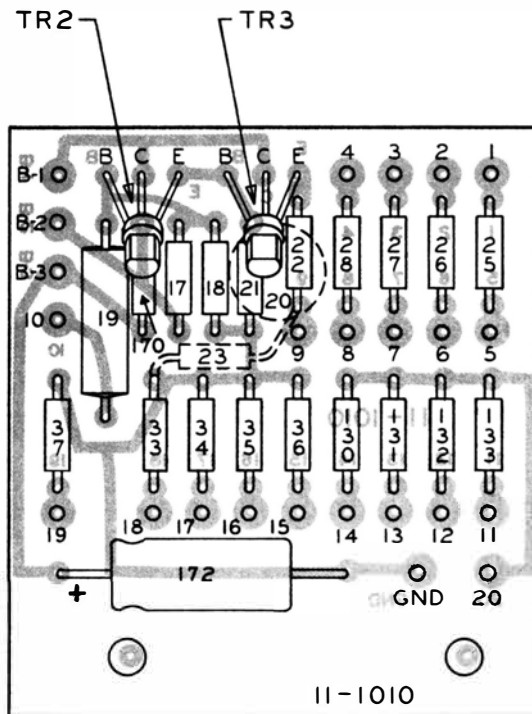
FOR COMPLETE WIRING SEE SCHEMATIC NO. 11-1136.  
 DOTTED COMPONENTS ARE LOCATED ON UNDERSIDE  
 OF P.C. BOARD.

THE WURLITZER COMPANY - DEKALB DIVISION - DEKALB, ILLINOIS  
 MODEL - 207 COMMUNICATION CENTER  
 TITLE - PRINTED CIRCUIT BOARD  
 STARTING SERIAL NO. 49151

PART NO. 11-1134-S-1-E-3  
 DATE - SEPT. 1, 1969



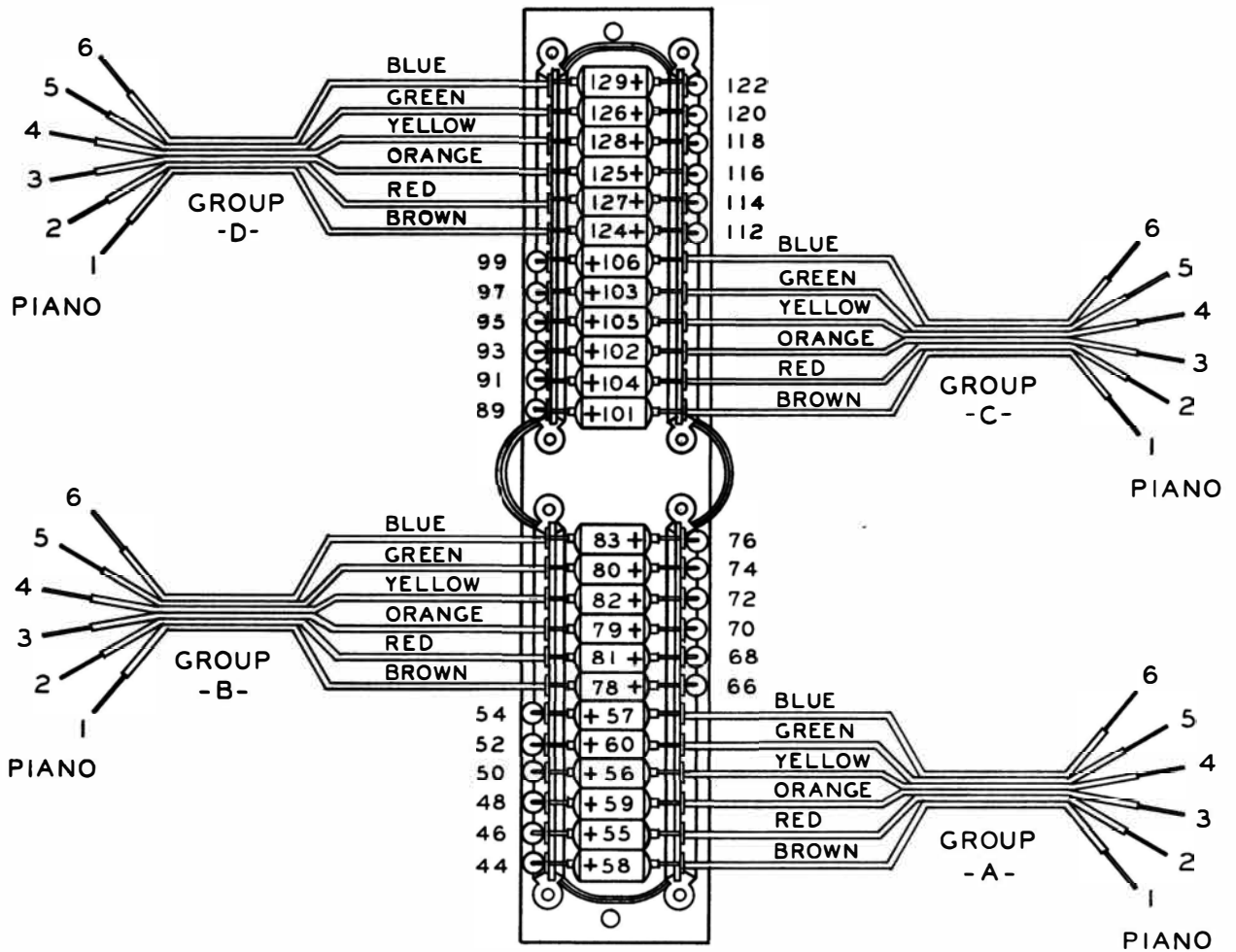
# P.C. BOARD - INSTRUCTOR'S HEADPHONE DRIVER



NOTE:  
RESISTORS 33-34-35-36 AND 130  
131-132-133 RANDOM WIRED.

THE WURLITZER COMPANY - DEKALB DIVISION - DEKALB, ILLINOIS  
MODEL - 207  
TITLE - P.C. BOARD - INSTRUCTOR'S HEADPHONE DRIVER. PART NO. II-1025-S-2-E-3  
STARTING SERIAL NO. 49151 DATE - SEPT. 1, 1969

# D.C. ISOLATION TERMINAL



THE WURLITZER COMPANY DEKALB DIVISION-DEKALB, ILLINOIS  
 MODEL - 207  
 TITLE - D.C. ISOLATION TERMINAL  
 STARTING SERIAL NO. 49151.

PART NO. 11-1120-S-I-E-1  
 DATE - SEPT. 1, 1969

TRANSFORMER #2  
POWER AMP.  
201807

TRANSFORMER #1  
COMM. CENTER  
202162

CAPACITOR - 2000 MFD  
202165

FUSE SLO-BLO  
.2 AMP

CAPACITOR  
500 MFD  
76811

FUSE SLO-BLO  
1/2 AMP

4 CIRCUIT SOCKET  
201801

CAPACITOR .01 MFD  
( DISC ) 202519

TERMINAL STRIP - 4 LUG  
202219

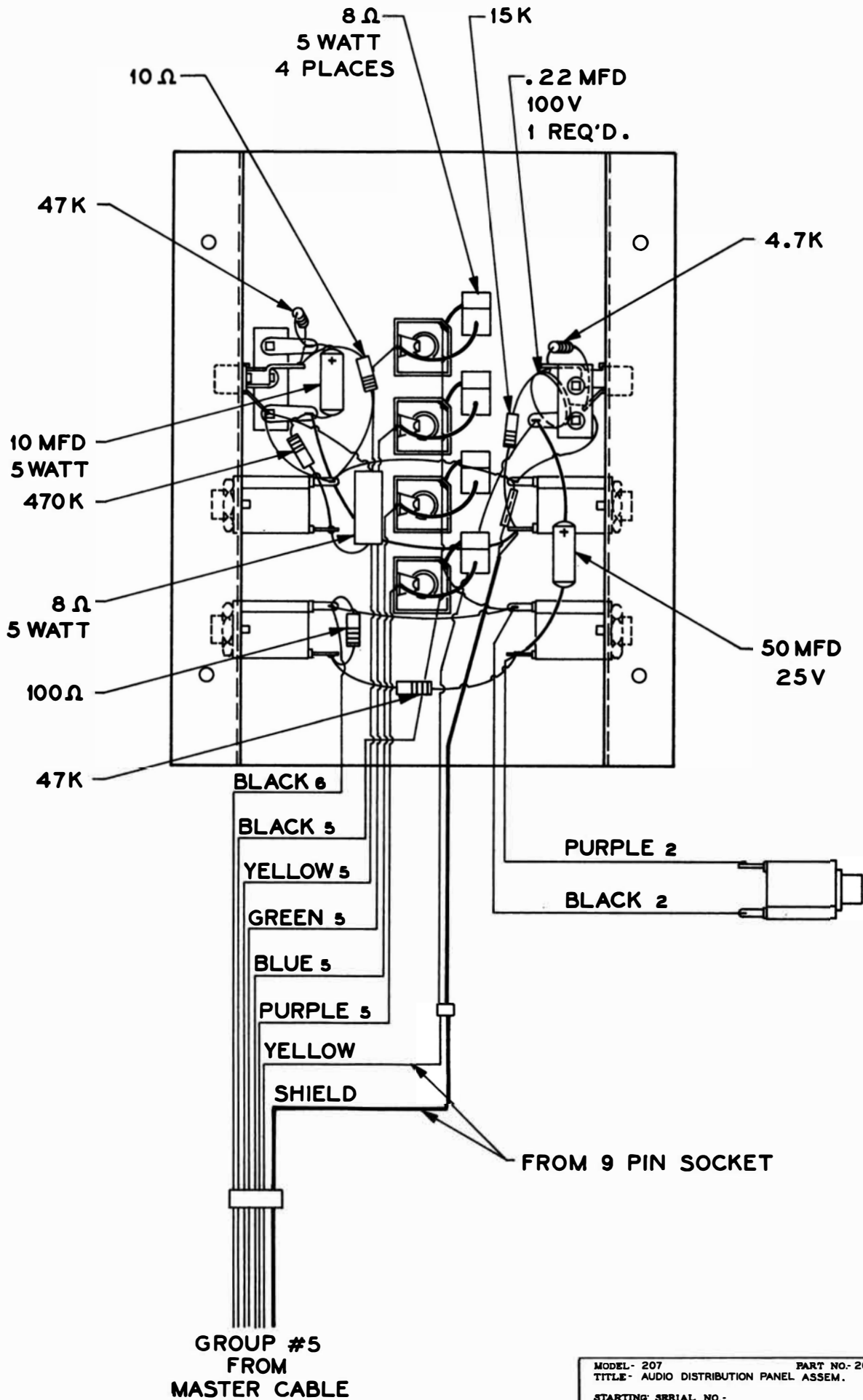
RESISTOR - 330Ω  
2 REQ.  
77281-35

DIODE - 2 REQ.  
202164

9 CIRCUIT SOCKET  
202166

TERMINAL STRIP  
5 LUG  
201946

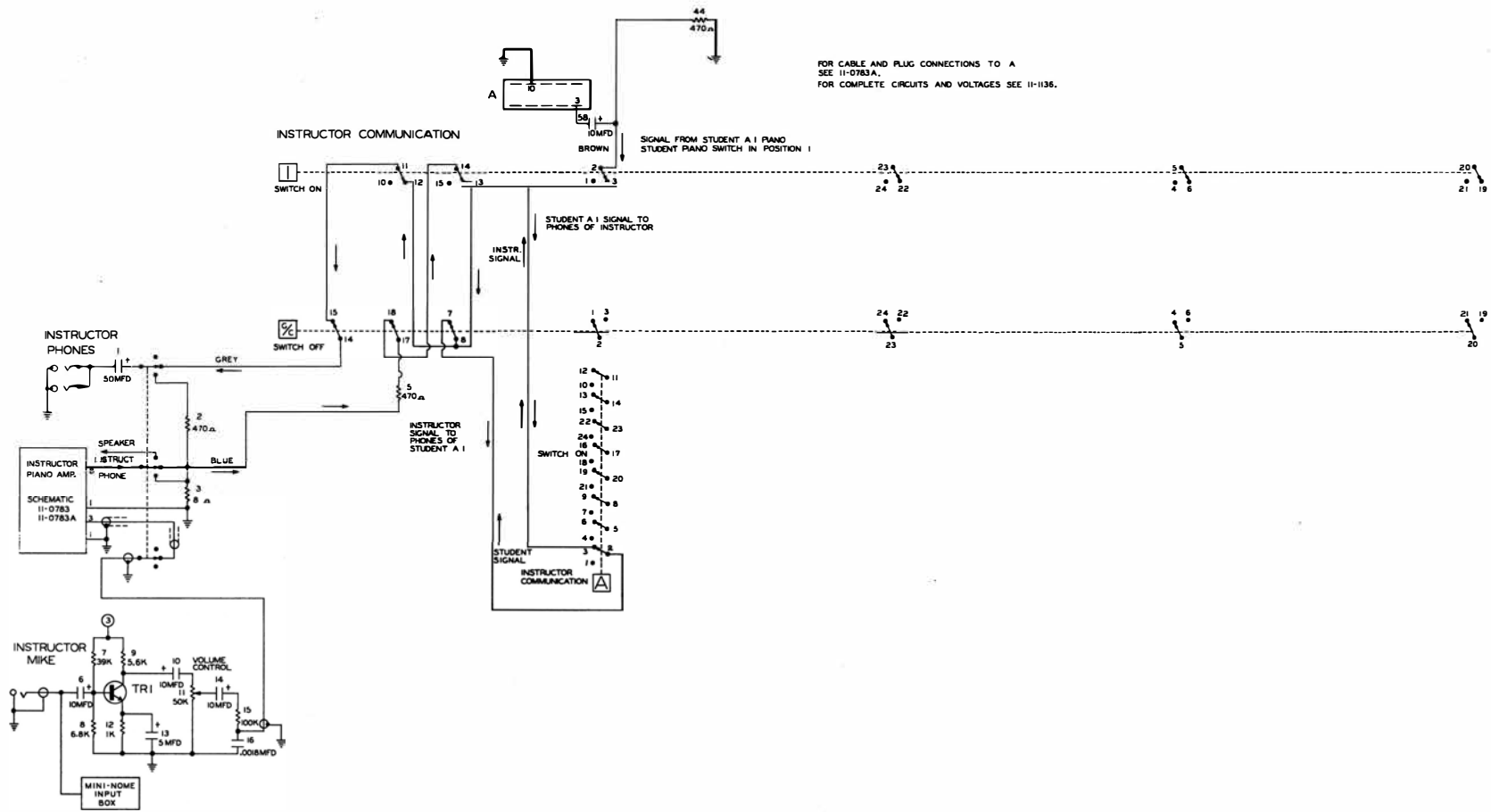
MODEL - 207  
TITLE - CHASSIS ASSEM. COMPLETE POWER SUPPLY  
STARTING SERIAL NO. -  
THE WURLITZER COMPANY - DEKALB DIVISION - DEKALB, ILL.  
PART NO. 202159-5-1-E-8  
DATE: 6-1-73



MODEL - 207                      PART NO. 202146-S-1-E-5  
 TITLE - AUDIO DISTRIBUTION PANEL ASSEM.  
 STARTING SERIAL NO. -                      DATE - 6-1-73  
 THE WURLITZER COMPANY - DEKALB DIVISION - DEKALB, ILL.

COMMUNICATION BETWEEN  
INSTRUCTOR AND A-1  
STUDENT ONLY

11-1137

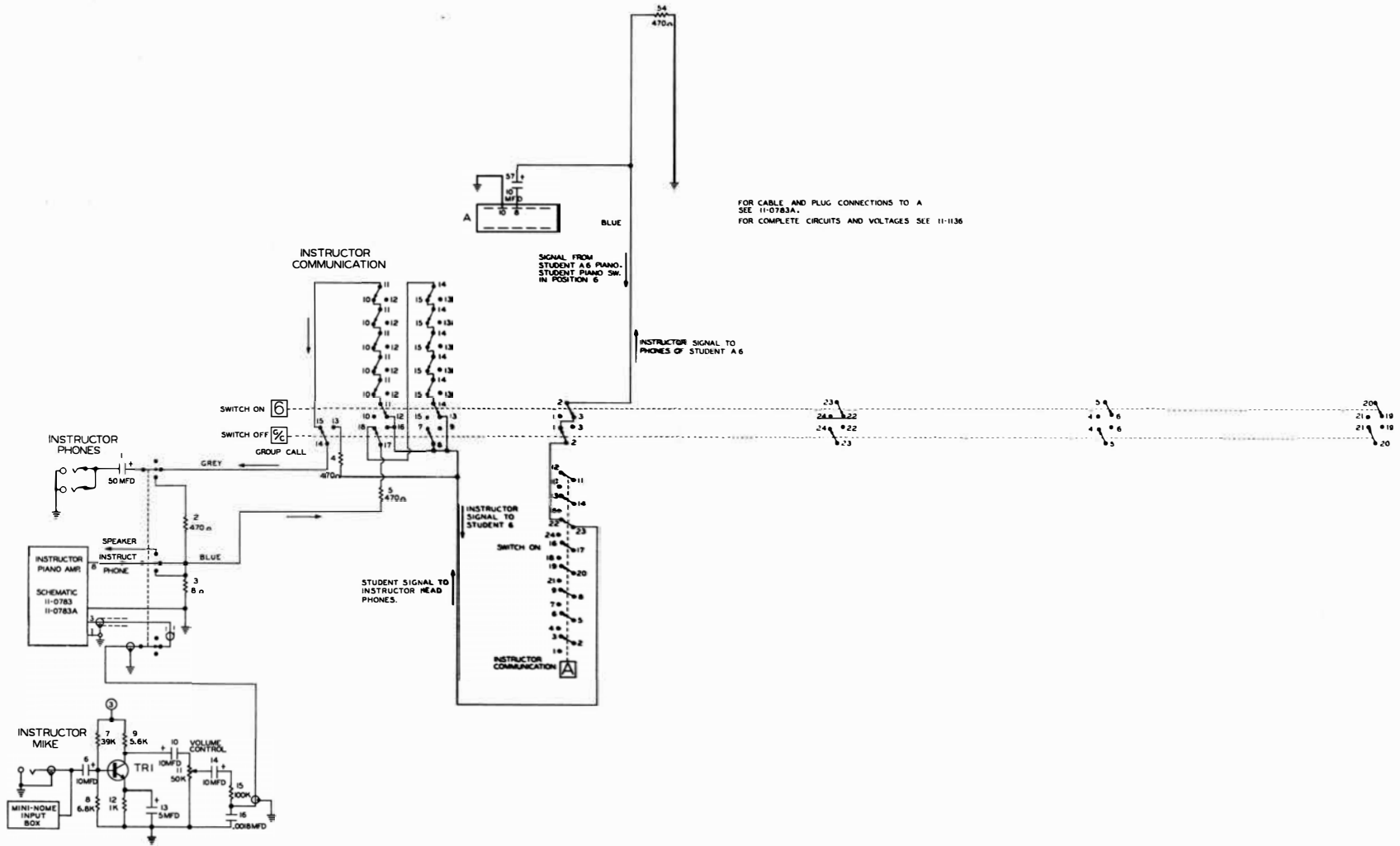


THE WURLITZER COMPANY  
MODEL - 207  
TITLE - COMMUNICATION CENTER SCHEMATIC  
STARTING SERIAL NO. 49151

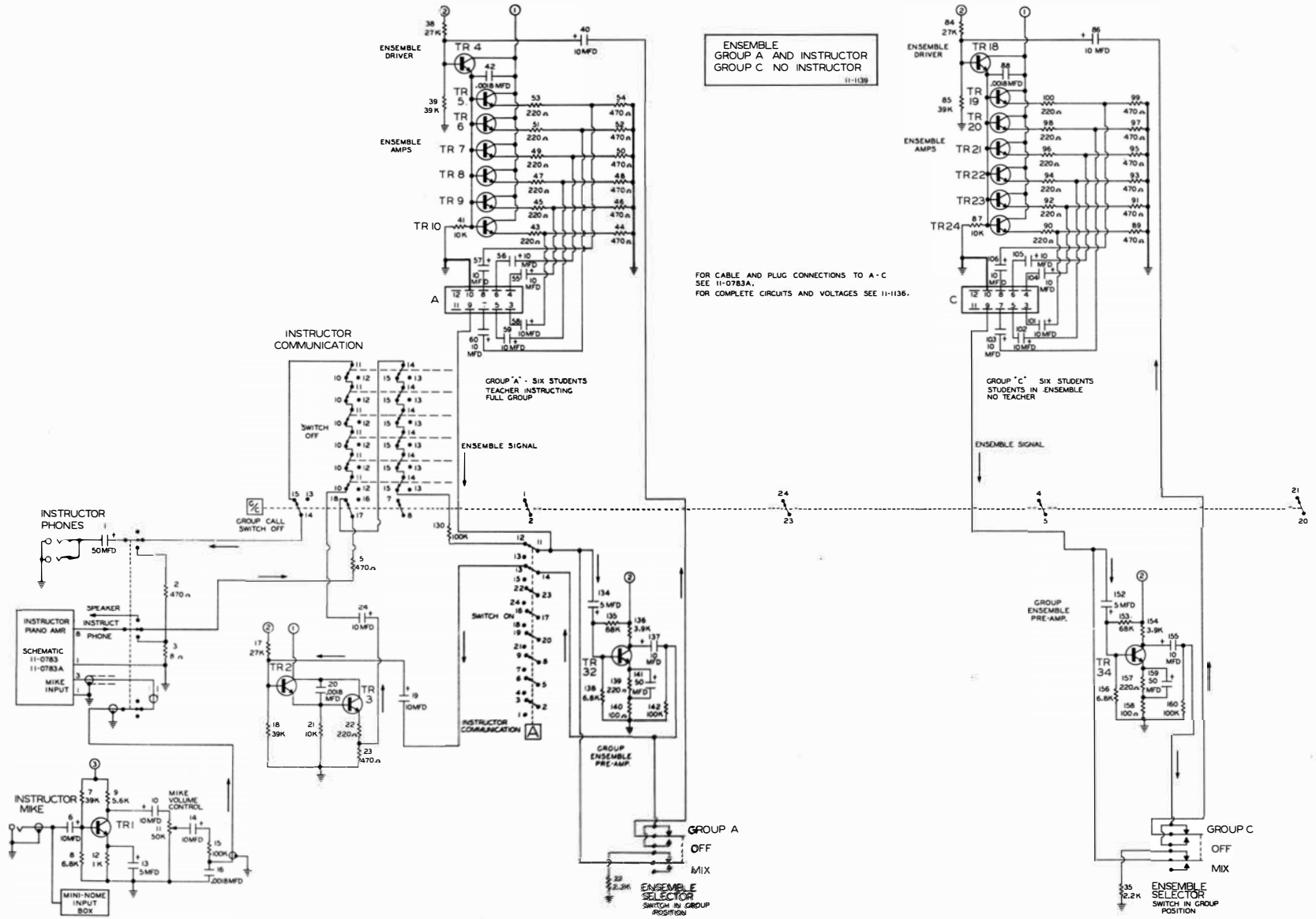
DEKALB DIVISION - DEKALB, ILLINOIS  
PART NO. - 11-1137-S-2  
DATE - SEPT. 1, 1969

COMMUNICATION BETWEEN  
INSTRUCTOR AND A 6  
STUDENT ONLY

11-1136



FOR CABLE AND PLUG CONNECTIONS TO A  
SEE 11-0783A.  
FOR COMPLETE CIRCUITS AND VOLTAGES SEE 11-1136



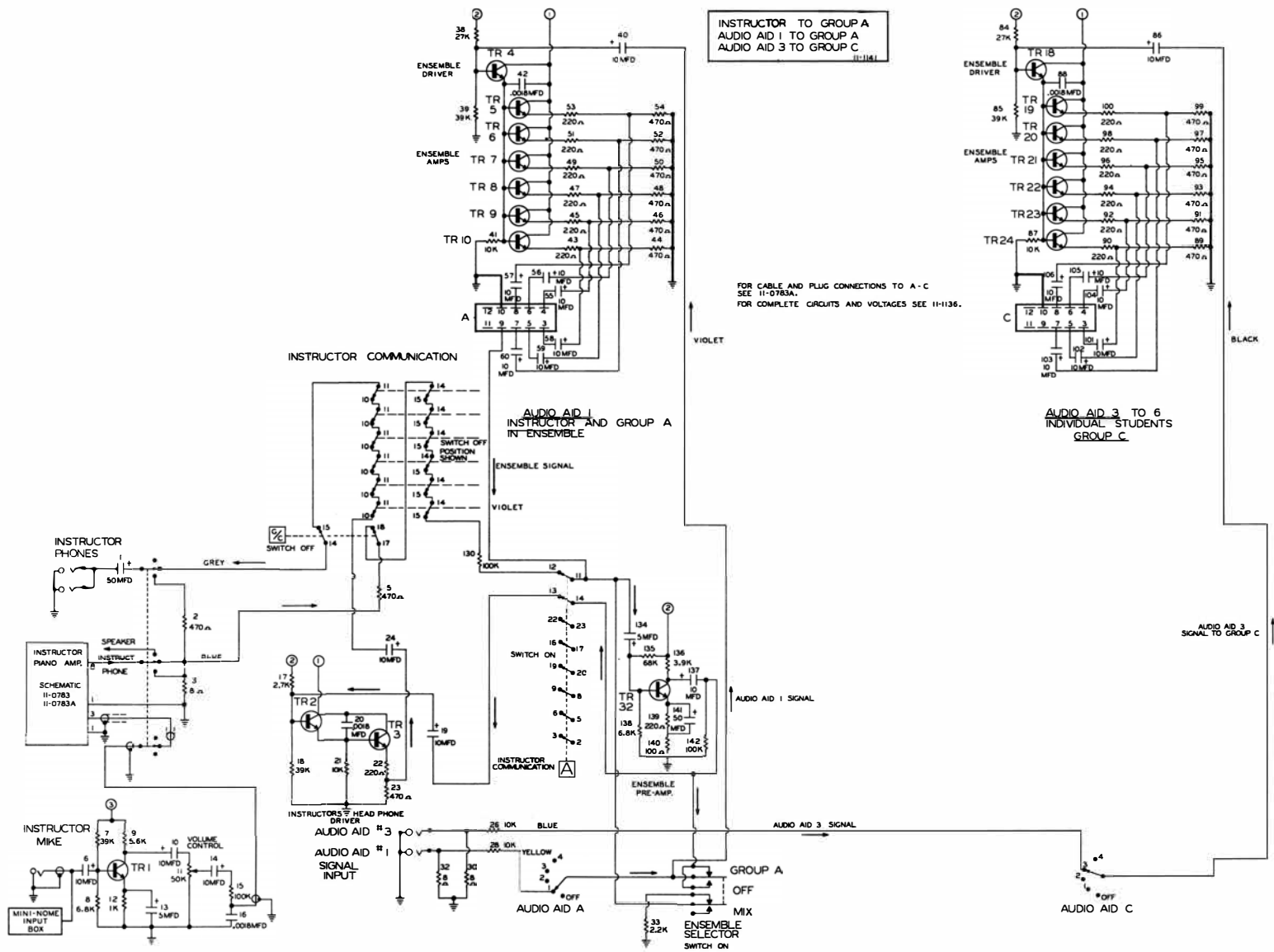
ENSEMBLE  
GROUP A AND INSTRUCTOR  
GROUP C NO INSTRUCTOR  
II-1139

FOR CABLE AND PLUG CONNECTIONS TO A-C  
SEE II-0783A.  
FOR COMPLETE CIRCUITS AND VOLTAGES SEE II-1136.

THE WURLITZER COMPANY DEKALB DIVISION - DEKALB, ILLINOIS  
MODEL - 207  
TITLE - COMMUNICATION CENTER SCHEMATIC PART NO. II-1139-S-2  
STARTING SERIAL NO. 49151 DATE - SEPT. 1, 1969







INSTRUCTOR TO GROUP A  
 AUDIO AID 1 TO GROUP A  
 AUDIO AID 3 TO GROUP C

FOR CABLE AND PLUG CONNECTIONS TO A-C  
 SEE 11-0783A.  
 FOR COMPLETE CIRCUITS AND VOLTAGES SEE 11-1136.

AUDIO AID 3 TO 6  
 INDIVIDUAL STUDENTS  
 GROUP C



# MODEL 200A

STARTING SERIAL NO. 102905  
ASS'Y. NO. 203730-3

