



Master Assembly

GALAXY

AM 075

1 PREFACE

The following extracts are taken from the Master Assembly Manual for the Galaxy, to cover the layout of the organ modules, testing, and cable-form wiring.

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Figure 1 Layout of the building blocks in the organ top

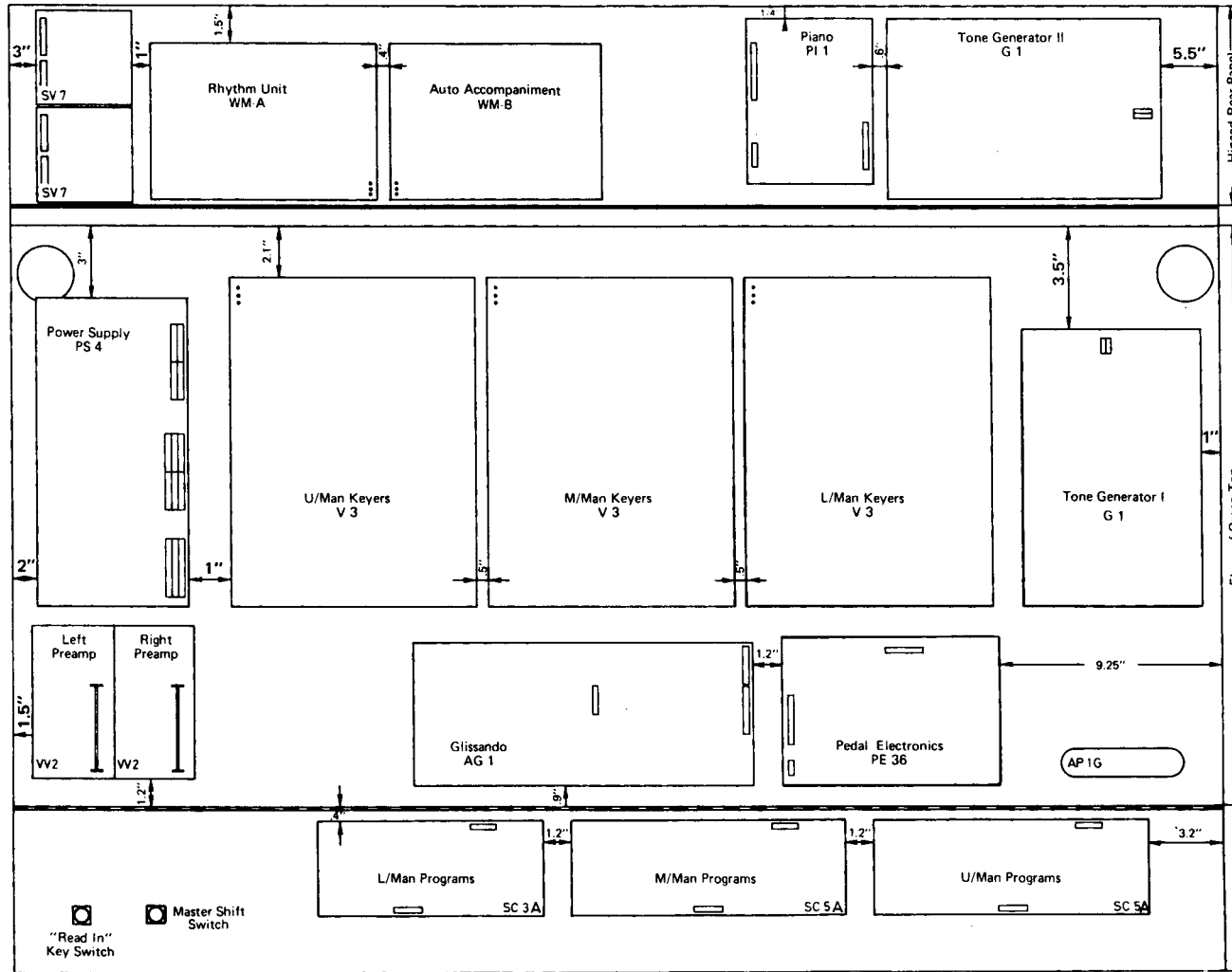
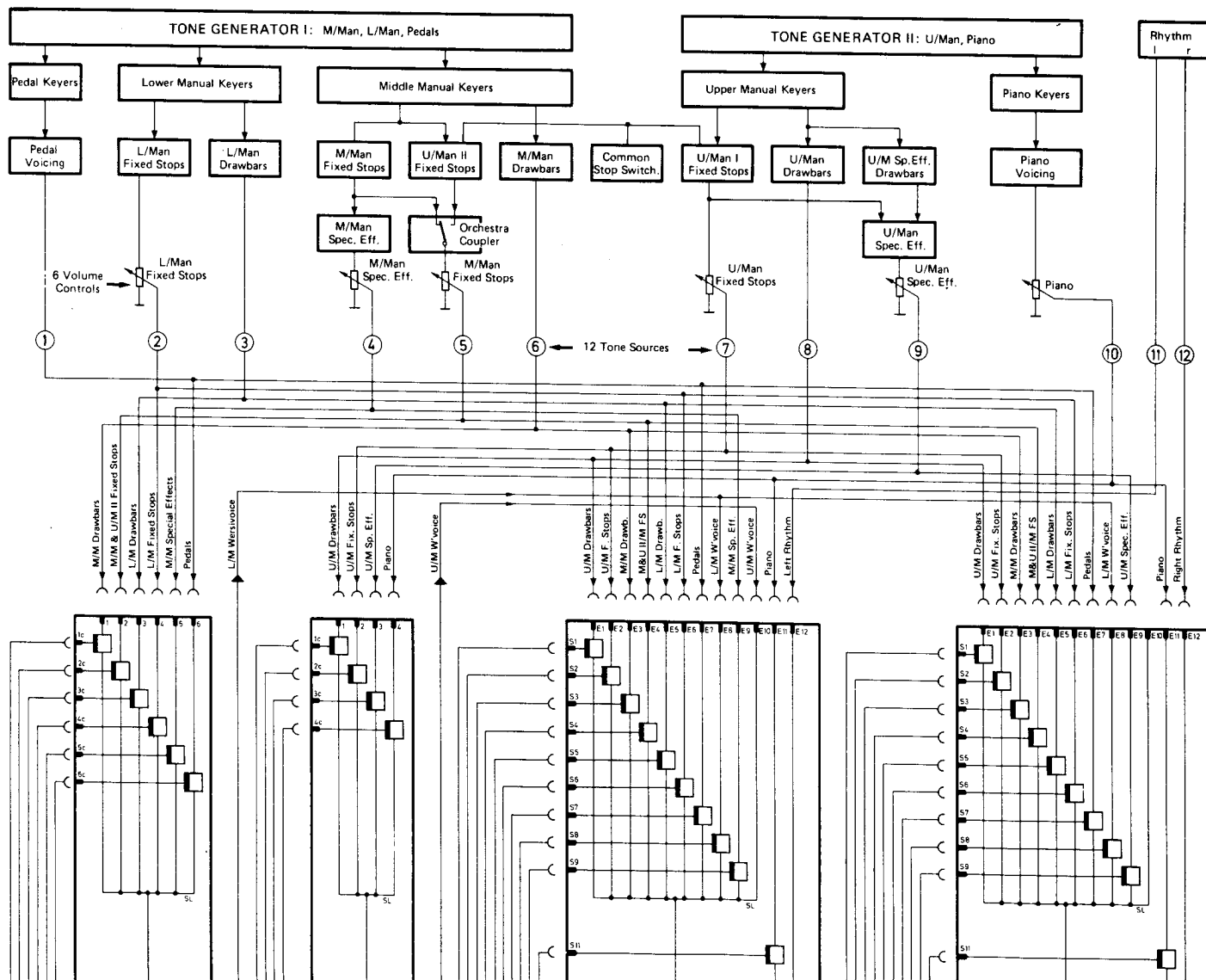


Figure 2 Block diagram of the audio distribution and associated DC controls



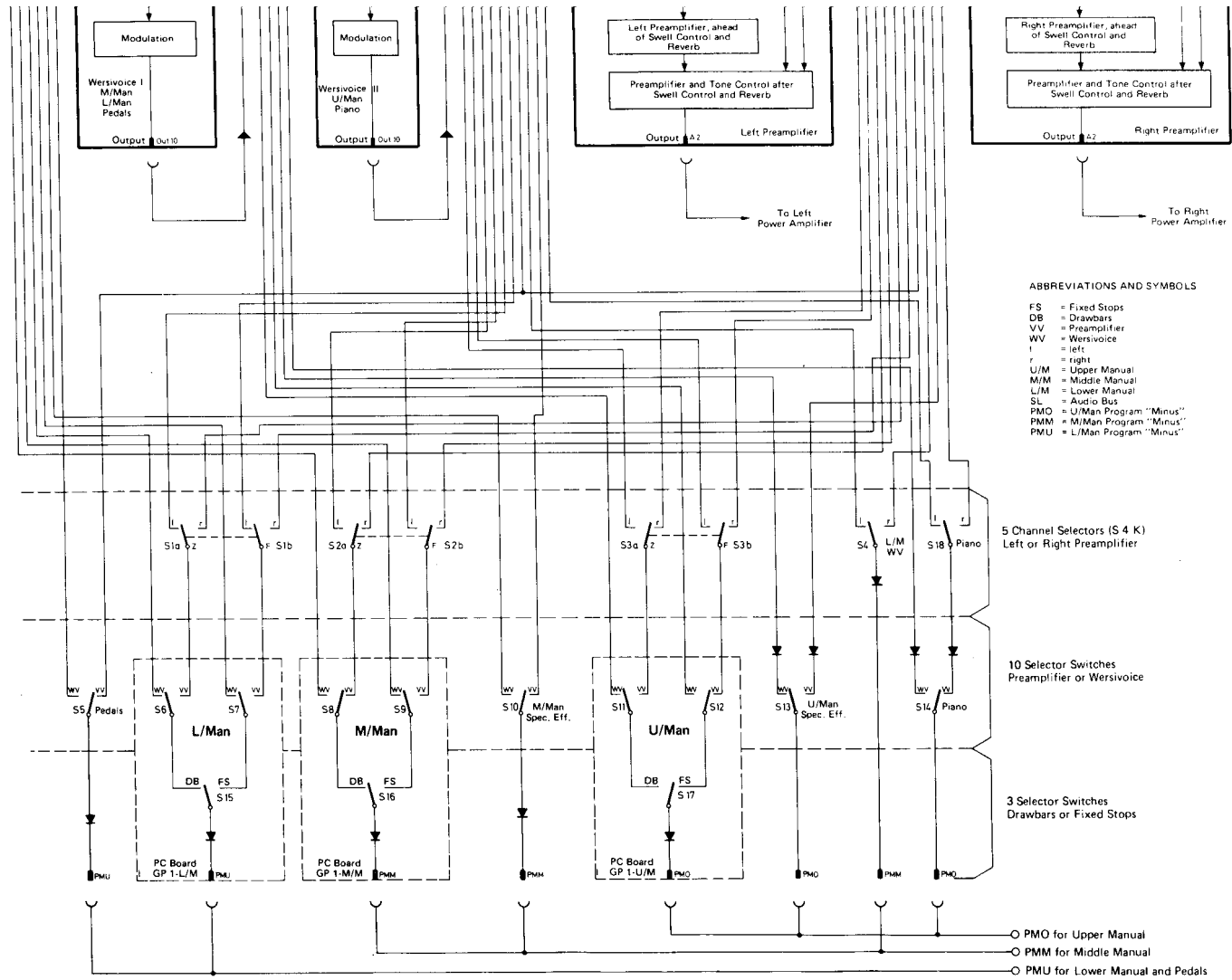
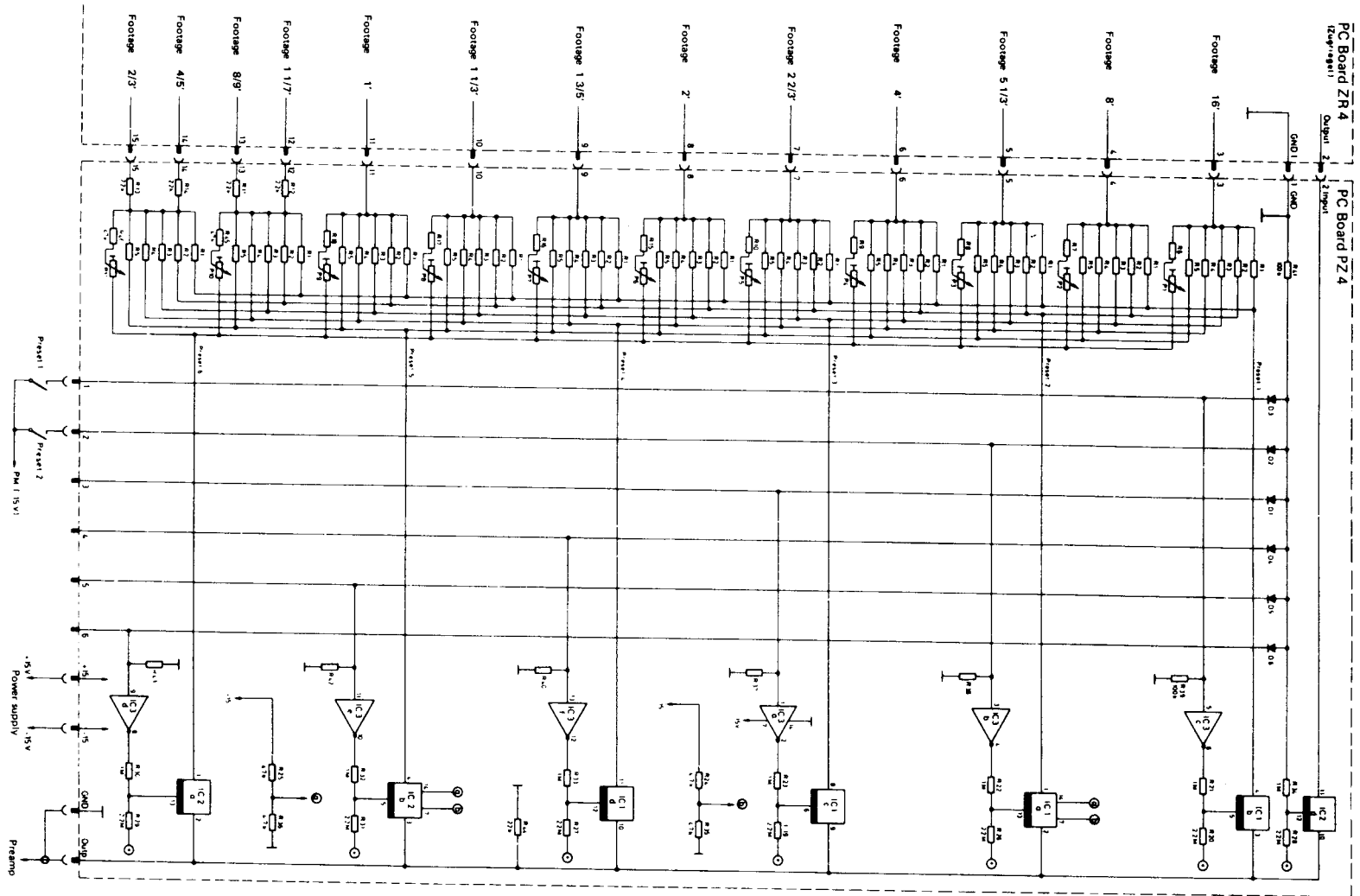


Figure 3 Schematic diagram of the drawbar presets PZ4
 (Applies also to PZ6 with different component numbers)



3 Initial Operation

We presume that the power supply, the tone generators, the electronic keyers, the envelope control, as well as the power chassis, have passed their respective testing successfully earlier.

As a reminder, the harness P R 4 must not be installed yet at this point in time. If it is installed (against our recommendations) do not mate any connectors to the sound computer boards SC 3 and SC 5 respectively.

We further presume that the harness G04 was wired exactly as described earlier in this manual. Only a limited number of connectors should be mated at this time. Others are not connected yet.

NOTE-IMPORTANT

Refer to Fig. 91. Remember that you have joined the 5 blue wires in the vicinity of the "Read-in" key switch and that all " PM ..." lines were joined with the respective blue wires. This applies an unconditional negative control voltage to all tab and rocker switches of the organ, that is, the organ is permanently under manual control. When you will be ready to install the sound computer, these temporary connections will have to be eliminated.

3.1 Test Lead

1. Cut a 40" long piece of thin hookup wire and attach a connector insert to one end. Push this insert into a free

position of one of the -15 V connectors on the power supply. (Many blue wires are already connected there.)

2. Attach an alligator clip to the other end of the test lead. We are going to call this wire simply "Test lead" in the future. Never allow the alligator clip to touch ground (all black wires and metal chassis parts respectively) nor +1 5 V (all red wires).

As you may have noticed by now, all functions of the organ are controlled by a negative control voltage. This control voltage may stem from a front panel switch, from the sound computer, or from our test lead.

The conversion of this control voltage into the respective function normally takes place directly on the circuit board where that function is located.

Examples: Electronic input gates on the preamplifier board V V 2 determine whether a particular audio signal is to be passed on to the circuitry or not. Electronic switches select the voices on the piano voicing board PI 1. D C controlled field effect transistors (F E T) activate the fixed stops. Logic circuits determine the modes and speeds of the Wersivoice.

We may use the test lead to by-pass any switches and activate a particular function directly by applying -15 V directly to a control input terminal. Should you encounter a function which is inoperative when the corresponding switch is activated, the trouble-shooting procedure is straightforward. In that case, consult the wire list for the harness G O 4. There you find the wire number between the switch in question and the corresponding control port. Apply the test lead to that control terminal. If the function is now operative, the trouble is limited to the wiring (check colours) or the switch (solder connections, associated diode). If the function remains non-

operative, the problem is to be found on the circuit board where the electronics is located.

3.2 Preparation of the Organ

It is necessary that we have a defined initial setup of the organ before we start to activate the various subunits. Set the switches and controls as follows:

- () All tongue tab switches off (up). () All rocker switches off (pushed in on top).
- () All drawbars, including the master controls, pushed home.
- () All push button switches on both slanted control panels off (in the "out" position).
- () Transposer switch in position C (standard pitch).
- () "Slalom" control (left control panel) at its right hand stop.
- () Push the AC on/off switch down.
- () Set all trim pots on both preamplifiers VV 1 to the centre of rotation.
- () Connect the speakers to the organ.

3.3 First-Time Power On

This is the moment of truth. We hope that you appreciate the significance of the impending action. Optimists, at this moment,

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unplug the soldering iron and put it back in the closet. Pessimists, on the other hand, fight a certain tightness in the stomach area.

Plug the AC line cord into a grounded outlet. If nothing happens you should mark it as a success. Pushing the button at the lower right corner of the right control panel (you performed this step in the preceding paragraph II) turned the organ off.

Now push the AC on/off button again to release it which turns the organ on. Limit this first on-period to about 3 seconds and turn it off again.

If your eyes, nose and other senses did not receive any "smoke signals" or strange noises from within the organ or from the speakers turn the organ on again. You should be able to notice the following:

- () The AC on/off button should be lit.
- () The tongue tab illumination should be lit. () The pedal spot lights should be on.
- () The 8 push button "Instruments Delete" on the left control panel should be lit.
- () The speakers should produce a faint noise, coming from the operating power amplifiers.

3.4 Preliminary Tests

1. Check the presence of the power supply voltages by using a voltmeter. Measured against ground you should be able to

read +15 V DC and 15 V DC respectively. Both voltages should be correct within +/-1VDC.

Possible problems: One or both voltages are missing or read well below the 15 Volts.

Possible cause: A short circuit in any of the organ's subunits that use this voltage.

Trouble-shooting: Unplug all connectors on the power supply leading to the pins of the voltage in question. Do not remove any connectors leading to "GND". Turn on the organ again and verify the presence of the proper voltage. It is very likely that it will be there since the power supply was found to be in good working condition earlier. Re-connect the connectors one by one while constantly monitoring the voltage. The connector which, when mated, causes the voltage to collapse, obviously contains the wire with the short circuit. Consult the wire list to locate all possible "users" of this voltage. Check for a short circuit (using the ohmmeter and looking for a very low resistance, e.g., less than 10 Ohms) at each point where the supply voltage is used. (The connector which contains the wire with the trouble is to be disconnected from the power supply during this test.) After the subunit is located which presents a short circuit to the power supply, consult the respective assembly manual for assistance to the troubleshooting on the subunit proper.

In any case, the power supply voltages must be at their proper values with all supply wires connected. Anything that impedes this must be located and rectified before any subsequent tests are meaningful.

2. Prepare another 40" long piece of hookup wire by removing the insulation at both ends over a length of about 1/4".

Attach a 1" long piece of heavy bare hookup wire to one end of this wire. Stick the end with the bare wire into the rear opening of the connector on the left preamplifier, namely into the hole with leads to pin "A 2" on plug 5. This location corresponds to the audio output of the left preamplifier (= audio input of the left power amplifier).

Turn on the organ and touch the other end of this wire with your hand. The formerly faint noise from the left speaker should become more pronounced. This test verifies the continuity of the audio output line all the way from the preamplifier to the speaker.

Plug the lead with the bare piece of wire into the opening corresponding to "A 2" of plug 5 on the right preamplifier. Again, touch the other end of the wire. The increased noise, this time, should come from the right speaker.

Leave the wire connected to "A 2", plug 5 on the right preamp. Hold the other end of the wire with one hand and run a finger of the other hand along the foil side of the gating boards G 2 on either tone generator. All sorts of tones should be heard at a certain volume which depends on whether you have dry or moist skin. The "bridging" action of your body between the tone generator and the power amplifier is totally harmless. However, should you be reluctant to lend your body as a part of the test circuit, delete this test altogether. Under no circumstances must you touch any circuit components directly with the audio monitor lead. The power amplifiers are designed to accept millivolts (a few thousandths of a volt) for full output power. The voltages in the organ (including the tone generator) range up to 15 Volts. Applying that kind of a signal to the power amplifier

will, at best, knock you off your feet, and, at worst, destroy the amplifier and the speaker.

Run your test finger along the G 2 boards of the other tone generator too. The tones you hear indicate that both generators deserve their prefix (namely tone...)

3. The same "test finger" method can also be used to verify that the electronic keyers and the envelope control boards are working. Leave the bare wire end connected at "A 2"; plug 5, of either preamplifier. Hold the other end with one hand and touch the pins "Sq " or "Sin" of the E T 13 boards (on keyer block) with a finger of the other hand while holding down one or more keys. Obviously, the keys of the lower manual are to be depressed when touching the outputs of the L/Man keyers. Tones at different pitches should be heard when touching the output pins of different footages.

Repeat this test for the other two manuals and keyers respectively.

Remove the audio monitor lead from the location "A 2" on the preamplifier. Save the lead for future use. Turn off the organ.

3.5 Testing of the Lower Manual Drawbars

1. Pull all drawbars of the lower manual halfway.
2. Locate the pre-assembled drawbar preset board P Z 4 (L/Man) and push it onto the round pins of the L/Man drawbar board Z R 4.

3. Mate the connector attached to branch 7.3 of the harness G O 4 with the pins of plug 1 on the board P Z 4 (L/Man), referring to Fig. 84.
4. Turn on the organ. Depress a key near the centre of the lower manual and hold it depressed. (Wedge some non-metallic material between the key and the manual spacer.) No tone should be heard yet.
5. Clip the test lead (-15 V) to pin " S 5"; plug 4, of the right preamplifier. ("S 5" is the control input for the audio input "E 5" where the audio signal from the L/Man drawbars arrives - see Fig. 65.)
6. The drawbar signal should be audible from the right speaker. Adjust the trim pot P 5 "Volume" on the right preamplifier VV 1 to obtain a satisfactory listening level.

Possible problems: The (mixed) drawbar signal is not audible.

Possible causes: The input gate responsible for the input E 5 on the right preamplifier is not working properly or the audio signal from the L/Man drawbars does not arrive at pin E 5.

Trouble-shooting: Push the saved lead with the bare wire into the opening, corresponding to pin " E 5 " of the right preamplifier. Leave the test lead (-15 V) clipped to S5. Hold the other end of the audio monitor lead with one hand (you may hear hum) and touch the input pins on the L/Man drawbars one by one (the 14-conductor cable is attached to these pins). The tones from the various footages should be heard. If not, the trouble is located in the preamplifier (either associated with the input gate E 5/S 5 or the

daughter board V V 1 is not working properly). The V V 1 boards are interchangeable as long as the reverb is not hooked up.

If the tones from the drawbar inputs are audible but not from the output (sum signal), the problem is likely to be found on the associated drawbar preset board PZ4 (no supply voltages on PZ4, faulty IC 2 on PZ 4).

7. Remove the audio lead from the pin E 5 (if applicable). Remove the test lead (- 15 V) from pin S 5 of the right preamplifier and clip it to S 5 of the left preamplifier. The combined drawbar signal now should be audible from the left speaker. Adjust the volume to match the one you heard earlier by means of the trimpot P 5 "Volume" on the left preamplifier V V 1.

Should the signal not appear from the left speaker, the problem is probably located on the "left half" of the board V V 2 (input gate E 5/S 5) or on the left channel plug-in board V V 1. Since we trust your workmanship we are discarding the possibility of the missing ribbon cable on the foil side of V V 2, joining the inputs E ... of both preamplifiers.

8. Push all L/Man drawbars home except the left-most one (master volume control for the mixed signal). The drawbar tones should disappear. In case you still hear an appreciable sound level, check for unreliable ground connections at the solder lug near pin 15 on the drawbar board Z R 4.
9. Pull out one drawbar at a time. The pitch of the tone heard should increase when you progress from left to right across the individual drawbars. If you listen closely you will hear two tones when either of the right-most two drawbars is pulled. The eleventh drawbar controls the sum of two footages,

namely the Seventh 1-1/7' and the Ninth 8/9' while the twelfth drawbar is fed with the two footages Third 4/5' and Fifth 2/3: Release the key of the lower manual.

10. Check all footages over the entire lower manual. That means you have to depress 61 keys 11 times. Since you tested the electronic keyers as well as the envelope control earlier we are confident that your ear will meet with all of the 671 tones of this test. We just want to make sure that everything is still in perfect working condition. You will notice that some tones repeat at the treble end of the keyboard when listening to pitches at 2' or higher. For more information on the "fold-back" tones refer to the assembly manual AM 120 "Electronic Keyers"

3.6 Testing of the L/Man Envelope Control

1. Pull out the left-most and the 4' drawbar respectively of the lower manual. Depress a key repeatedly in the centre of the keyboard. Note that the tone starts with somewhat of a popping sound and that it stops abruptly upon the release of the key.
2. Depress the button "Soft Attack" on the right control panel, associated with the lower manual. It should light up. Depressing a key again, the tone should start with a soft volume build-up (what else?). Actually, we also added a slight amount of sustain which, however, is almost unnoticeable. Check the "Soft Attack" for every key of the lower manual. There is no need to repeat that test for any other footage than the 4'.

3. Now depress the switch "Short Sustain" which should cause it to light up. Check every key for a tone decay which is no longer sudden but has a "tail".
4. Depress the switch "Medium Sustain" (L/Man). It should light up. The sustain on all lower manual keys should be longer.
5. Depressing the switch "Long Sustain" should produce an even more pronounced sustain.

Note 1: Activating the medium and/or long sustain will cause the corresponding push buttons to light up. In either case, the short sustain button will be lit too, disregarding whether it is depressed or not.

Note 2: The length of the medium sustain can be adjusted by means of the trimpot on the envelope control board H K 13 (underneath the lowest octave). Adjust it such that the sustain length is centered between "short" and "long".

Should any of these functions not be operative, isolate the problem area as follows: Lift the lower manual and apply the control voltage (test lead) directly to the terminals on the H K 13 board (pins "Att. soft" "Sustain short"; "Sustain medium"; or "Sustain long" respectively). If everything works okay when the control voltage is applied there the problem is to be found in the wiring between the right control panel and the L/Man envelope control or in the control panel itself. Otherwise the trouble is limited to the envelope control boards. (The latter is unlikely since these boards were tested earlier.)

3.7 Testing of the Middle and Upper Manuals respectively

Repeat all tests of the preceding chapter VI with the following changes:

The middle manual drawbar signals are applied to the inputs "E 3" of the preamplifiers and the corresponding control inputs are the terminals "S 3": Similarly, the upper manual signals are connected to "E 1" (control to "S 1"). Also consult the block diagram, Fig. 6 5. Do not forget to install the corresponding drawbar preset boards PZ4.

Note: It would be purely coincidental if corresponding keys of the U/Man and the M/Man respectively produced tones of identical pitch at the same footage. We shall achieve this later by tuning the tone generators.

3.8 Testing of the Drawbar Presets

The manual drawbars can be disabled by activating the drawbar presets. Each preset board (PZ 4) has space for up to 6 presets. Some of the preset locations are not equipped with resistor combinations and only a total of 5 presets (out of a possible total of 18) can be activated by front panel controls. Others will be used by the sound computer.

1. Attach the test lead to pin "S 5" of either preamplifier. You can play the drawbars as usual on the lower manual.
2. Turn on the front panel switch "L/Man Preset" (rocker switch on the stop board). This will disable the manually adjustable drawbars, including the volume drawbar. Instead, the

artificial drawbar setting which corresponds to "Preset 1" on PZ 4 (L/Man) will sound.

3. Move the test lead from the pin "S 5" to pin "S 3" on the preamplifier being used. Now verify the changeover to the middle manual presets, namely "M/Man Preset 1" and "M/Man Preset 2" respectively. By the way, the presets are non-exclusive, that is, more than one preset can be used in an additive fashion.
4. Move the test lead to "S 1" of the preamplifier and test the operation of both U /Man presets.

In case of any malfunction in this area, check whether the control voltage (-15 V D C) arrives at the corresponding terminals on the preset boards PZ 4 (consult Fig. 47). If that is the case the problem is to be located on the preset board(s). If no control voltage appears there, check the wiring (see wire list) and the circuit board which carries the preset switches.

Note: Like the vast majority of the organ's control switches, the preset switches are effective only as long as the organ is under manual control (not under the control of the sound computer). Furthermore, the drawbars (and their presets) will be active only when the corresponding tongue tab switch of that manual is in its "up" position ("Drawbars").

5. Turn the organ off.

3.9 Testing of the L/Man Fixed Stops

1. Depress and hold a key of the lower manual.

2. Activate a few fixed stops of the lower manual by flipping the corresponding tongue tabs down.
3. Pull the master control "L/M an Volume" (grey drawbar) out halfway.
4. Mate the connector attached to branch 9.6 of the harness GO 4 with the pins of plug 2 on the board G P 1 (L/Man), referring to Fig. 89.
5. Clip the test lead (-15 V) to pin "S 6" of the right preamplifier. Turn on the organ. The fixed stops should be audible from the right speaker.
6. Changing the test lead to pin "S 6" of the left preamplifier should cause the stops to sound from the other speaker.
7. Turn off all stops which should silence the sounds altogether. Check the on/off operation of each individual stop by flipping its tab down and up again.

Note: The fixed stops have not been tested prior to their installation. It is, therefore, conceivable that you may encounter a problem at this phase of the test procedure.

Possible problem: A stop sounds all the time and cannot be turned off.

Possible causes: A faulty F E T on a filter board (this field effect transistor acts as an audio switch). A FET installed wrong (not corresponding to the mounting instructions for its particular type).

Trouble-shooting: Isolate the stop in question by locating the stop tab which does not change the sound. The associated filter board is

the one you are looking for. Remove this filter board from the motherboard (if you installed the optional edge connectors) or unsolder the F E T from the filter board (with power off). Inspect the board closely by consulting the manual AM 204 "Galaxy Voicing":

Possible problem: A stop does not produce a sound.

Possible causes: Faulty F E T on the filter board, missing components or missing wire jumpers on the filter board, connecting pin (s) at the wrong location(s) in hard-wired systems.

Trouble-shooting: Compare the board with the assembly instructions of AM 204.

Possible problem: No stops produce any sounds.

Possible causes: Short circuit between the foil trace "Su" and the neighbouring foil pattern on the motherboard G P 1. Faulty IC 1 on GP1. Faulty wiring of the audio cable from the pin "Outp." on G P 1 to pin " E 6" on the preamplifier.

Trouble-shooting: Remove the connector from plug 2 on GP 1. Stick a pin into each of the two connector openings where shielded cables are attached. Hold both pins with one hand and "borrow" an audio signal from the tone generator with your other hand (G 2 boards). No sound = trouble in the wiring (consult wire list). If you get sound, the problem is located on the voicing motherboard G P 1. Remove it from the lid and inspect the narrow foil pattern very carefully.

8. Check the sounds of each fixed stop with the description below, while playing the lower manual.

Note 1: Minor variations may be noticed since the tone generator is not set to its correct pitch.

Note 2: Do not jump to conclusions if a particular stop does not sound exactly as you envisioned. The speaker placement and the tone control settings may not be matched yet or maybe you are playing notes on the 61 note keyboard which do not exist on the real-life counterpart of the simulated instrument. (We do not know either how a clarinet is supposed to sound when played [hypothetically] at the normal pitch of a Piccolo.)

Sound Characteristics of the L/Man Fixed Stops

1. Bourdon 16'
Mellow and hollow, no brilliance.
2. Diapason (Principal) 16'
Full sound, somewhat bright.
3. Cello 16'
Rich in harmonics, raspy at the bass end.
4. Gedackt 8'
Pitched one octave higher than the 16'stops, softer than the other 8' stops, hollow sound, compared with an 8' drawbar.
5. Diapason (Principal) 8'
Full and powerful sound, rich in harmonics.
6. Viola 8'
Brighter than the diapason, plenty of harmonics.
7. Tibia (Flute) 4'
Pitched one octave higher than the 8' stops, mellow and pleasant.

8. Diapason (Principal) 4'

Rich in harmonics, loud.

9. Nasat 2-2/3'

Pitched a major fifth higher than the 4' stops (a G sounds on a C-key), softer than the 4' tibia but somewhat brighter.

10. Diapason (Principal) 2'

Pitched one octave higher than the 4' stops, full sound at the bass end, narrower spectrum towards the treble keys. Repeats at the highest C (same tone as the C one octave lower).

11. Third 1-3/5'

Pitched a major third higher than the 2' stop (an E sounds on a C-key), soft, intended to add color only, not to be used as a solo stop. Repeats at the highest G #-key and up.

12. Fifth 1-1/3'

Pitched a major fifth higher than the 2' stop (a G sounds on a C-key), soft, intended to add color only in conjunction with lower pitch stops. Repeats at the highest F-key and up.

13. Piccolo 1'

Pitched one octave higher than the 2' stop, thin voice. Repeats at the C-key of the 4th octave and up. (The 3 highest C-keys produce the same note.)

14. Cymbal V

Very bright and powerful, brilliant down to the bass end, requires a full complement of lower pitch stops as a foundation.

15. Mixture III

Powerful mixture, less brilliant than the Cymbal V but fuller towards the bass end.

3.10 Testing of the M/Man Fixed Stops

Test the middle manual fixed stops in a similar fashion. This time, however, clip the test lead (-1.5 V) to pin "S 4" of either preamplifier.

Mate the connector attached to branch 9.5 with plug 2 of the M/Man fixed stops (board G P 1), referring to Fig. 89.

Note that the audio output from the middle manual fixed stops is not connected directly to the preamplifier. Cable No. 141 leads to the small board DS 1 "Orchestra Coupler" attached to the U /Man II fixed stops.

This board is to be plugged onto plug 2 of the U/Man II fixed stops and the connector attached to branch 9.3 is to be mated with the pins on the board DS 1. Refer to Fig. 88.

Provided this is all done, the board DS 1 is powered by the D C voltages which activate the electronic switches located on the board. The M/Man fixed stops signal, therefore, is routed from the board G P 1 (M/Man) via cable No. 141 to the board DS 1, passes a closed electronic switch (details see AM 204 "Galaxy Voicing"), continues via cable No. 142 to the M/Man volume control from where cable No. 143a carries the signal to the inputs "E 4" of both preamplifiers.

Sound Characteristics of the M/Man Fixed Stops

1. Horn 16'

Subdued "brassy"; has some nasal character.

2. Trombone 16'
Bold and "brassy".

3. Cello 16'
Plenty of harmonics, but with a warm character.

4. Tibia (Flute) 8'
Pitched one octave above the 16' stops, mellow stop which mixes well with others.

5. Clarinet 8'
Typical hollow woodwind character.

6. Oboe 8'
Narrow spectrum, nasal character.

7. Trumpet 8'
Loud metallic sound with high-pitched resonance.

8. Viola 8'
Rich in harmonics, narrower spectrum than the lower pitched cello 16':

9. Tibia (Flute) 4'
Pitched one octave above the 8' stops, powerful but pleasant.

10. Violin 4'
Very bright, little fundamental tone.

11. Nasat 2-2/3'
Pitched a major fifth above the 4' stops (a G sounds on a C-key), softer than the 4' Tibia but somewhat brighter.

12. Piccolo 2'
Pitched one octave above the 4' stops, thin background voice, repeats at the highest C.

13. Flute 1'
Pitched one octave above the 2' Piccolo, mellow, turns softer towards the treble end. Repeats at the C-key of the 4 octave and above. (The 3 highest C-keys produce the same note.)

14. Mixture II
Piercing add-on brightness over the entire manual, not a solo stop.

3.11 Testing of the U/Man II Fixed Stops

The U/Man II fixed stops are located on the voicing block of the upper manual which is not equipped with stop switches. (We already connected the board DS1 there as well as the connector of branch 9.3 according to Fig. 88.)

Depress the button "Orchestra Coupler" on the right control panel. It should light up and it should disable the M /M an fixed stops (you may want to verify that). Instead, the audio output of the U/Man // fixed stops is now applied to the volume control and the audio inputs " E 4 " of the preamplifiers which are assigned to the middle manual. Also refer to Fig. 7b of AM 204.

The stops of the U/M an II voicing block are activated by the tab switches attached to the U/Man (voicing block).

Are you thoroughly confused now? If so, forget the preceding paragraphs and simply perform the following steps:

- a) Leave the test lead at " S 4 " (as if you tested the M/Man stops)
- b) Depress the button "Orchestra Coupler" (right control panel)
- c) Depress the tab " Horn 8" of the upper manual d) Mate the connector attached to branch 9.4 with plug 2 of the U /Man I fixed stops, referring to Fig. 88.

You should be able to hear that stop from your speaker. If you don't, well, you still have to trace the signal using the descriptions at the beginning of this chapter.

Compare the sounds of the U/Man II fixed stops with the descriptions below. Remember, while the tab switches are located on the U /Man I voicing block, you are listening to the circuitry on the U/Man II block (without switches).

Sound Characteristics of the U /Man Fixed Stops (applies to U/Man I and U/Man II)

1. Horn 16'(or Flugel horn 16')

Subdued "brassy"; a bit hollow at the bass end.

2. Saxophone 16'

Rich in harmonics with traces of a "stopped" pipe at middle to low pitches, very reed-like.

3. Accordion 16'

Very brilliant with lots of harmonics (contains the aliquotes 1-3/5' and 1-1/3' respectively).

4. Trombone 16'

Bold and "brassy".

5. Cello 16'

Plenty of harmonics, but with a warm character.

6. Clarinet 8'

Pitched one octave above the 16' stops, typical hollow woodwind sound.

7. Horn 8'

Fundamental tone somewhat suppressed, barely nasal character.

8. Schalmei 8'

Rich in harmonics with a mellow touch, becomes slightly hollow at the bass end.

9. Trumpet 8'

Loud metallic sound with high pitched resonance.

10. Viola 8'

Brighter than the lower pitched cello 16':

11. Tibia (Flute) 4'

Pitched one octave above the 8' stops, mellow and "airy".

12. Violin 4'

Very bright, little fundamental tone.

13. Diapason (Principal) 2'

Pitched one octave higher than the 4' stops, full 5. sound with plenty of harmonics.

14. Cymbal II

Very piercing, glittering all the way down to the bass end.

15. Mixture V

Less brilliant than the Cymbal 11, grows fuller at the lower pitches.

3.12 Testing of the U/Man I Fixed Stops

Move the test lead (-15 V) from the preamplifier terminal "S 4" to terminal "S 2": Repeat the listening tests by activating the U/Man stop tabs again and comparing the sounds with the descriptions of the preceding chapter. This time, however, the filter boards directly adjacent to the tab switches are responsible for the sounds.

Both U/Man voicing blocks are equipped identically. It might be interesting to compare the sounds between the filters from either block. If you switch the test lead back and forth between the pins S2 and S4 you alternately hear the same stop (or stops) coming from two different voicing blocks (adjust the M/Man and U/Man volume control for balanced volume).

Remove the test lead from the preamplifier.

3.13 Testing of the Tongue Tab Switches "Drawbars(or) Fixed Stops"

Lower Manual

1. Mate the connector leading to plug 1 on the lower manual fixed stops, referring to Fig. 89.
2. Flip the switch "Drawbars/Fixed Stops" downwards (left-most switch of the group "Lower Manual Fixed Stops"). Leave the next two switches to Wersivoice") in their up position.
3. Activate a few stops.

4. Pull a few L/Man drawbars about halfway, must include the volume drawbar(left-most black drawbar of the group).
5. Mate the connector leading to plug 4 of the right preamplifier, referring to Fig. 7 0.
6. Play on the lower manual. The fixed stops should sound from the right speaker (provided the channel selector switch still is in its up position).
Flipping the switch " Drawbars/Fixed Stops" up again, the fixed stops should be silenced and the drawbars should sound instead.
Turn on all L/Man fixed stops.
7. Pull the L/ M an volume control (grey drawbar) all the way.
8. Pull all L/ Man drawbars (12 drawbars).
9. Hold a chord on the lower manual and flip the tab " Drawbars/Wersivoice" back and forth. First, adjust the trimpot P 5 "Volume" on the right preamp to a suitable listening volume.

Second, adjust the trim pot P1 on GP 1 (L/Man) to balance the fixed stops volume with the draw bar volume with a slight emphasis of the fixed stops, that is, the fixed stops should sound a little bit louder.

Should you be unable to reduce the fixed stops volume sufficiently, reduce the resistor R6 on G P 1 (L/Man) from 22 kOhms to 10 kOhms. (Hint: If you parallel a second 22 kOhm resistor piggy-back style onto the first one you don't have to dismount the voicing block.)

3.14 Testing of the "Drawbar/Fixed Stops" switches of the M/Man and U/Man respectively

Mate the connectors leading to plug 1 on G P 1 (M/Man) and G P 1 (U/Man I) respectively.

Release the push button "Orchestra Coupler". Balance the fixed stops of the middle manual against the M /Man drawbars (trimpot P1 on GP1 M/Man).

Depress the push button "Orchestra Coupler". Balance the U/Man II fixed stops against the M/Man drawbars 10. (trimpot P 1 on G P 1 U/Man II).

Balance the U/Man I fixed stops against the drawbars of the upper manual (trim pot P1 on GP1 U/Man I).

3.15 Tuning of the Tone Generators and Testing of the Generator Functions

1. Set the rotary control "Master Pitch" on the panel 12. AP 1 G to the centre of rotation.
2. Set the control "Orchestra Intonation" on the right control panel to the centre of rotation.
3. Flip the tab " Drawbars/Fixed Stops" of the upper manual down (Fixed Stops).
4. Flip the tab " Drawbars/Fixed Stops" of the middle manual down (Fixed Stops).
5. Activate the stop "Clarinet 8" in both U /Man and M /M an respectively. Do not select any other stops. Make sure that the push button "Orchestra Coupler" (right control panel) is released. Playing either upper or middle manual, you should hear a clarinet sound, very likely at different pitches.
6. Convince yourself that the transposer switch is set to " C " (standard pitch).

7. Push the " Slalom " control on the left control panel to its left-hand stop.
8. Depress and hold the A-key of the 4th octave on the middle manual This tone should be "middle A"; having a frequency of 440 Hz. There are many methods by which this can be achieved (frequency counter, tuning fork, tuning flute, or another instrument of known tuning).

Adjust the cermet trim pot P 2 on the tone generator I until the "middle A " has the exact pitch. If you are using another instrument as a reference, listen for the beat frequency which is to be slowed down until it disappears. If you are using a frequency counter at the tone generator test point set the frequency to 3520 Hz.

9. Push the "Slalom" control to its right-hand stop. The tone will rise by approximately one octave.
10. Depress and hold the A-key of the 3rd octave. This tone should become the "middle A"! Adjust the trim pot P 1 on the tone generator I until this is achieved. If you use a frequency counter you are to get a reading of 7040 Hz.
11. As a crosscheck slide the " Slalom " control from stop to stop. The pitch of the "A" should change exactly one octave. By the way, the normal pitch of the entire organ is obtained with the "Slalom" control at its right-hand stop.
12. Depress and hold the same key in the upper manual. You will hear a second clarinet which very likely is out of tune with the first one.
13. Set the "Slalom" control to its left-hand stop.
14. Verify that none of the push buttons "Ensemble Tuning" on the right control panel is depressed.
15. Adjust the trimpot P 2 on the tone generator II to achieve a "zero beat" between the two clarinets.
16. Set the "Slalom" control to its right-hand stop.

17. Adjust the trim pot P 1 on the tone generator II to achieve a "zero beat" between the two clarinets.

Now both generators are toned at both ends of the octave glide ("Slalom"). Release the two keys.

18. Next, we are going to test the vibrato modes. Depress the push button "Delayed Vibrato" in the 3rd row on the right control panel. It should light up. The switches of the 3rd row belong to the tone generator 11 (U/Man and Piano).

19. Depress one or more keys of the upper manual and listen carefully. Shortly after you depressed the key(s) a shallow vibrato will appear. This delayed onset of the vibrato should start anew every time a key is depressed staccato-style (but not when playing legato-style). The delay time can be adjusted to suit your taste by means of trim pot P 3 on the tone generator II. (We recommend centre of rotation.)

20. Release "Delayed Vibrato" and depress "Cont. Vibrato". The vibrato should be present all the time without any delay.

21. In addition, depress the button "Vibrato II". The depth or intensity of the vibrato should increase.

22. In addition, depress the button "Vibrato III" to 30.

obtain a stronger vibrato yet.

Note that there are really 4 vibrato intensities, Namely

I: None of the buttons "Vibrato II" nor "Vibrato III" depressed

II: "Vibrato II" only depressed

III: "Vibrato III" only depressed

IV: "Vibrato II" and "Vibrato III" depressed

23. In addition, depress the button "Slow Vibrato": The formerly fast vibrato (approximately 6 Hz) should slow to about 4 Hz.

Note: The switches "Vibrato II"; "Vibrato III" and "Slow Vibrato" are effective only if either "Delayed Vibrato" and/or "Cont. Vibrato" is turned on.

24. Next, we are going to test the autoglide modes of the generator 11. Release all push buttons in the 3rd row from the top on the right control panel.

25. Set the transposer switch to "C" (it was supposed to be in that position all the time so far). Push the grey drawbar "Autoglide Speed" home all the way.

26. Depress and hold a key on the upper manual. Depress the push button "Autoglide (3n)". The pitch should slowly move downwards by exactly one octave. Prerequisites: Correctly tuned generator and transposer at "C": Release the key and depress it again. The tone glide should start again at the top and move downwards.

27. In addition, depress the button "Autoglide up/ down": The pitch should be low at the beginning and rise by an octave when a key is depressed.

28. The speed of this octave glide can be varied by the grey drawbar "Autoglide Speed": The speed increases by pulling this grey drawbar out.

29. The autoglide has a constant low pitch limit which corresponds to the left-most setting of the "Slalom" control. The upper end, however, can be influenced by the "Slalom" control or by the transposer. The total "travel distance" of the autoglide can, therefore, be controlled from zero ("Slalom" control at left-hand stop) to about an octave-and-a-half (transposer at "F"). Warning: The transposer is not tuned yet and its action does not make any sense now.

Release all autoglide buttons.

30. The "Hawaii" effect and the master pitch control respectively are the last two of the frequency controlling devices. Check whether the master pitch control (on AP 1 G) varies the tone by about a half-tone in either direction from the centre of rotation. Depress the button "Hawaii II" and deflect the right-hand foot lever on the swell pedal. The tone should drop by about a half-tone and slowly return to normal. If the foot lever is released prematurely the tone will return to normal pitch much faster.
31. Repeat all test steps, starting with No. 18, for the tone generator I (M/Man, L/Man and Pedals). The associated switches are located in the 4th row from the top on the right control panel. The slide controls " Slalom " and "Autoglide Speed" are dual controls and serve both generators.

3.16 Testing of the Functions "Manual Couple" "Orchestra Coupler" and "Ensemble Tuning"

The Galaxy is equipped with a manual coupler by which the stops of the upper manual can be played on the middle manual, in addition to the stops of the middle manual proper. The coupler works in one direction only, that is, the middle manual stops will not appear on the upper manual.

1. Set up the middle manual for "Fixed Stops" and select, for example, the Trombone 16:
2. Similarly, select a stop of a different footage, for example, the Clarinet 8; on the upper manual.
3. Set both selectors " Drawbars/Fixed Stops" of either manual to "Fixed Stops" (down).

4. Verify that the channel selector switches still are in the up position, activating the right channel. The left channel is not operating yet.
5. Play on both the U/Man and M/Man respectively. The clarinet should sound on the U/Man and the trombone on the M/Man. Adjust the volume controls (grey drawbars) to suit.
6. Depress the push button "Program Coupler" on the left control panel (top right-hand corner). It should light up and also should cause the button "Manual Coupler" on the right control panel to light up whether it is depressed or not.
7. Play on the M /Man again. The clarinet should be heard in addition to the trombone. The clarinet only will sound on the U/Man. Play every key on the middle manual to test the coupler action for the entire keyboard. Of course, the coupler will "pull down" any desired stop or stops of the upper manual and works for the drawbars too.
8. Turn the control "Orchestra Intonation" on the right control panel while holding a key on the lower manual. The clarinet should become detuned with respect to the trombone. Return the control to the centre of rotation.
9. Sequentially depress the 4 buttons "Ensemble Tuning" from left to right. The detuning should increase in discreet steps.
10. Depress the button "Orchestra Coupler" on the right control panel (in addition to the "Program Coupler" on the left panel).
11. Play on the middle manual. The trombone should have disappeared. In fact, the fixed stops of the M /Man are completely disabled. Note: The switch " Drawbars/Fixed Stops" of the M/Man is still active and should be left in the down position (Fixed Stops) for the test to follow. Two clarinets will sound when the M/M an is played. They are fed from two different tone generators, keyed by two independent keyers and voiced by two independent titters. They can be detuned to any desired degree by means of the

buttons " Ensemble Tuning" to create the "orchestra effect" or "chorus effect".

12. The versatility of these controls discussed above is rather complex and we are limiting the discussion just to the description of the bare facts. We recommend that you spend some time studying the couplers and the ensemble tuning feature, referring to the summary below.

There is one additional button that needs to be mentioned. The button "Manual Coupler" on the right panel, at first glance, performs the identical operation as the button "Program Coupler" on the left panel. However, the difference is that the right panel coupler buttons are subject to control from the sound computer while the left panel button is an unconditional coupler. That means that you can force the manual coupler into operation (by the left panel button) even if the sound computer ordered "no coupling".

Summary of the Coupler and Tuning Modes

- a) *No coupler on and no ensemble tuning buttons on:* U/Man and M/M an respectively can be set up for drawbars or fixed stops and can be played independently. The tones should be in perfect tune. If not, tune for zero beat with the rotary control "Orchestra Intonation".
- b) *"Manual Coupler" on the right panel on:* U/Man and M/M an respectively can be set up for drawbars or fixed stops. The U /M an retains its own voicing. When playing the M/Man the registrations of both manuals will be heard. By the way, this is one method (not the only one) to combine drawbars with fixed stops (borrowed from two different manuals).

Any desired degree of ensemble tuning can be selected by the corresponding 4 push buttons. Try it out by selecting some brass stops on both manuals and use the ensemble tuning button III.

- c) "Manual Coupler" and "Orchestra Coupler" on: Select any fixed stops on the upper manual. Set the " Drawbar/Fixed Stops" switch of the M /Man to fixed stops (down). Two sets of stops will sound on the M/Man, identical in sound character (as selected in the U /Man) but coming from two generators/ keyers/voicing chains. Detune the sets as desired by the ensemble tuning buttons. If the M/Man switch " Drawbars/Fixed Stops" is u p (drawbars) the M/Man drawbars will sound, together with one set of the U/Man fixed stops.

Every control button used so far can be operated on by the sound computer, that is, they are programmable. Should it be desirable to couple the manuals while the organ is under sound computer control, this can be accomplished by the "Program Coupler" on the left control panel. Of course, this latter action is meaningful only as long as the selected sound computer program does not contain the coupler function already.

If these explanations magnified your confusion about the subject, don't blame us or yourself. The features of the Galaxy are rather intricate and it will require some time and experimentation until you can play it blindfolded.

One last word of caution: The tone generator I is responsible for the voices of the U/Man 11, the M/Man, the L/Man and the Pedals respectively. Its pitch stays constant and is not affected by the ensemble toning. (The master pitch control, the "Slalom" control

and the transposer, of course, will influence its frequencies.) The tone generator feeds the U/Man I voices and the piano section. Its pitch changes with the ensemble toning. Assume that you have selected a strong detuning (as is used for the French Accordion). If you play both the M/Man and the L/Man respectively everything is fine, since the L/Man is in tune with one of the pitches of the M/Man. Should you, however, play the U/Man with one hand and the L/Man with the other hand, the resulting sound will be an earsore due to the non-related detuning.

3.17 Testing of the Wersivoice I

The Wersivoice I is intended to operate on the audio signals coming from the M/Man (drawbars, fixed stops, special effects), from tP7;: 1-..Man (drawbars, fixed stops) and from the pedals respectively. Its modes of operation are controlled by the switchbank "Wersivoice I". Also refer to Fig. 65.

1. Mate the connectors with the corresponding pins on the Wersivoice I, referring to Fig. 82.
2. Select a few fixed stops in both M/Man and L/Man respectively. Flip the switches "Drawbars/Fixed Stops" down for both manuals. Flip the switches "Fixed Stops to Wersivoice" down for both manuals.
3. Play on both manuals (M/Man and L/Man) without any couplers. The fixed stops should sound with the kind of vibrato that appears to come from rotating speakers. When flipping the switch "Fixed Stops to Wersivoice" up again, the sound should come "straight" from the right speaker.
4. Set the trim pot P 1 (Output) on the Wersivoice I to the centre of rotation. Select a "heavy" registration (almost all fixed stops active) on the M/Man.

5. While holding a full chord on the middle manual, turn the trim pot P 2 (Input) on the Wersivoice I clockwise until you detect some distortion. Turn the trim pot P 2 counter clockwise for about 15 degrees such that the distortion disappears.
6. Flip the M/Man switch "Fixed Stops to Wersivoice" back and forth. You probably notice a volume difference. Adjust the trim pot P 1 (Output) on the Wersivoice until the volume is approximately equal in both switch positions.
7. Depress and hold a chord on the middle manual. Flip the switch "Fast/Chorale" (Wersivoice 1) down. The vibrato should become slow.
8. Flip the switch "Fast/Chorale" up again. The vibrato speed should gradually increase until it reaches the fast speed again.
9. Adjust the trim pot P3 (Fast) of the Wersivoice I to obtain a vibrato of about 7 Hz. Compare it with your impression of a tremulant human soprano voice or adjust it to your personal taste.
10. Set the "Fast/Chorale" switch to "Chorale" again and adjust the trim pot P 4 (Slow) to obtain a vibrato speed of approximately .6 Hz (116 "revolutions" in 10 seconds).
11. Flip the switch "Normal/Heavy" down and all others up. The vibrato will gain intensity.
12. Flip the switch "Normal/Soft" down and all others up. The vibrato intensity should be diminished. If you listen carefully you detect 2 "straight" portions and a "vibrato" portion respectively on the audio signal.
13. Flip both switches "Normal/Heavy" and "Normal/Soft" down. A very emphasized vibrato should result. This mode is inhibited internally at the "Chorale" speed.

Note that 4 intensities are available, namely soft, normal, heavy, and very heavy.

14. Flip the switch "Whirl/Choir" down, all others up. Select one or more string stops only. The string voices will be "multiplied" into a set of voices. Test the result at the four possible intensities, using the switches "Normal /Heavy" and "Normal/ Soft" respectively. The switch "Fast/Chorale" is disabled in the "Choir" mode.
15. Assign the M/Man drawbars to the Wersivoice I by flipping the switch " Drawbars/Fixed Stops" up and the switch " Drawbars to Wersivoice" down. Check all possible Wersivoice modes. The effect of the "Choir" mode on the drawbars is not very dramatic.
16. Check all modes of operation again by using the drawbars and fixed stops of the lower manual. Do not disturb the settings of the trim pots on the Wersivoice.

3.18 Testing of the Wersivoice II

The Wersivoice II can be fed with the signals from the upper manual (drawbars, fixed stops, special effects) and from the piano respectively. Its modes of operation are controlled by the 5-position switch bank "Wersivoice II".

1. Mate the connectors to the pins of the Wersivoice II, referring to Fig. 82.
2. Select a few fixed stops on the upper manual.
3. Flip the U/Man switch " Drawbars/Fixed Stops" down. Flip the switch "Fixed Stops to Wersivoice" down.
4. Play the upper manual. The fixed stops should sound with a normal vibrato from the left channel.
5. Repeat all tests of the preceding chapter, starting with step 4, but using the switches and controls of the U/Man and Wersivoice II respectively.

6. There is an additional switch in the switchbank "Wersivoice II"; namely "Fast/Slow Speed shift". In its normal (up) position, the speed change from "Chorale" to "Fast" is inertial, as you experienced with the Wersivoice I. Flip this switch down and operate the "Fast/Chorale" switch, using the "Whirl" mode. The speed change from "Chorale" to "Fast" now will be instantaneous. The reverse speed change, from "Fast" to "Chorale"; is rapid in all cases, independent of the setting of the "Speedshift" switch.

3.19 Testing of the Channel Selectors U/Man, M/M an, L/Man and Wersivoice I respectively

1. Mate the connector leading to plug 4 of the left preamplifier, referring to Fig. 70.
2. Play on all three manuals without Wersivoice. Flip the channel selectors " U /Man right/left", " M /M a n right/left" and " L/M an right/left" back and forth. The sound should alternately come from the right or left speaker respectively. Adjust the volume of the left channel by means of the trim pot P 5 (Volume) on the left preamplifier V V 1 to match the one from the right channel.
3. Operate the M/Man and the L/M an (drawbars or fixed stops) via the Wersivoice I. Flip the switch "Wersivoice I right/left" back and forth. The treated signal should change channels.

Note: The U/Man can be fed to the Wersivoice II. The latter is assigned permanently to the left channel and cannot be "channel selected".

3.20 Testing of the U /Man Special Effects

The testing and adjustments of the special effects is treated in the assembly manual AM 400.

1. Mate the connectors with the pins of the U /Man special effects, referring to Fig. 81.
2. Push the drawbar preset board PZ 6 onto the round pins on the special effects drawbars P Z 6 and mate the connector of branch 7.4 with the pins on PZ 6, referring to Fig. 84.
3. Test the operation of the U /Man special effects, in conjunction with the 20 associated rocker switches on the stop board, referring to the manual AM 400. The slide controls are located among the grey draw bars and the associated "Manual Wah Wah" control is part of the left control panel.

Note: The U/Man special effects do not pass any channel selectors. However, they sound from the right channel if no Wersivoice is used and from the left speaker if the Wersivoice is treating the audio signal.

3.21 Testing of the M/Man Special Effects

1. Mate the connectors with the pins of the M/Man special effects, referring to Fig. 80.
2. Test all modes of operation of the M /Man special effects. The associated switches and controls are located on the right control panel (except the master volume control which is a grey drawbar on the left side).

Note: No drawbars are assigned to the M/Man special effects and only 16 control switches are used. The switches which are missing with respect to the U /Man special effects are:

- a) " Drawbars": Only preset 2nd and 3rd harmonics can be selected but not manually settable drawbars.
- b) "Fast Rate", "Medium Rate" and "Short Rate": The special effects rate is "slow" as long as the button "Variable Rate" is released. Depressing the latter button activates the rotary control "Spec. Eff. Rate" on the right control panel.

The special effects audio signals of the M /Man are either fed directly to the left channel (button "Spec. Eff. to Wersivoice" released) or to the Wersivoice I ("Spec. Eff. to Wersivoice" depressed). When channelled through the Wersivoice, the audio signal may be channel-selected by the rocker tab "Wersivoice I right/left".

3.22 Testing of the Piano

1. Mate the connectors to the pins of the piano voicing board PI 1 as shown in Fig. 72.
2. Pull the volume drawbar "Piano" (grey drawbar) halfway.
3. Perform the tests and adjustments on the piano section, referring to the assembly manual AM 420. After the adjustment of the tremolo modulator, check the individual voices. Verify the operation of the drawbar type control "Tremolo Speed" (grey drawbar) in connection with the rocker tab switches "Echo" and "Tremolo" respectively. The speed of either operating mode should increase as the grey drawbar " Tremolo Speed" is pulled out.

Check the operation of the "Long Sustain" switch and check whether the left-hand foot lever on the swell pedal produces long sustain too (independently of the position of the "Long Sustain" switch).

Note: The sustain (or, better, the lack thereof) of the voice "Banjo" is fixed and cannot be influenced by the "Long Sustain" switch nor the left foot lever.

4. Verify that the channel selector "Piano right/left" actually assigns the piano voices to one or the other channel. Check the operation of the switch "Piano to Wersivoice". Recipe for a real Honky-Tonk piano: Select the voice "Honky To n k"; assign the " Piano to Wersivoice" and set the Wersivoice I to the "Choir" mode (all other switches up).

3.23 Testing of the Pedals

1. Set the pedals near the front of the organ and plug the 16-pin connector into the corresponding receptacle on the organ base. Push the pedal clavier in its place.
2. Mate all connectors to the pins of the pedal electronics P E 36 (partially shown in Fig. 78).
3. Pull all 7 drawbars for the pedals halfway.
4. Depress the button " Drawbars" in the bottom row on the right control panel.
5. Try each pedal. The combined pedal draw bar signal should appear from both speakers without sustain.
6. Check the pedal drawbar voices using each of the brown drawbars singly.
7. In addition, depress the button "Short Sustain" on the right control panel (bottom row). The draw bar sounds should exhibit some sustain after the release of the pedal.
8. In addition, depress the button "Long Sustain" which should lengthen the sustain.
9. Release the button " Drawbars".

10. Individually, depress the buttons "Tuba", "Trumpet" and "Contrabass" respectively. These fixed stops of the pedals should be volume adjustable by the black draw bar "Fixed Stops". The Tuba is a 16' stop while the Trumpet and Contrabass belong to the 8' rank. The sustain controls do not influence the fixed stops.
11. Depress the button "Bass guitar" and release all other buttons of the pedal group (bottom row). Play the pedals and you should be able to hear the typical plucked string sound. The plectron attack can be adjusted to suit your taste by means of the trim pot P1 on the board PE 36: Centre of rotation for a more traditional sound or fully clockwise for the harder sound more common today. The sustain controls do not influence the bass guitar.
12. Verify the action of the switch "Pedals to Wersivoice". Check the following interesting setting: "String bass", "Pedals to Wersivoice" and the Wersivoice I set to "Choir".

3.24 Testing of the Swell Pedal and Reverb respectively

1. So far, the swell pedal as well as the reverb have not been active. This should change drastically if you mate the connectors leading to plug 1 of both preamplifiers, referring to Figs. 70 and 71 respectively. Also connect the single connectors to the pins " RE"; " RA " and "A3" (see text associated with Fig. 70 in regard to the pins "A3").
2. Set all channel selectors to "right" (up).
3. Play anything on the various manuals and check the action of the swell pedal.
4. Set the swell pedal to its "low stop" and hold a drawbar chord on a manual. Adjust the trim pot " Null" on the right preamplifier board V V 1 such that the resulting sound is at a

minimum. It is not possible (nor desirable) to achieve total silence since the swell pedal volume control circuitry is designed with a slight treble and bass boost at low volumes.

5. Set all channel selectors to "left" and adjust the "Null" on the left preamplifier.
6. Depress the push button "Reverb I" on the right control panel. Depress the swell pedal fully. Hit a chord very briefly and listen for the reverb sound to decay. If no reverb exists, flip the toggle switch near the M/Man fixed stops (under the lid).
7. Depress the "Reverb II" switch in addition to "Reverb I". The reverb decay should last longer. Adjust the trim pots P 2 "Reverb" on both preamplifiers for a suitable reverb time. Don't overdo it. We recommend centre of rotation.
8. This is a good time to set the volume and tone controls on the preamplifiers too. Set the treble control (top control) and the bass control (centre) to the centre of rotation on both upright boards on the preamplifiers. Later on, when you get accustomed to the organ's sound, you may want to touch up these settings to suit your taste. Set the volume controls (bottom control) such that you achieve the highest desirable volume from your speakers when you play with "full organ" and a fully depressed swell pedal. This gives you the proper dynamic volume range.

3.25 Testing of the Swell Indicator

1. Mate the connectors of branch 8.1 with the pins on the swell indicator board L A 1, referring to Fig. 85. Depending on the swell pedal position, a few LED lights should be lit.
2. Set the swell pedal to the low volume stop. None of the LED! or maybe the bottom one should light up.

3. Set the swell pedal to its high volume stop. If necessary, adjust the trim pot on the board LA 1 such that all LED's are just lit. From now on, you will be able to anticipate the to be expected volume even before you start playing.

3.26 Testing of the Key Pop

1. Mate the connector with the pins on the board H P 1, referring to Fig. 86.
2. Set up the 8' drawbar only on both the U/Man and the M/Man. Verify the proper sound.
3. Depress the button "Key Pop" on the right control panel. Play both U/Man and M/Man again. The 8' drawbar sound should still be there but a short and scratchy "key pop" everytime a key is depressed should remind you of the days when dirty key contacts were a common nuisance. The intensity of the key pop sound can be adjusted on the board HP 1 by means of P1 for the M/Man and P 2 for the U/Man.

Remember: The key pop can be turned off!!

3.27 Testing of the Rhythm/Auto Accompaniment

Complete the installation and wiring of the rhythm and auto accompaniment respectively, consulting the assembly manuals AM 480 (rhythm), AM 481 or AM 841 (accompaniment) and AM 485 (Wersimatic Galaxy).

Test the operation of the Wersimatic, referring to the manuals listed above. When tuning the auto accompaniment, also consult the following chapter.

3.28 Tuning of the two Twin Transposers

It is the purpose of the transposer to change the pitch of the organ's master oscillators in discreet steps which correspond to half-tones. The Galaxy is equipped with a total of 3 tone generators (generator I, generator II and accompaniment generator).

The twin transposes !affects the pitches of the organ generator) as well as the auto accompaniment generator. Also refer to Figs. 86 and 87.

The twin transposes II controls the organ generator II only. The second half of this transposer is not used.

We presume that both organ generators are properly tuned and that the accompaniment generator is tuned but still set up for tuning (steady tones of the chords).

1. Preparations:

- a) "Master Pitch" control (on AP1G) at centre of rotation.
- b) "Orchestra Intonation" control (on right control panel) at centre of rotation.
- c) "Slalom" control (on left control panel) at the right-hand stop.
- d) No vibrato set, no Wersivoice activated, no reverb on, no couplers on, no "Ensemble Tuning" buttons depressed.
- e) Select the fixed stop Clarinet 8' in both U /Man and M/Man respectively.
- f) Transposer switch at "C".

2. Depress and hold the A-key of the 3rd octave on the middle manual. You should hear the "middle A" of exactly 440 H z (you tuned it earlier). If the pitch is slightly off against your

reference (other instrument, tuning fork, absolute ear, etc.) adjust the master pitch control (on AP 1 G) to set it correctly.

3. Set the transposes switch to " C # ". Depress and hold the key G#. Set the trim pot P 12 on the twin transposer I (next to Key Pop) until the tone is pitched to middle A (= 440 Hz) again.
4. Set the transposes switch to " D': Depress and hold the key G. Set the trim pot P 13 on the same twin transposes until the tone returns to middle A (= 440 Hz).
5. Continue, using the same procedure, until you reach the transposes position "F ". Then, tune the other half of the rotation, from B down to F#. This time hold and depress keys above the middle A key. Consult the Tuning Table below.

Note 1: There are many ways to tune the transposers. The method described above has the advantage that you are always tuning towards the same pitch, namely middle A (= 440 Hz). This is especially useful if you only own a single tuning fork (and not 12).

Note 2: if you are using a frequency counter, connect it to the test point "3 520 Hz- of the generator being tuned (via its transposer) and consult the Tuning Table for frequencies vs. transposer positions.

Note 3: It is possible that, due to the additive effect of parts tolerances, the range of a trim pot on a transposes does not allow the tuning to the perfect pitch. In that case, the series resistor associated with that trim pot has to be changed to a larger or smaller value. Refer to the schematic diagram in the AM 102 "Twin Transposes".

6. Set the transposer switch to " C': Depress and hold the middle A key of the upper manual, in addition to the held A

key of the middle manual. If necessary, touch up the "Orchestra Intonation" for "zero beat".

7. Set the transposer switch to any desired position. Consult the Tuning Table and adjust the trim pot that corresponds to the particular transposer position on TP 2 // to achieve "zero beat". There is no need to change keys.
8. Set the trim pots P 12 thru P 22 on TP 211 to tune that transposer for the tone generator II.

As a result, both organ generators should be transposable in half-tone steps and they should stay in tune at every transposed key.

Note: You will find that it requires a very fine touch when adjusting the trim pots in order to achieve a true "zero beat" in all cases.

9. Adjust the trim pots P1 thru P11 on TP 21 until "zero beat" is reached between the accompaniment generator and the middle manual generator. Depress and hold the middle A key of the middle manual.

Depress the A key of the second octave on the lower manual.

This will hold the A note of the auto accompaniment if the

"Memory" is on. Consult the Tuning Table for the trimpot assignment vs. transposer position. Also refer to the manual AM 481 or AM 841 for information on tuning.

3.29 Testing of the Arpeggio/Glissando

Refer to the assembly manual AM 425 "Arpeggio/ Glissando" for information on the installation, wiring and testing.

3.30 Testing of the Studio Amplifiers

If you have elected to install the optional studio amplifiers (balanced 600 Ohms audio outputs used in recording studios) install the two boards S V 7 and mate the connectors as shown in Fig. 7 9. The assembly manual AM 545 contains information on testing and adjustments of the studio amplifiers.

Table 1 Tuning Table for the Twin Transposers

Transposer Position	Frequency at test point - 3520 Hz" in Hz	Trimpot on TP21 (Gen I) M/Man	Trim pot on TP 211(Gen II) U /Man	Trimpot on TP 21 (Accomp.) Accompaniment	Key to hold to achieve "middle A"
F #	2489	P17	P17	P 6	D #
G	2637	P18	P18	P7	D
G #	2794	P19	P19	P 8	C #
A	2960	P 20	P20	P 9	C
A #	3136	P 21	P 21	P10	B
B	3322	P22	P22	P11	A #

Transposer Position	Frequency at test point - 3520 Hz" in Hz	Trimpot on TP21 (Gen I) M/Man	Trim pot on TP 211(Gen II) U /Man	Trimpot on TP 21 (Accomp.) Accompaniment	Key to hold to achieve "middle A"
C	3520				A
C #	3729	P12	P12	P1	G #
D	3951	P13	P13	P 2	G
D#	4186	P14	P14	P3	F#
E	4435	P15	P15	P 4	F
F	4699	P16	P16	P5	E

3.31 Testing of the Sound Computer

As we mentioned earlier, we urge you to postpone the installation of the sound computer, especially its harness PR4, before the entire organ is in perfect working condition under manual control. If you followed the prescriptions of this manual so far and have reached this paragraph we must assume that your Galaxy is in excellent health. That means it is ready to accept the sound computer. Consult the manual AM 505 for information on the installation, wiring and step-by-step initial operation of the sound computer.

4 Final Steps

Your Galaxy building project is now completed. You deserve the unconditional admiration of your family, friends and neighbours for this accomplishment. As a result, you have created an outstanding musical instrument which will provide you with a lot of excitement and enjoyment for a long time to come. We are convinced that this

will be ample compensation for your work (and possibly some frustrating stumbling blocks) luring the assembly period.

Now, once more, clean out the instrument by removing any residual debris, temporary wires, hardware, tools, etc. Keep an eye open to detect the smallest wire clippings. Remember the modified law of gravity which applies to organ builders: Any conductive material will eventually fall down (if it is at the bottom it will jump up first). When falling, it will deviate from a straight line towards the centre of the earth and it will seek out a location where it can lodge between the terminals of the most expensive components. (This law is also called the "Revenge of the Neglected Wire Clipping.")

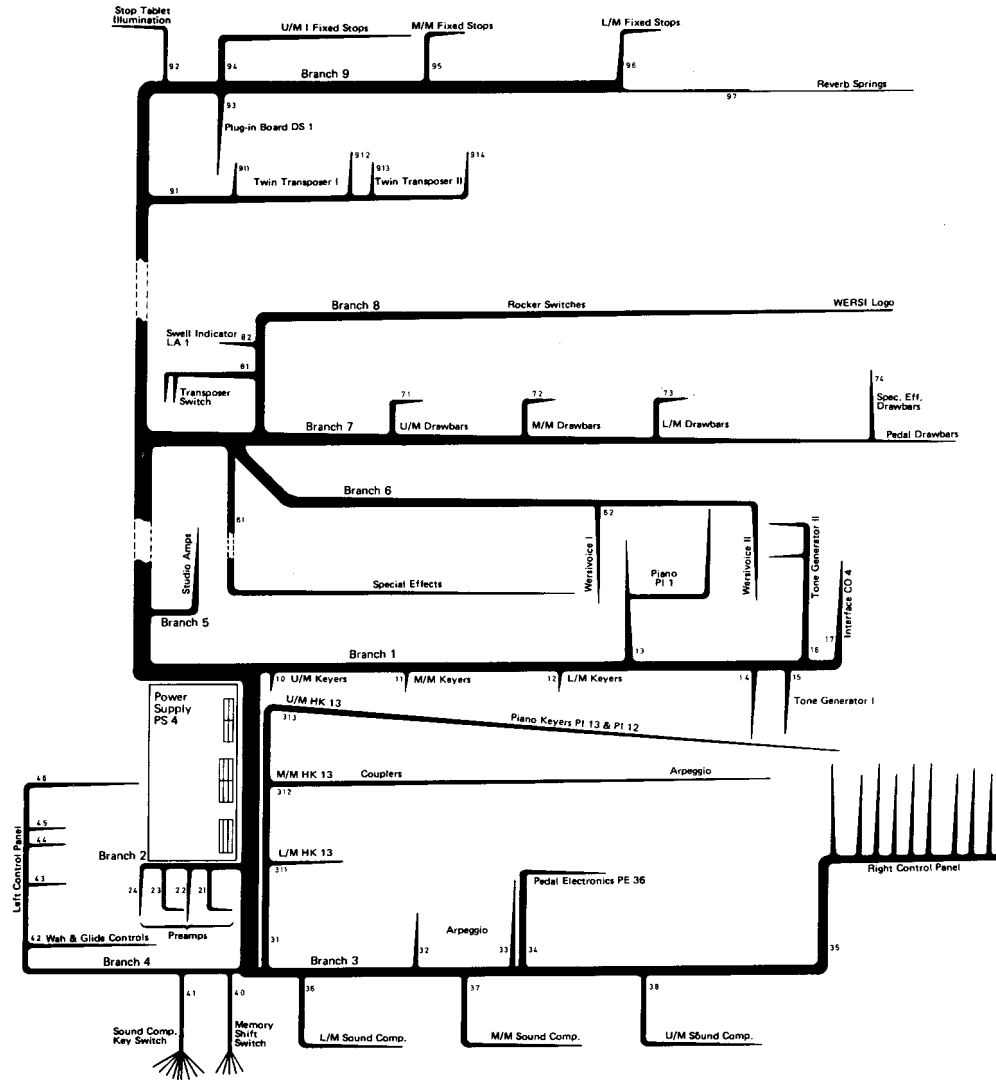
Dress the cables and harnesses again and fasten them together or to the cabinet where needed. We know you will open the top of the organ many times just to show it off.

Fasten the control panels to the uppermost C-bar, using a sheet metal screw for each panel. Close the hinged rear panel, using decorative screws (Phillips head with plastic plug). Close the hinged front cover using two thumbscrews.

We wish you the best of luck for your inauguration concerts, marked by the absence of "demonstration effects": You are embarking on the second phase of a long journey, namely the never-ending discovery of new sounds.

Congratulations Your
WERSI team

Figure 4 Schematic layout of the wiring harness GO 4



The wiring list on the following pages contains the wire numbers, colors and types of wires used in the harness GO 4. Beginning and end of each wire are also identified as to subunit name and terminal designation as far as the wiring of the organ is concerned, we do not make use of this list. It is provided as an aid in trouble-shooting and for future reference.

Table 2 Wire List of Harness GO 4

Wire No.	Type/ Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
1	W, r	Power supply, PS 4, +15 V	L/M fixed stops, G P 1, plug 2, pin +15	Pos.supply voltage
2	W, r	Power supply, PS 4, +15 V	M/M fixed stops, G P 1, plug 2, pin +15	Pos. supply voltage
3	W, r	Power supply, PS 4, +15 V	U/M I fixed stops, G P 1, plug 2, pin +15	Pos.supply voltage
4	W, r	Power supply, PS 4, +15 V	U/M II fixed stops, DS 1, plug t, pin 2	Pos.supply voltage
5	W, r	Power supply, PS 4, +15 V	Swell indicator, LA 1, plug 1, pin +15	Pos.supply voltage
6	W, r	Power supply, PS 4, +15 V	D B presets, PZ 6, plug 1, pin 15 V+	Pos.supply voltage
7	W, r	Power supply, PS 4, +15 V	L/M presets, PZ 4, plug 1, pin 15 V+	Pos.supply voltage
8	W, r	Power supply, PS 4, +15 V	M /M presets, PZ 4, plug 1, pin 15 V+	Pos.supply voltage
9	W, r	Power supply, PS 4, +15 V	U/M presets, PZ 4, plug 1, pin 15 V+	Pos.supply voltage
10	W, r	Power supply, PS 4, +15 V	Key pop, H P 1, pin +V	Pos.supply voltage
11	W, r	Power supply, PS 4, +15 V	Wersivoice 11, W V 7, pin 11	Pos.supply voltage
12	W, r	Power supply, PS 4, +15 V	Wersivoice I, WV 7, pin 11	Pos.supply voltage
13	W, r	Power supply, PS 4, +15 V	U/M spec. eff., E F 1, pin 19	Pos.supply voltage
14	W, r	Power supply, PS 4, +15 V	M /M spec. eff., E F 1, pin 19	Pos.supply voltage
15	W, r	Power supply, PS 4, +15 V	Left studio amp, SV 7, pin +15 V	Pos. supply voltage
16	W, r	Power supply, PS 4, +15 V	Right studio amp, SV 7, pin +15 V	Pos.supply voltage
17	W, r	Power supply, PS 4, +15 V	Board CO 4, point 35	Pos.supply voltage
18	W, r	Power supply, PS 4, +15 V	Generator 11, G t, plug A, pin 4	Pos.supply voltage
19	W, r	Power supply, PS 4, +15 V	Generator I, G 1, plug A, pin 4	Pos.supply voltage
20	W, r	Power supply, PS 4, +15 V	Piano, PI 1, plug 3, pin +15	Pos.supply voltage
21	W, r	Power supply, PS 4, +15 V	L/M Keyers, V 3, pin +15	Pos.supply voltage
22	W, r	Power supply, PS 4, +15 V	M/M Keyers, V 3, pin +15	Pos.supply voltage
23	W, r	Power supply, PS 4, +15 V	U /M Keyers, V 3, pin +15	Pos.supply voltage
24	W, r	Power supply, PS 4, +15 V	Right preamp, VV 2, plug 5, pin +15	Pos.supply voltage

Wire No.	Type/ Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
25	W, r	Powersu pply, PS 4, +15 V	Left preamp, V V 2, plug 5, pin +15	Pos. supply voltage
26		not used		
27a	W, r	Power supply, PS 4, +15 V	Piano PI 13, pin +V	Pos. supply voltage
27	W, r	Piano PI 13, pin +V	Piano PI 12, 2nd octave, pin +V	Extension of 27a
27c	W, r	Piano PI 12, 2nd octave, pin +V	Piano PI 12, 3rd octave, pin +V	Extension of 27 b
27	W, r	Piano PI 12, 3rd octave, pin +V	Piano PI 12, 4th octave, pin +V	Extension of 27c
27e	W, r	Piano PI 12, 4th octave, pin +V	Piano PI 12, 5th octave, pin +V	Extension of 27d
28	W, r	Power supply, PS 4, +15 V	Arpeggio AG 1, plug 1, pin 12	Pos. supply voltage
29	W, r	Power supply, PS 4, +15 V	Pedal electr PE 36, plug 7, pin +15	Pos. supply voltage
30		not used		
31		not used		
32		not used		
33	W, bi	Power supply, PS 4, -15 V	L/M fixed stops, G P 1, plug 2, pin -15	Neg. supply voltage
34	W, bl	Power supply, PS 4, -15 V	M /M fixed stops, G P 1, plug 2, pin -15	Neg. supply voltage
35	W, bi	Power supply, PS 4, -15 V	U/M I fixed stops, G P 1, plug 2, pin -15	Neg. supply voltage
36	W, bl	Power supply, PS 4, -15 V	U /M II fixed stops, DS 1, plug t, pin 1	Neg. supply voltage
37	W, bl	Power supply, PS 4, -15 V	Swell indicator LA 1, plug 1, pin -15	Neg. supply voltage
38a	W, bl	Power supply, PS 4, -15 V	U/M presets, PZ 4, plug 1, pin 15 V	Neg. supply voltage
38b	W, bl	U/M presets, PZ 4, plug 1, pin 15 V	M/M presets, PZ 4, plug 1, pin 15 V	Extension of 38a
38c	W, bl	M/M presets, PZ 4, plug 1, pin 15 V	L/M presets, PZ 4, plug 1, pin 15 V	Extension of 38b
38d	W, bl	L/M presets, PZ 4, plug 1, pin 15 V	D B presets, PZ 6, plug 1, pin 15 V	Extension of 38c
39a	W, bl	Power supply, PS 4, -15 V	Twin transp.I, TP 2, plug 1, pin -15	Neg. supply voltage
39b	W,bl	Twin transp.I, TP 2, plug 1, pin -15	Twin transp.II. TP 2, plug 1, pin -15	Extension of 39a
40	W, bl	Power supply, PS 4, -15 V	Key pop, H P 1, pin -V	Neg. supply voltage
41	W, bl	Power supply, PS 4, -15 V	Master control "Spec. eff.rate"term. S	Neg. control voltage
42	W, bl	Power supply, P S 4, -15 V	Wersivoice II, WV 7, pin 17	N eg. supply voltage
43	W, bl	Power supply, PS 4, -15 V	Wersivoice I, WV 7, pin 17	Neg. supply voltage
44	W, bl	Power supply, PS 4, -15 V	U/M spec. eff., E F 1, pin 24	Neg. supply voltage
45	W, bl	Power supply, PS 4, -15 V	M/M spec. eff., E F 1, pin 24	Neg. supply voltage
46	W, bl	Power supply, PS 4, -15 V	Generator 11, G 1, plug A, pin 8	Neg. supply voltage
47	W, bl	Power supply, PS 4, -15 V	Generator 1, G 1, plug A, pin 8	Neg. supply voltage

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
48	W, bl	Power supply, PS 4, -15 V	Piano, P11, plug 3, pin -15	Neg. supply voltage
49	W, bl	Power supply, PS 4, -15 V	L/M keyers, V 3, pin -15	Neg. supply voltage
50	W, bl	Power supply, PS 4, -15 V	M /M keyers, V 3, pin -15	Neg. supply voltage
51	W, bl	Power supply, PS 4, -15 V	U/M keyers, V 3, pin -15	Neg. supply voltage
52	W, bl	Power supply, PS 4, -15 V	Left control panel, SW 4, point -15 V	Neg. supply voltage
53	W, bl	Power supply, PS 4, -15 V	Left control panel, "Wah wah"term. A	N eg. control voltage
54a	W, bl	Power supply, PS 4, -15 V	Right preamp, VV 2, plug 5, pin -15	Neg. supply voltage
54b	W, bl	Right preamp, VV 2, plug 5, pin -15	Left preamp, V V 2, plug 5, pin -15	Extension of 54a
55	W, bl	Power supply, PS 4, -15 V	Left control panel, SW 3, point - 15 V	Neg. supply voltage
56	W, bl	Power supply, P S 4, -15 V	Piano, PI 13, pin -V	N e, supply voltage
57a	W, bl	Power supply, PS 4, -15 V	U/M envelope, H K 13, pin -15	Neg. supply voltage
57b	W, bl	U/M envelope, H K 13, pin -15	U/M bus bar	Keying voltage
58	W, bl	Power supply, PS 4, - 15 V	Couplers, K 1, pin -15	Neg. supply voltage
59a	W, bl	Power supply, PS 4, -15 V	M/M envelope, H K 13, pin -15	Neg. supply voltage
59b	W, bl	M/M envelope, H K 13, pin -15	M/M bus bar	Keying voltage
60a	W, bl	Power supply, PS 4, -15 V	L/M envelope, H K 13, pin -15	Neg. supply voltage
60b	W,bl	L/M envelope, H K 13, pin -15	L/M bus bar	Keying voltage
61	W,bl	Power supply, PS 4, -15 V	Arpeggio AG 1, plug 3, pin 20	Neg. supply voltage
62	W, bl	Power supply, PS 4, -15 V	Pedal electr., P E 36, plug 7, pin -15	N eg. supply voltage
63	W, bl	Power supply, PS 4, -15 V	Right control panel, "Sp.eff.rate", term. S	Neg. control voltage
64	W,bl	Power supply,PS4,-15V	Rightcontrolpanel,SW 6, point-15	Neg. supply voltage
65	W, bl	Power supply, PS 4, - 15 V	Right controlpanel,SW 5, point -15	Neg. supply voltage
66a	W, bl	Power supply, PS 4, -15 V	"Read-in" switch	Neg. control voltage
66b	W, bl	"Read-in" switch	L/M sound comp., SC 3, plug 2, pin 24	Neg. supply voltage
67a	W, bl	"Read-in" switch	M/M sound comp., SC 5, plug 2, pin 24	Neg. supply voltage
67 b	W, bl	"Read-in" switch	U/M soun d comp., SC 5, plug 2, pin 24	N eg. supply voltage
68	W, bl	"Read-in" switch	"Memory doubling" switch	Neg. control voltage
69	VV, bk	Power supply,PS4,G N D	L/M fixed stops, GP1,plug2,pin G N D	G N D = Ground
70	VV, bk	Power supply, PS 4, G N D	M/M fixed stops, G P 1,plug 2, pin G N D	G N D
71	W, bk	Power supply, PS 4, G N D	U/M I fixed stops, G P 1, plug 2, pin G N D	G N D
72	W, bk	Power supply, PS" G N D	U/M If Axed stops, DS 1,plug 1,pin 7	G N D

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
73	W, b k	Power supply, PS 4, G N D	Stop tablet illu uration	G N D
74		not used		
75	W, b k	Power supply, PS 4, G N D	Stop board,groundlug	G N D
76	W,bk	Powersupply,PS4,G N D	Swell indicator LA 1, pin GN D	G N D
77	W,bk	Power supply, PS 4, G N D	Tmnspowr TP,point B 7	G N D
78	W, OK	Power supply,PS4,G N D	Pedaldrawbars,ZR 1,term.14	G N D
79	W,bk	Power supply,PS4,G N D	Sp.eff.drawbars,ZR 6,term.14	G N D
80	VI bk	Powersupply,PS 4,G N D	U/M drawbars,ZR 4,term.15	G N D
81	W, bk	Power supply, PS 4, G N D	Twin transp.II, TP 2, plug 1, pin G N D	G N D
82	W, bk	Power supply, PS 4, G N D	Twin transp.I, TP 2, plug 1, pin G N D	G N D
83	W, bk	Power supply, PS 4, G N D	Master controls, ground plane	G N D
84	VI bk	Power supply,PS 4, G N D	Key pop, HP1,pin G N D	G N D
85	W, bk	Power supply, PS" G N D	Wwsivoice II, WV 7, pin 9	G N D
86	W, b k	Power supply, PS 4, G N D	Wersivoice 1, W V 7, pin 9	G N D
87	W, bk	Power supply, PS 4, G N D	U/M spec. eff., E F 1, pin 21	G N D
88	W,bk	Power supply,PS4,G N D	M/M spec. eff.,EF1,pin 21	G N D
89	W,bk	Power supply,PS 4, G N D	C-bar of shelf	G N D
90	W, bk	Power supply, PS 4, G N D	Left studio amp, SV 7, pin G N D	G N D
91	W, b k	Power supply, P S 4, G N D	Right studio amp, SV 7, pin G N D	G N D
92	VC bk	Powersupply, PS4,G N D	Board CO 4,point36	G N Dforswellpedal
93	W, bk	Power supply, PS 4, G N D	Generator 11, G 1, plug B, pin 8	G N D
94	W, bk	Power supply, PS 4, G N D	Generator I, G 1, plug B, pin 8	G N D
95	W, bk	Power supply, PS 4, G N D	Piano, PI 1, plug 3, pin G N D	G N D
96	W,bk	Power supply,PS4,G N D	L/M keyers,V 3, pin G N D	G N D
97	W, bk	Power supply, PS 4, G N D	M/M keyers, V 3, pin G N D	G N D
98	W,bk	Power supply, PS 4,G N D	U/M keyers,V 3, pin G N D	G N D
99	W,bk	Power supply,PS 4,G N D	Left control panel,SW 3, point G N D	G N D
100	W,bk	Power suppC PS 4, G N D	Left control panO,SW 4, point G N D	G N D
101	W,bk	Power supply,PS 4,G N D	Left control panel,"Wah wah";term.E	G N D
102	W, bk	Power supply, PS 4, G N D	Right preamp, VV 2, plug 5, pin G	G N D
103	W,bk	Power supply, PS 4, G N D	L/M sound comp., SC 3, plug 2, pin 23	G N D

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
104	W,bk	Power supply,PS 4,G N D	Piano PI 13,term.G N D	G N D
105	W,bk	Power supply,PS4,G N D	U/M envelope, H K 13, term. GN D	G N D
106	W,bk	Powersupply,PS4,G N D	Couplers, K 1, term. G N D	G N D
107	W,bk	Power supply,PS4,G N D	M/M envelope, H K 13, term. G N D	G N D
108	W,bk	Power supply,PS4,G N D	L/M envelope, HK 13,term.G N D	G N D
109	W, bk	Powersupply, PS 4, G N D	Arpeggio, AG 1, plug 3, pin 19	G N D
110	W, bk	Power supply, PS 4, G N D	Pedal Own, P E 36, plug 7, pin GN D	G N D
111	W,bk	Power supply,PS 4, G N D	Right control panel, SW 6, point G N D	G N D
112	W,bk	Power supply, PS 4, G N D	Right control panel, SW 5, point G N D	G N D
113	W,bk	Power supply,PS4,G N D	M/M sound comp., SC 5,plug2,pin23	G ND
114	W,bk	Power supply,PS4,G N D	U/M sound comp., SC 5, plug 2, pin 23	G N D
115		not used		
116		not used		
117a	W, w/bl	Power supply, PS 4,+25 V D C	Lower lamp at WE R SIlogo	Unregulated D C
117b	W,w/bl	Lower lamp at WE RSIlogo	Upper lamp at WERSIlogo	Extension of 117a
117c	W,w/bl	Upper lamp at WERSIlogo	Stop tablet illumination	Extension of 117b
118	W,gn/bn	L/M sound comp., SC 3, plug 1, pin 1	L/M fixed stops, G P 1, plug 2, pin PM	PMU = L/Man program control voltage
119	W,gn/bn	L/M sound comp., SC 3, plug 1, pin 2	Switchbank "DrawbarPresets"switch " L/M Preset 1"; US 1, point p M	PM U
120	W,gn/bn	L/M sound comp., SC 3, plug 1, pin 3	Right control panel,SW 6, point PM U	P M U
121	W,gn/w	M/M sound comp., SC 5, plug 1, pin 1	M/M fixed stops, GP1,plug2,pin PM	PM M = M/Man program control voltage
122a	W,gn/w	M/M sound comp., SC 5, plug 1, pin 2	Switch bank " Drawbar Presets"; switch " M /M Preset 1"; US 1, point pM	PM M
122b	W,gn/w	Switchbank " Drawbar Presets"; switch "M/M Preset 1", US 1, point p M	Switchbank "Wersivoice I" (4 pos.), US 1, point pM	Extension of 122a
122c	W,gn/w	Switchbank "Wersivoice1" (4 pos.)	Channel selectors, S 4 K, point 22	Extension of 122b

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
123	W,gn/w	M/M sound comp., SC 5, plug 1, pin 3	M/M spec. eff., E F 1, pin 22	P M M
124a	In gn/w	M/M sound comp., SC 5, plug 1, pin 4	Right control panel, SW 6, point PM M	P M M
124b	W,gn/w	Right controlpanel,SW 6, point PM M	Right controlpanel,SW 5, point PM M	Extension of 124a
125	W,gn	U/M sound comp., SC 5, plug 1, pin 1	U/M I fixed stops, GP 1, plug 2, pin PM	P MO = U/Man program control voltage
126a	W,gn	U/M sound comp., SC 5, plug 1, pin 2	Switchbank "Piano", US1,pointpM	PMO
126b	W,gn	Switchbank "Piano",US1, point pM	Switchbank "Spec. eff."(U/M),US1, point PM	Extension of 126a
126c	W,gn	Switch bank -Spec. eff."(U/MI, US 1, point p M	Switch bank "Spec. eff.Sources", US 1, point p M	Extension of 126b
126d	W,gn	Switch bank -Spec. eff.Sources", US 1, point pM	Switchbank "Wah Wah" US 1, point p M	Extension of 126c
126e	W,gn	Switchbank "Wah Wah",US1, point p M	Switchbank "Spec. Eff.Rates",US1, point p M	Extension of 126d
126 f	W,gn	Switchban k "Spec. Eff. Rates"; U S 1, point p M	Switchbank " Drawbar Presets", switch " U/M Preset 1", point pM	Extension of 126e
126g	W,gn	Switchbank " Drawbar Presets", switch " U/M Preset 1", point p M	Switchbank "Wersivoice II" (5 pos.), US 1, point p M	Extension of 126f
127	W,gn	U/M sound comp., SC 5, plug 1, pin 3	U/M spec. eff.,EF1,pin 22	PMO
128a	W,gn	U/M sound comp., SC 5, plug 1, pin 4	Right control panel, SW 6, point PM O	PMO
128b	W,gn	Right control panel,SW 6, point PMO	Right control panel, SW 5, point PM O	Extension of 128a
129a	W, w/pk	L/M sound comp., SC 3, plug 1, pin 10	Lower lamp at WE R SIlogo	Lamp control
129b	W,w/pk	Lower lamp at WE RSIllogo	Upper lamp at WERSIllogo	Extension of 129a
130		not used		

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
131	S,gn	LIM fixed stops, G P 1, plug 2, cond.to pin Outp.,shield to pin G N D	LIM volume control, cond.to term. E, shield to jumper	L/M fixed stops audio to volume control
132a	S,gn	LIM volume control, cond.to term. S, shield to term. A	Right preamp, VV 2, plug 3, cond.to pin E6, shield cut off	LIM fixed stops audio to both preamps
132b	S,gn	LIM volume control, cond.to term. S, shield to term. A	Wersivoice I, WV 7, cond.to pin 4, shield cut off	LIM fixed stops audio to Wersivoice 1
133	W,pk	LIM fixed stops, GP 1,plug 1, pin SIN-V V	Channel selectors,S 4 K, point 14	L/M drawbarsto ch. sel.
134	W,bn	Channel selectors, S 4 K, point 13	Right preamp, VV 2, plug 4, pin S5	LIM drawbars to right preamp
135	W,ye/r	Channel selectors,S 4 K, point 15	Left preamp, VV 2, plug 4, pin S 5	L/M drawbars to left preamp
136	W,ye/r	L/M fixed stops, G P 1, plug 1, pin SIN-WV	Wersivoice I, WV 7, pin 3c	LIM drawbars to Wersivoice I
137	W, w/bk	LIM fixed stops, G P t, plug 1, pin F R-VV	Channel selectors,S 4 K, point 17	LIM fixed stops to ch. sel.
138	W,ye	Channel selectors,S 4 K, point 18	Right preamp, VV 2, plug 4, pin S6	LIM fixed stops to right preamp
139	W,r/bl	Channel selectors, S 4 K, point 16	Left preamp, VV 2, plug 4, pin S 6	L/M fixed stops to left preamp
140	W,r/bl	LIM fixed stops, G P 1, plug 1, pin F R-WV	Wersivoice 1, WV 7, pin 4c	L/M fixed stops to Wersivoice 1
141	S,gn	MIM fixed stops, G P 1, plug 2, cond.to pin Outp.,shield to G N D	U/M It fixed stops, board DS 1, plug 1, cond.to pin S, shield cut off	M/M fixed stops audio to orchestra coupler
142	S, ye	U/M Ifixed stops, board DS 1, plug 1, cond.to pin 4, shield to pin 6	M/M volume control, cond. to term. E, shield to jumper	M/M & U/M 11 audio to volume control
143a	S, ye	M/M volume control, cond.to term. S, shield to term. A	Right preamp, VV 2, plug 3, cond.to pin E 4,shield cut off	M/M & U/M II audio to both preamps
143b	S, ye	M/M volume control, cond. to term. S, shield to term. A	Wersivoice I, WV 7, cond. to pin 2, shield cut off	M /M & U/M 11 audio to Wersivoice I

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
144a	S,gn	M/M fixed stops, G P 1, plug 2, cond.to pin Outp.,shield to G N D	M/M spec. effects, E F 1, cond.to pin 13,shieldjoined with 144b	M/M fixed stops audio to M/M spec. effects
144b	S,gn	M/M spec. effects, E F 1, cond.to pin 13,shield cut off	M/M spec. effects, E F 1, cond.to pin 20, shield joined with 144a	Extension of 144a
145	W,gy	M/M fixed stops, GP 1,plug 1, pin SIN-VV	Channel selectors, S 4 K,point8	M/M drawbars to ch. sel.
146	W,ye/bn	Channel selectors, S 4 K, point 7	Right preamp, VV 2, plug 4, pin S3	M /M drawbars to right preamp
147	W, yell	Channel selectors, S 4 K, point 9	Left preamp, V V 2, plug 4, pin S 3	M/M drawbars to left preamp
148	W, yell	M/M fixed stops, GP 1, plug 1, pin SIN-WV	Wersivoice I, WV 7, pin 1c	M/M drawbars to Wersivoice I
149	W,gn/r	M/M fixed stops, G P 1, plug 1, pin F R-VV	Channel selectors,S 4 K, point 11	M/M & U/M II to ch. sel.
150	W,ye/bk	Channel selectors,S 4 K, point 12	Right preamp, VV 2, plug 4, pin S4	M/M & U/M II to 'right preamp
151	W,gn/bk	Channel selectors, S 4 K,point10	Left preamp,V V 2, plug 4, pin S4	M/M & U/M II to left preamp
152	VC gn/bk	M/M fixed stops, GP1, plug1, pin F R-WV	Wersivoice1,WV 7, pin 2c	M/M & U/MII to Wersivoice I
153	W,bn	U/M II fixed stops, board DS 1, plug 1, pin 3	Right control panel, SW 6, point 3	Control voltage for orchestra coupler
154	S,gy	U/M I fixed stops, GP 1, plug 2, cond.to pin Outp.,shield to G N D	U/M volume control, cond.to term. E, shield to jumper	U /M I fixed stops audio to volume control
155a	S,gy	U/M volume control, cond.to term. S, shield to term. A	Right preamp, VV 2, plug 3, cond.to pin E2, shield cut off	U/M I fixed stops audio to both preamps
155b	S,gy	U/M volume control, cond. to term. S, shield to term. A	Wersivoice II, WV 7, cond.to pin 2, shield cut off	U/M I fixed stops audio to Wersivoice II

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
156a	S,gy	U/M I fixed stops, G P 1, plug 2, cond.to pin Outp.,shield to G N D	U/M spec. eff., E F 1,cond. To pin 13,shield joined with 156b	U/M I fixed stops audio to U/M spec. eff.
156b	S,gy	U/M spec. eff.,EF1,cond.to pin 13,shield joined with 156a	U/M spec. eff.,EF1,cond.to pin 20,shield cut off	Extension of 156a
157	W,ye	U/M I fixed stops, G P t, plug 1, pin SIN-VV	Channel selectors, S 4 K, point 2	U/M drawbarsto ch. sel.
158	W, w/bl	Channel selectors, S 4 K, point 1	Right preamp, VV 2, plug 4, pin S1	U/M drawbars to right preamp
159	W, w/bn	Channel selectors, S 4 K, point 3	Left preamp, VV 2, plug 4, pin S 1	U/M drawbars to left preamp
160	W, w/bn	U/M I fixed stops, G P 1, plug 1, pin SIN-WV	Wersivoice II, WV 7, pin 1c	U/M drawbars to Wersivoice II
161	W, w	U/M I fixed stops, G P 1, plug 1, pin F R-V V	Channel selectors, S 4 K, point 5	U/M fixed stops to ch. sel.
162	W, w/r	Channel selectors, S 4 K, point 6	Right preamp, VV 2, plug 4, pin S 2	U/M fixed stops to right preamp
163	W, wiye	Channel selectors, S 4 K, point 4	Left preamp, V V 2, plug 4, pin S 2	U /M fixed stops to left preamp
164	W, w/ye	U/M I fixed stops, G P 1, plug 1, pin F R-WV	Wersivoice II, WV 7, pin 2c	U/M fixed stops to Wersivoice 11
165	S,gy	Pedal drawbars, ZR 1,cond.to pin 10,shield to pin 9	Pedal electr.,PE 36, plug 6,cond.to pin 18, shield cut off	Pedal drawbarsaudio to pedal electronics
166	S, r	Pedal drawbars, Z R 1, con d. to pin 8, shield to pin 13	Pedal electr, P E 36, plug 6, con d. to pin 9,shield cut off	Bass guitar audio to volume control
167	S, w	Pedal drawbars,ZR 1,cond.to pin 7, shield to pin 12	Pedal electr.,PE 36, plug 6,cond.to pin 10, shield cutoff	Pedal fixed stops audio to volume control
168	W, pk	Pedal drawbars, Z R 1, pin 5	Pedal electr., P E 36, plug 6, pin 15	1' pedal drawbar
169	W, ye	Pedal drawbars, Z R 1, pin 4	Pedal electr., P E 36, plug 6, pin 14	2' pedal drawbar
170	W, bn	Pedal drawbars, Z R 1, pin 3	Pedal electr., P E 36, plug 6, pin 13	4' pedal drawbar
171	W,gy	Pedal drawbars, Z R 1, pin 2	Pedal electr.,PE 36, plug 6, pin 12	8' pedal drawbar
172	W, w	Pedal drawbars, Z R 1, pin 1	Pedal electr.,PE 36, plug 6, pin 11	16' pedal drawbar

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
173	S, r	Sp. eff, drawbar preset, P Z 4, plug 1, cond.to pin Outp.,shield to pin G N D	U/M spec. eff., E F 1, cond.to pin 16, shield cut off	Spec. eff. drawbars audio to U/M spec. effects
174a	S, bk	L/M drawbar presets, PZ 6, plug 1 cond.to pin Outp.,shieid to pin G N D	Right preamp, VV 2, plug 3, cond.to pin E5, shield cut off	L/M drawbars audio to both pream ps
174b	S,bk	L/M drawbar presets, PZ 6, plug 1, cond.to pin Outp_shield to pin G N D	Wersivoice 1, WV 7, cond.to pin 3, shield cut off	L/M drawbars audio to Wersivoice I
175	W, bn	L/M drawbarpresets,PZ 4, plug t, pin 1	Switchbank " Drawbar Presets", U S 1, switch " L/M Preset"; point a	L/M drawbar preset control voltage
176	S, r	M/M drawbars, Z R 4, cond.to pin 6, shield to pin 19	M/M spec. eff., E F 1, cond.to pin 11,shield cut off	3rd harmonic audio to M/M spec. effects
177	S, bl	M/M drawbars, ZR 4, cond.to pin 5, shield to pin 18	M/M spec. eff., E F 1, cond.to pin 12, shield cut off	2nd harmonic audio to M/M spec. effects
178a	S,bn	M/M drawbar presets, PZ 4, plug 1, cond. to pin Outp., shield to pin G N D	Right preamp, VV 2, plug 3, cond.to pin E3, shield cut off	M/M drawbars audio to both preamps
178b	S, bn	M/M drawbar presets, PZ 4, plug 1, cond.to pin Outp.,shield to pin G N D	Wersivoice I, WV 7, cond.to pin 1,shield cut off	M/M drawbars audio to Wersivoice I
179	W, ye	M/M drawbar presets, PZ 4, plug 1, pin 1	Switchbank " Drawbar Presets", U S 1, switch "M/M Preset 1",point a	M/M drawbar preset 1 control voltage
180	W, ye	M/M drawbar presets, P Z 4, plug 1, pin 2	Switch bank " Drawbar Presets", U S 1, switch "M/M Preset 2", point a	M/M drawbar preset 2 control voltage
181	S, r	U/M drawbars, Z R 4, cond.to pin 6, shield to pin 19	U/M spec. eff., E F 1, cond.to pin 11,shield cut off	3rd harmonic audio to U/M spec. effects
182	S,bl	U/M drawbars,ZR 4, cond.to pin 5, shield to pin 18	U/M spec. eff.,EF1, cond.to pin 12,shield cut off	2nd harmonic audio to U/M spec. effects
183	S, bl	U/M drawbar presets, P Z 4, plug 1, cond.to pin Outp.,shield to pin G N D	Right preamp, VV 2, plug 3, cond.to pin E 1,shield cut off	U/M drawbars audio to both preamps

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
183b	S, bl	U/M drawbar presets, PZ 4, plug 1, cond.to pin Outp.,shield to pin G N D	Wersivoice II, WV 7, cond.to pin 1,shield cut off	U/M drawbars audio to Wersivoice II
184	W,gy	U/M drawbar presets, PZ 4, plug 1, pin 1	Switchbank " Drawbar Presets"; U S 1, switch " U/M Preset 1", point a	U/M drawbar preset 1 control voltage
185	W,pk	U/M drawbar presets, PZ 4, plug 1, pin 2	Switchbank " Drawbar Presets"; U S 1, switch " U/M Preset 2", point a	U/M drawbar preset 2 control voltage
186	W,gy	Wersivoice 11, WV 7, pin 16	I Switch bank "Wersivoice II" (5-pos.), U S t,switch "Speedshift",point a	Fast/Slow Speedsh,ft
187	W, w	Wersivoice il, WV 7, pin 1 5	Switch bank "Wersivoice II" (5-pos.), U S 1,switch "Whirl /Choir", point a	Whirl/Choir
188	W,pk	Wersvoicell, W V 7, pin 14 (Switchbank "Wersivoicell"(5-pos.), U S 1, switch "Fast Chorale", point a j	Fast/Chorale
189	W,bn l	Wersrvorcell, WV 7,pin 13	Switchbank "Wersivoice 11" (5-pos.), US 1,switch "Normal/Soft", point a	Normal/Soft
190	W, ye '	Wersivoice 11, WV 7, pin 12	Switch bank "Wersivoice II" (5-pos.), US 1,switch "Normal /Heavy", point a	Normal/Heavy
191	S,ye	Wersivoice II, W V 7, cond.to pin 10, shield to pin 9	Left preamp, V V 2, plug 3, cond.to pin E 10,shield cut off I	Wersivoice II audio ic. left preamp
192	W,r/bl	Wersivoice I, W V 7, pin 15	Switch bank "Wersivoice 1' 14-p os./, U S 1, switch "Whirl /Choir", point a	Whirl/Choir
193	W,ye/bnl	Wersivoice I, W V 7, pin 14	Swiwhbank "W ersivoicel" (4-pos.), U S 1, switch "Fast/Chorale", point a	Fast/Chorale
194	W, w/ye	Wersivoice I, W V 7, pin 13	Switch bank "Wersivoice I" (4-pus.). U S 1, switch "Normal/Soft",point a	Normal/Soft
195	W, w/bl	Wersivoice I, W V 7, pin 12	Switchbank "Wersivoicel"(4-pos.I, US 1,switch "Normal?Heavy",point::	Normal(Heavy
196	S, bk	Wersivoice I, W V 7, cond.to pin 10, shield to pin 9	Right preamp, V V 2, plug 3, cond. To pin E8, shield cut off.	Wersivoice I audio to both preamps.
197	W , pk	Channel selectors, S4 K, point 24	Right Weam p, V V 2, Wucl 4, pin S 8	Wersrvolce I to right preamp
198	W, w	Channel selectors, S4 K, point 23	Left preamp, V V 2, plug 4, pin S 8	Wersivoice I to left preamp

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
199	W, ye	U/M spec. eff., EF 1 pin 23	Left control panel "Wah Wah", tenn.S;	Manual Wah Wah control
200	W, pk	U/M spec. eff., EF 1 pin 17	Master control "Wah Wah Speed", term.A	Wah Wah %wed
200b	W, pk	U/M spec. eff., EF 1 pin 18	Master control "Wah Wah Speed", term . S	Wah Wah Speed
201a	W, bn	U/M spec. eff., EF 1 pin 9	Master control "Free Run Speed", term. A	Fms, Run Speed
201b	W, bn	U/M spec. eff., E F 1, pin 10	Master control "Free Run Speed"; term. S	Free Run Speed
202	S, bn	U/M spec. eff., E F 1, cond.to pin 8, shield to pin G N D	U/M spec. eff.volume control, cond.to term. E, shield to jumper	U/M spec. eff. audio to volume control
203a	S, bn	U/M spec. eff. volume control, cond.to term. S, shield to term. A	Right pream p, VV 2, plug 3, cond.to pin E9, shield cut off	U/M spec. eff. audio to right preamp
203b	S, bn	U/M spec. eff.volume control, co nd. to term. S, shield to term. A	Wersivoice II, WV 7, cond.to pin 3, shield cut off	U/M spec. eff.audio to Wersivoice II
204	W, w/bn	U/M spec. eff., E F 1, pin 6	Switch "Fast Rate", US 1, point a	Fast Rate
205	W, w/bk	U/M spec. eff., E F 1, pin 5	Switch "Medium Rate", US 1, point a	Medium Rate
206	W, w/bl	U/M spec. eff., E F 1, pin 4	Switch "Slow Rate"; US 1, point a	Slow Rate
207	W, w/r	U/M spec. eff., E F 1, pin 3	Switch "Variable Rate"; US 1, point a	Variable Rate
208	W, ye	U/M spec. eff., E F 1, pin 2	Master control "Sp. eff. rate" term. A	
209a	W, ye/bl	U/M envelope, H K 13, pin "Perc."	U/M spec. eff., E F 1, pin 1	"Key down" to spec. eff.
209b	W, ye/bl	U/M spec. eff., E F 1, pin 1	Piano, PI 1, plug 1, pin "Trig."	"Key down" to piano
209c	W, ye/bl	Piano, PI 1, plug 1, pin "Trig."	Generator II, G 1, plug A, pin 5	"Key down" to generator 11
210	W, bn	U/M spec. eff., EF1, pin Pg15	Switch "Manual Wah Wah", US1, pointa	
211	W, ye	U/M spec. eff., EF1, pin Pg14	Switch "Autowah On", USt, pointa	
212	W, gy	U/M spec. eff., E F 1, pin Pg 13	Switch "Autowah Up/Down"; US 1, point a	
213	W, w	U/M spec. eff., E F 1, pin Pg 12	Switch "Free Run Wah Wah" US 1, point a	
214	W, pk	U/M spec. eff, E F 1, pin Pg 11	Switch "Wah Wah to Sp. Eff.", US 1, point a	
215	W, r/bl	U/M spec. eff., E F 1, pin Pg 10	Switch "2nd Harmonic"; US 1, point a	
216	W, ye/bn	U/M spec. eff., E F 1, pin Pg 9	Switch "3rd Harmonic", US 1, point a	
217	W, w/bk	U/M spec. eff., E F 1, pin Pg 8	Switch " Drawbars" US 1, point a	

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
218	W, w/bn	U/M spec. eff., E F 1, pin Pg 7	Switch "Fixed Stops", US 1, point a	
219	W, w/r	U/M spec. eff., E F 1, pin Pg 6	Switch "2nd Voice", US 1, point a	
220	W, w1bl	U/M spec. eff., E F 1, pin Pg 5	Switch "Tremolo"; US 1, point a	
221	W, ye/r	U/M spec. eff., E F 1, pin Pg 4	Switch " Contracussion" US 1, point a	
222	W,ye/bk	U/M spec. eff., E F 1, pin Pg 3	Switch "Repeat", US 1, point a	
223	W, bn	U/M spec. eff., E F 1, pin Pg 2	Switch "Soloperc." U S 1, point a	
224	W, ye	U/M spec. eff., E F 1, pin Pg 1	Switch "Percussion"; US 1,point a	
225	W,bn	Switch "Sp. Eff to Wersiv.", US 1, point b	Right preamp, VV 2, plug 9, pin S9	U/M spec. eff.to right preamp
226	W,ye	Switch "Sp. Fff.to Wersiv.", US 1, point a	Wersivoice It, W V 7, pin 3c	UIM spec. eff.to Wersivoice 11
227	W,ye	M/M spec. eff., FF 1, pin 23	Left control panel "Wah Wah",term.S	Manual Wah Wah
228a`	W,ye	M/M spec. eff., EF 1, pin 18	Right control panel, "Wah Wah Speed", term. A	
228b	W,ye	M/M spec, eff., EF t;oin 17	Right controlpanel,"Wah Wah Speed", terms	
229a	W,pk	M/M soec. eff., EF 1, pin 10	Right control panel, "Free Run Speed", term. a	
229b	W,pk	M/M spec. eff., EF 1, pin 9	Right control panel,"Free Run Speed"; term s	
230	S, w	M/M spec. eff, E F 1, cond.to pin 8,shield to pin G N D	M/M spec. eff, volume control cond.to term. E, shield to jumper	M/M spec. effects audio to volume control
231a	S, w	M/M spec. eff. volume control, cond.to term. S, shield to term. A	Left preamp p, VV 2, plug 3, cond.to pin E9, shield cut off	M/M spec. effects audio to left preamp
231b	S, w	M/M spec. eff. volume control, cond.to term. S, shield to term. A	Wersivoice I, W V 7, cond.to pin 5,shield cut off	M/M spec. effects audio to Wersivoice I
232	W,ye	M/M spec. eff., E F 1, pin 3	Right control panel, SW 5, point 7	Variable Rate (M/M sp. eff.)
233	W, w/r	M/M spec. eff., E F 1, pin 2	Right control panel, "Sp. Eff. Rate";	M/M spec. eff. rate control

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
234a	W, w/ye	M/M envelope, H K 13, pin "Perc."	Generator I, G 1, plug A, pin 5	"Key down" to generator 1
234b	W,w/ye	M/M envelope, H K 13, pin "Perc."	Key pop, HP t, pin T1	"Key down" to M/M key pop
234c	W, w/ye	Key pop, H P 1, pin T 1	M/M spec. eff., E F 1, pin 1	"Key down" to M/M spec. eff.
235	W, w/bk	M/M spec. eff., E F 1, pin Pg 15	Right control panel, SW 5, point 16	Manual Wah Wah
236	W, ye/bk	M/M spec. eft., E F 1, pin Pg 14	Right control panel, SW 5, point 15	M/M Autowah On
237	W, ye	M/M spec. eff., E F 1, pin Pg 13	Right control panel, SW 5, point 14	M/M A utowah Up/Down
238	W,bn	(M/M spec. eff., EF 1, pin Pg 12	Right controlpanel,SW 5, point 13	M/M Free Run Wah Wah
239	W, w/bl	M/M spec, eff., E F 1, pin Pg 11	Right control panel, SW 5, point 12	Wah Wah to Spec. Eff.
240	W,w/r	M/M spec. eff.,EF 1, pin Pg 10	Right control panel,SW 5,point11	M/M 2nd harmonic
241	W, w/bn	M/M spec. eft., E F 1, pin Pg 9	Right control panel, SW 5, point 10	M/M 3rd harmonic
242	W, ye/r	M/M spec. eff., E F 1, pin Pg 7	Right control panel, SW 5, point 9 I	M/M fixed stops
243	W, ye/bn	M/M spec. eff- E F t, pin Pg 6	Right control panel, SW 5, point 6	M/M 2nd Voice
244	W,r/bl	M/M spec. eff , E F 1, pin Pg 5	Right control panel, SW 5, point 5	M/M Tremolo
245	W,pk	M/M spec, eff., E F 1, pin Pg 4	Right control panel, SW 5, point 4	M/M Contracussion
246	W, w	M/M spec. eff., E F t, pin Pg 3	Right control panel, SW 5, point 3	M/M Repeat Percussion
247	W,qy	M/M spec elf., FF 1, pin Pg 2	Right control panel, SW 5, point 2	M/M Solo Percussion
248	VV, ye	M/M spec. elf., FF t, pin Pg 1	Right controlpanel,SW 5, point 1	M/M Percussion
249	W, bn	Right control panel, SW5, point 8v	Left pream p, V V 2, plug 4, pin S 9	M/M spec. eff.to left pream p
250	W,qy	Right control panel, SW5, point 8w	Wersivoice I, V VV 7, pin 5c	M/M spec. eff,to Wersivoice I
251	W,qy	Generator11,G 1, plug A pin 1	Right control panel,SW 5, point 21	Vibrato III, Gen.II
252	W, w	Generator11,G 1, plug A pin 2	Right control panel,SW 5, point 20	Vibrato II, Gen. II
253	W, w	Generator11,G 1, plug A pin 3	Right control panel,SW 5, point 19	(Slow vibrato, Gen. II I
254	W,bn	Generator11,G 1, plug A pin 6	Right control panel,SW 5, point 18	Cam. vibrato, Gen. II

Wire No.	Type/ Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
255	W, ye	Generator11, G 1, plug A pin 7	Right control panel, SW 5, point 17	Delayed vibrato, Gen. II
256	W, r/bl	Generator11, G 1, plug B pin 2	Right control panel, SW 5, point 22	Autoglide On, Gen. II
257a	W, ye/bn	Generator11, G 1, plug B pin 3	Master control "Autogl.Speed", term, S	Autoglide Speed, Gen. II
257b	W, ye/bn	Master control "Autogl.Speed", term, S	Right control panel, SW 5, point 23 I	Autoglide Up/Down, Gen. II
258	W, w/bl	Generator11, G 1, plug W pin 1	Master control "Autogl.Speed", term. A I	Autoglide Speed, Gen II
259	W, w/r	Generator11, G 1, plug W pin 4	Right control panel, SW 5, point 24	Hawaii effect, Gen. II
260	W, w/bn	Generator II, G 1, plug B, pin 6	Right control panel, SW 6, point G 2	Pitch control
261	W, ye/bn	Generator 11, G 1, plug B, pin 7	Twin transp. II, TP 2, plug 1, pin B 7	Pitch control
262	W, w/bk	Twin transp. 11, TP 2, plug 1, pin B 7	Left control panel, "Slalom" control, term. S (side II)	Slalom control
263	W, w/r	Twin transp. 11, TP 2, plug 1, pin S	Left control panel, "Slalom" control, term. A (side 11)	Slalom control
264	W, gy	Generator 1, G 1, plug A, pin 1	Right control panel, SW 5, point 29	Vibrato III, Gen. I
265	W, w/bl	Generator 1, G 1, plug A, pin 2	Right control panel, SW 5, point 28	Vibrato 11, Gen. I
266	W, ye/bn	Generator 1, G 1, plug A, pin 3	Right control panel, SW 5, point 27	Slow vibrato, Gen. I
267	W, r/bl	Generator 1, G 1, plug A, pin 6	Right control panel, SW 5, point 26	Cont. vibrato, Gen. I
268	W, ye	Generator 1, G 1, plug A, pin 7	Right control panel, SW 5, point 25	Delayed vibrato, Gen. I
269	W, bn	Generator 1, G 1, plug B, pin 2	Right control panel, SW 5, point 30	Autoglide On, Gen. I
270	W, pk	Generator I, G 1, plug B, pin 3	Right control panel, SW 5, point 31	Autoglide Up/Down, Gewl
271	W, w	Generator 1, G 1, plug B, pin 4	Right control panel, SW 5, point 32	Hawaii effect, Gen. I
272	W, bn	Generator 1, G 1, plug B, pin 6	Right control panel, SW 5, point G 1	Pitch control, Gen. I
273	W, ye/bk	Generator I, G 1, plug B, pin 7	Twin transp. I, TP 2, plug 1, pin 87	Pitch control, Gen. 1
274	W, w/bn	Twin transp. I, TP 2, plug 1, pin B 7	Left control panel, "Slalom" control, term. S (side I)	Slalom, Gen. I
275	W, w/bl	Twin transp. I, TP 2, plug 1, pin S	Left control panel, "Slalom" control, term. A (side I)	Slalom, Gen. I

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
276a	W,bn	Transposerswitch, TP,pointc	Twin transp.1,plug 2,pin c	
276b	W, bn	Twin transp.I, TP 2, plug 2, pin c	Twin transp.11, plug 2, pin c	
277a	W,ye	Transposerswitch, TP,pointc #	Twin transp.1,plug 2, pin cis	
277b	W, ye	Twin transp.I, TP 2, plug 2, pin cis	Twin transp.II, plug 2, pin cis	
278a	W,gy	Transposes switch, TP, point d	Twin transp.1, plug 2, pin d	
278b	W,gy	Twin transp.I, TP 2, plug 2, pin d	Twin transp.II, plug 2, pin d	
279a	W, w	Transposer switch, TP, point d #	Twin transp.1, plug 2, pin dis	
279b	W, w	Twin transp.I, TP 2, plug 2, pin dis	Twin transp.11, plug 2, pin dis	
280a	W, pk	Transposer switch, TP, point a	Twin transp.I, plug 2, pin a	
280b	W, pk	Twin transp.I, TP 2, plug 2, pin a	Twin transp.II, plug 2,pin a	
281a	l W,r/bl	Transposer switch, TP, point f	Twin transp.I, plug 2, pin f	
281b	VV, r/bl	Twin transp.I, TP 2, plug 2, pin f	Twin transp.II, plug 2, pin f	
282a	W,ye/bl	Transposerswitch, TP,point b	Twin transp.I,plug 2, pin ces	
282b	W, ye/bl	Twin transp.I, TP 2, plug 2, pin ces	Twin transp.II, plug 2, pin ces	
283a	W, w/bk	Transposerswitch, TP,point b b	Twin transp.I,plug 2,pin b	
283b	i W, w/bk	Twin transp.1, TP 2, plug 2, pin b	Twin transp.II, plug 2, pin b	
284a	W,r/ye	Transposerswitch, TP,point a l	Twin transp.I,plug 2,pin a	
284b	W, r/ye	Twin transp. I, TP 2, plug 2, pin a	Twin transp.II, plug 2, pin a	
285a	W, w/bn	Transposes switch, TP, point a b	Twin transp.I, plug 2, pin as	
285b	W w/bn	Twin transp.I, TP 2, plug 2, pin as	Twin transp.II, plug 2, pin as	
286a	W, w/r l	Transposes switch; TP, point g	Twin transp.I, plug 2, ping	
286b	W, w/r	Twin transp.I, T P 2, plug 2, ping	Twin transp.II, plug 2, ping	
287a	W, w/bl	Transposes switch, TP,point g b	Twin transp.I,plug 2, pin ges	
287b	W, w/bl	Twin transp.I, T P 2, plug 2, pin ges	Twin transp.II, plug 2, pin ges	
288	W,gn/bk	Right control panel,SW 5, point FS	Board CO 4,point34	Hawaii foot switch
289	W,bk	Right controlpanel,SW 6,point A	Panel AP 1G, master pitch,term. A	
290	W,ye	Right controlpanel,SW " point S	Panel AP 1 G, master pitch, term. S	
291	W, b!	Right control panel,SW6,point E	Panel AP 1 G, master pitch, term. E	
292	S, bn	Piano, P!1, plug 3, cond to pin nutp ,shield to pin G N D	Piano volume control, cond.to term. E, shield to jumper	Piano audio to volume

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
293a	S, bn	Piano volume control, cond..to tern. S,shield to term. A	Right preamp, VV 2, plug 5, cond.to pin E 11, shield cut off	Piano audio to both preamps
293b	S, bn	Piano volume control, cond..to tern. S,shield to term. A	Wersivoice II, WV 7, cond.to pin 4,shield cut off	Piano audio to Wersivoice II
295	W, gy	Channel selectors S4K, point 19	Right pream p, VV 2, plug 4, pin S11	Piano to right prey m p
296	W, pk	Channel selectors S4K, point 20	Left preamp, V V 2, plug 4, pin S 11	Piano to left preamp
297	W, gy	Switch "Piano to Wersiv" US1 point a	Wersivoice II, W V 7, pin 4 c	Piano to Wersivoice II
298	W, ye	Piano, PI1, plug 2 pin Ki	Switch "Kinura", US t,pointa	
299	W, w/bl	Piano, PI1, plug 2 pin Hs	Switch " Harpsich.';JJSI,point a	
300	W, pk	Piano, PI1, plug 2 pin Ho	Switch "Honky Tank",US1,pointa	
301	W, r/bl	Piano, PI1, plug 2 pin Ce	I Switch "Celesta", US 1 , point a	
302	W, ye/bn	Piano, PI1, plug 2 pin Pi	Switch "Piano"; US 1 point a	
303	W, ye/bk	Piano, PI1, plug 2 pin Ba	Switch "Banjo"; US 1, point a	
304	W, ye/r	Piano, PI1, plug 2 pin B	Piano, PI13,term. B	Banjo control line
305	W, w/bn	Piano, PI1, plug 2 pin Ec	Switch "Echo"; US 1,pointa	
306	W, w/r	Piano, PI1, plug 2 pin Tr	Switch "Tremolo"; US 1, point a	
307	W, w/bl	Piano, PI1, plug 2 pin S/L	Switch " Long Sustain'; US 1, point a	
308	W, w/bk	Piano, PI1, plug 2 pin A	Piano, P113,term. A	Long sustain control
309a	W, gn/r	Piano, PI1, plug 2 pin Pe	Board C01 point 33	Sustain toot switch
309b	W, gn/r	Board CO4, point 33	Arpeggio, AG 1, plug 1, pin 10	Foot trigger for arpeggio
310	W, ye	Piano PI1 plug 2, pin "Speed"	Master control "Trem.speed";term. S	
311	W, ye	Piano PI1 plug 2, pin "Speed"	Master control "Trem.speed";term. A	
312	S, bk	Piano PI 13 (1st octave), cond. To pin OUT, shield to jumper	Piano, P11, plug 1, cnnd.to pin Input t, shield cut off	
313	S, bl	Piano PI 12 (2nd octave), cond. To pin OUT, shield to jumper	Piano. PI 1, plug 1. cond.to pin Input 2, shield cut off	
314	S, w	Piano PI 13 (3rd octave), cond. To pin OUT, shield to jumper	Piano, P!1, plug 1, cond.to pin Input 3,shield cut off	

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
315	S, r	Piano PI 13 (4th octave), cond. To pin OUT, shield to jumper	!Piano,PI1,plug 1, f cond.to pin Input 4, shield cut off	
316	S, gy	Piano PI 13 (5th octave), cond. To pin OUT, shield to jumper	Piano. P11, plug 1, V crnd.tn pin Input 5,shield rut off I	
317a	W, ye	Right control panel, SW6, point 15	Right preamp, VV2, plug 5 pin R1	reverb 1
317b	W, ye	Right preamp, VV2, plug 5 pin R1	Left preamp, VV2, plug 5 pin R1	Extension of 317a
318a	W, pk	Right control panel, SW6, point 16	Right preamp, VV2, plug 5 pin R2	Reverb II
318b	W, pk	Right preamp, VV2, plug 5, pin R2	Left preamp, VV2, plug 5 pin R2	Extension of 318a
319	S,gn	Left preamp, VV 2, plug 5, cond.to pin A2, shield to pin G	Board CO 4, cond.to point 24,shield to point 23	Left audio to left power amp
320	S, bn	Right pream p, VV 2, plug 5, cond.to pin A2, shield to pin G	Board CO 4, cond.to point 26, shield to point 25	Right audio to right power amp
321	S, r	Left preamp, V V 1, plug 1, cond.to pin LD R,shield to pin G	Board CO 4, cond.to point 28,shield to point 27	Left LDR of swell pedal
322	S, bn	Left preamp, VV 1, plug 1, cond.to pin E 13, shield to pin G	Panel AP 1 G, twin control, cond.to term. SI, shield to term. AI	Left playback volume
323	S,bn	Panel AP 1G,twin control, cond.to term. EI, shield to term. AI	Panel AP 1G, DIN connector, cond.to term. 3, shield cut off	Left tape playback
324	S,ye	Left pream p, V V 1, plug 1, cond.to pin AI 3,shield to pin G	Panel AP 1G, DIN connector, cond.to term. 1, shield cut off	Left tape record
325	W,bk	Left prea m p, V V 1, plug 1,pin G	Panel AP 1G, DIN connector, term.2	(Terminal 2 to be connected to ground lug of connector)
326	S, bl	Right pream p, VV 1, plug 1, cond.to pin LD R,shield to pin G	Board CO 4, cond.to point 30, shield to point 29	Right L D R of swell pedal
327	S, w	Right prearnp, VV 1, plug 1, cond.to pin E 13,shield to pin G	Panel AP 1 G, twin control, cond.to term. Sr, shield to term. At	Right playback volume !
328	S, w	Panel AP 1 G, twin control, cond.to term. Er,shield to term. At	Panel AP 1 G, DIN connector, cond.to term. 5,shield cut off	Right tape playback
329	S,gy	Right pream p, V V 1, plug 1, cond.to pin A 13, shield to pin G	Panel AP 1 G, DIN connector, cond.to term. 4, shield cut off	Right tape record
330	S, r	Right preamp, VV 1, plug 1, cond.to pin F 1, shield to pin G	" Ext. Reverb" switch, cond.to term. 2,shieldjoined with 331	Reverb input to selector switch

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
331	S, r	" Ext. Reverb" switch, cond.to term. 3,shieldjoined with 330	Reverb springs, phono plug In, cond.to inner pin, shield cut off	Reverbinputto built-in reverb springs
332	S, gy	Ext. Reverb" switch, cond.to term. 1,shieldjoined with 331	Board CO 4, cond.to point 14, shield to point 13	Reverb input to external reverb unit
333	W, bk	Right pream p, V V 1, plug 1, pin G	Ground lug of reverb springs	
334	S,gn	Right pream p, V V 1, plug 1, cond.to pin F2, shield to pin G	"Ext. Reverb" switch, cond.to point 6,shieldjoined with 335	Reverb output to preamps
335	S,gn	" Ext. Reverb" switch, con d. to term. 5,shieldjoined with 334	Reverb springs, phono plug Out, cond. to inner pin, shield cut off	Reverb output to selector switch I
336	S, w	"Ext.Reverb"switch,cond.toterm.4 (220 kOh ms),shield joined with 33 5	Board C04, cond.to term. 12,shield to term. 11	Reverb output from external reverb unit I
337	W, ye	U/M envelope, HK 13, term. Att. soft	Right controlpanel, SW 6, point 9	U/M Soft Attack I
338	VV, bn	U/M envelope, HK 13, term. Sust. short	Right controlpanel, SW 6, point 10	U/M Short Sustain
339	W, gy	U/M envelope, HK 13. term. Sust. med.	Right controlpanel, SW 6, point 11	U/M Medium Sustain
340	W, w l	(JIM envelope, HK13, term. Sust. long	Right controlpanel, SW 6, point 12	U/M Long Sustain
341	W, pk	M/M envelope, HK 13, term. Att. soft	Right controlpanel, SW 6, point 17	M/M Soft Attack
342	W, r/bl	' M /M envelopn, H K13, term. Stist. short	Right control panel, SW 6, point18	M/M Short Sustain
343	W, ye/bn	M/M envelope, H K 13, ternt. Sust. med.	Right control panel, SW 6, point 19	M/M Medium Sustain
344	W, ye/r	M/klenvelopo, H K 13; term. Sust. long	Right control panel, SW 6, point 20	M/M Long Sustain
345	W, ye	Couplers K 1, pin S 2	Right controlpanel, SW 6, point 2	Manual coupler
346	W, w/bn	L/ M envelope, H K 13, term. Att. soft	Right control panel, SW 6, point 25	L/M Se ft Attack
347	W, wir	L/M envelope, HK 13, term. Sust. short	Right controlpanel, SW 6, point 26	L/M Short Sustain !
348	W, w/bl l	L/M envelope, HK med.	Right control panel, SW 6, point 27	L/M Medium Sustain
349	W, w/bk	L/M envelope, HK 13, term. Sust. long	Right controlpanel, SW 6, point28	L/M Long Sustain

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
350	S, r	Pedal electronics, P E 36, plug 6, cond.to pin 17,shield to pin 16	Right pream p, V V 2, plug 3, cond.to pin E 7,shield cut off	Pedal audio to both preamps
351	S, r	Pedal electronics, P E 36, plug 6, cond.to pin 17,shield to pin 16	Wersivoice I, W V 7, cond.to pin 6, shield cut off	Pedal audio to Wersivoice I
352a	W, w/bk	Right control panel,SW 6, point 40 v	Right preamp, V V 2, plug 4, pin S7	Pedals to right preamp
352b	W, w/bk	Right pream p, V V 2, plug 4, pin S 7	'Left preamp, V V 2, plug 4, pin S 7	Pedals to left preamp
353	W,bn	Right control panel, SW 6, point 40 w	Wersivoice I, W V 7, pin 6 c	Pedals to Wersivoice I
354	W,bn	Pedal electr.,P E 36, plug 5, pin 7	Right control panel, SW6,point37	Tuba
355	W,ye	Pedal electr.,PE 36, plug 5, pin 6	Right control panel,SW 6,point39	Contrabass
356	W,gy	Pedal electr., P E 36, plug 5, pin 5	Right control panel, SW 6, point 36	Bass guitar
357	W, w	Pedal electr.,P E 36, plug 5, pin 4	Right control panel,SW 6, point 38	Trumpet
358	W,pk	Pedal electr.,P E 36, plug 5, pin 3	Right control panel,SW 6,point34	Long Sustain
359	W,r/bl	Pedal electr., P E 36, plug 5, pin 2	Right control panel, SW 6, point 33	Short Sustain
360	W,ye/bn	Pedal electr.,P E 36, plug 5, pin 1	Right control panel,SW 6, point 35	Pedal Drawbars
361	W, bn	Sweilindicator, LA 1, plug 1, pin L D R	Board CO 4, point 32	Swell indicator control voltage
362	W,ye	Key pop, H P1,plug1,pin C	Right control panel,SW 6,point8	Key Pop on
363	So bk	Key pop, HP 1,plug 1, con d.to pin 02, shield to pin G N D	L/M drawbars, Z R 4, co nd.to R 1,shield cut off	Audio source for L/M key pop
364a	W,ye/bn	LIM envelope, H K 13, term. "Perc."	Key pop, HP 1,plug 1, pin T 2	"Key Down" to L/M key pop
364b	W,ye/bn	L/M envelope, H K 13, term. " Perc,,"	Arpeggio, AG 1, plug 2, pin 14	"Key Down" to arpeggio
365	So bn	Key pop, HP 1,plug1, con d.to pin 0 1,shield to pin G N D	M/M drawbars,Z R 4, con d.to R 1,shield cut off	Audio source for M/M key pop
366	S,gn	Left prea mp, V V 1, co n d.to pin A3, shield cut off	Left studio amp, SV 7, co n d.to pin Input, shield to pin G N D	Left audio to studio amp
367	So ye	Left studio amp, SV 7, co nd.to pin 0 ut 1,shield to pin 0	Board CO 4, con d.to point 18,shield to point 17	Left audio to output connector (Cannon)

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
368	S, bl	Left studio amp, SV 7, cond.to pin 0 ut 2,shield to pin 0	Board CO 4, cond.to point 16,shield to point 15	Left audio to output connector (Cannon)
369	So bn	Right preamp, V V 1, co nd.to pin A3, shield cut off	Right studio amp, SV 7, co n d.to pin Input, shield to pin G N D	Right audio to studio amp
370	So b k	Right studio amp, SV 7, co nd.to pin 0 ut 1,shield to pin 0	Board CO 4, co n d.to point 22,shield to point 21	Right audio to output connector (Cannon)
371	S,r	Right studio amp, SV 7, co n d.to pin Out 2,shield to pin 0	Board CO 4, co n d.to point 20, shield to point 19	Right audio to output connector (Cannon)
372	W,gy	Right control panel, SW 6, point 41a	Board CO 4,point 2	Control line for A C switch
373	W, w	Right control panel,SW 6, point 41b	Board CO 4,point1	Control line for Ar zi/votrh
374	W, w	Left preamp, VV 1,pin R A	Right preamp, V V 1, pin R A	Reverb channel combinina
375	W,bn	Left preamp, VV 1,pin R E	Right preamp, VV 1, pin R E	Reverb channel combining
376	W,bn	U/M /fixed stops, GP 1,pin Pg 1	U/M Ifixed stops, G P1, pin Pg 1	Horn 16'
377	W,bn	U/M /fixed stops, GP1,pin Pg 2	U/M Ifixed stops, G P1,pin Pg 2	Saxophone 16'
378	W,bn	U/M Ifixedstops,GP 1,pin Pg3	U/M Ifixedstops,G P1,pin Pg 3	Accordion 16'
379	W,bn	U/M /fixed stops, GP 1,pin Pg 4 `l	U/M Ifixedstops,G P1,pin Pg 4	Trombone 16' i
380	W, bn	U/M I Axed stops, G P 1, pin Pg 5	U/M Ifixed stops, G P 1, pin Pg 5	Cello 16'
381	W, bn	U/M IfAed stops, G P 1, pin Pg 6	U/M Ifixed stops, G P 1, pin Pg 6	Clarinet 8'
382	W, bn	U/M I fixed stops, G P 1, pin Pg 7	U/M Ifixed stops, G P 1, pin Pg 7	Horn 8'
383	On bn	U/M I fixed stops, GP 1,pin Pg 8	U/M Ifixed stops, G P1, pin Pg 8	Schalmei 8'
384	W, bn	U/M I fixed stops, G P 1, pin Pg 9	U/M Ifixed stops, G P 1, pin Pg 9	Trumpet 8'
385	W, bn	U/M I fixed stops, G P 1, pin Pg 10	U/M Ifixed stops, G P 1, pin Pg 10	Viola 8'
386	W, bn	U/M I fixed stops, G P 1, pin Pg 11	U/M Ifixed stops, G P 1, pin Pg 11	Flute 4'
387	W, bn	U/M 1 fixed stops, G P 1, pin Pg 12	U/M Ifixed stops, G P 1, pin Pg 12	Violin 4'
388	W, bn	U/M I fixed stops, GP 1,pin Pg 13	U/M Ifixed stops, G P 1, pin Pg 13	Principal 2'
389	W,bn	U/M I fixed stops, GP 1,pin Pg 14	U /M Ifixed stops, GP 1,pin Pg 14	Cymbal 11
390	W, bn	U/M I fixed stops, G P 1, pin Pg 15	U/M Ifixed stops, G P 1, pin Pg 15	Mixture V

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
391	On ye/bn	Right control panel, SW6, point PK	Left control panel, SW 3, point 7	Manual coupler override
392	W, bn	Right control panel, SW 6, point 29	Arpeggio, AG 1, plug 2, pin 1	Arpeggio Inversion
393	W, ye	Right control panel, SW 6, point 30	Arpeggio, AG 1, plug 2, pin 17	Arpeggio Chords
394	On gy	Right control panel, SW 6, point 31	Arpeggio, AG 1, plug 2, pin 16	Memory off
395	W, w	Right control panel, SW 6, point 32	Arpeggio, AG 1, plug 2, pin 18	U/M Piano off
396	W, pk	Right control panel, SW 6, point 21	Arpeggio, AG 1, plug 1, pin 6	Arpeggio
397	On r/bl	Right control panel, SW 6, point 22	Arpeggio, AG 1, plug 1, pin 5	Arpeggio
398	W, ye/bn	Right control panel, SW 6, point 23	Arpeggio, AG 1, plug 1, pin 8	Arpeggio
399	W, w/r	Right control panel, SW 6, point 24	Arpeggio, AG 1, plug 1, pin 7	Arpeggio
400	W, w/bn	Right control panel, SW 6, point 13	Arpeggio, AG 1, plug 2, pin 13	Auto Trigger
401	W, ye/r	Right control panel, SW 6, point 14	Arpeggio, AG 1, plug 2, pin 14	Foot Trigger Off
402	W, ye/bk	Right control panel, "Arpeggio Speed", term. e	Arpeggio, AG 1, plug 1, pin 15	Arpeggio Speed
403	W, ye/bk	Right control panel, "Arpeggio Speed", terms	Arpeggio, AG 1, plug 1, pin 9	Arpeggio Speed
404	W, gy	Arpeggio control, term S	Arpeggio, AG 1, plug 1, pin 2	Slide control
405	W, w/bl	Arpeggio control, term. A	Arpeggio, AG 1, plug 1, pin 3	Slide control
406	W, w/bk	Arpeggio control, term. F	Arpeggio, AG 1, plug 1, pin 4	Slide control
407	W, ye/r	Aux. power supply, PS 5, plug 3, pin 1	L/M sound comp., SCI plug 2, pin 22	- 33 V D C
408	W, ye/r	Aux. power supply, PS 5, plug 3, pin 2	M/M sound comp., SC 5, plug 2, pin 22	- 33 V D C
409	W, ye/r	AUX, Dowersupply, PS5, plug3, pin 3	U/M sound comp., SC 5, plug2, pin 22	-33 V DC
410	W, gy j	"Read-in" key switch	Left control panel, SW 3, point 8	"Read-in" Inhibit
411	On gy l	"Read-in" key switch	L/M sound comp., SC 3, plug 1, pin 11	"Read-in" Inhibit
412	W, gy	"Read-in" key switch	M/M sound comp., SC 5, plug 1, pin 11	"Read-in" Inhibit
413	W, gy	"Read-in" key switch	U/M sound comp., SC 5, plug 1, pin 11	"Read-in" Inhibit
414	W, w	Left control panel, SW 3, point 1	L/M sound comp., SC 3, plug 1, pin 12	L/M Clock Trigger
415	AW, ye	Left control panel, SW 3, point 2	M/M sound comp., SC 5, plug 1, pin 12	M/M Clock Trigger
416	W, bn	Left control panel, SW 3, point 3	L/M sound comp., SC 5, plug 1, pin 12	U/M Clock Trigger

Wire No.	Type/Color	Starts at: (Subunit, PC board, terminal)	Ends at: (Subunit, PC board, terminal)	Use, Remarks
417	W, w/r	Left control panel, SW 3, point 23 l	L/M sound comp., SC 3, plug 1, pin 9 l	L/M Cancel
418	W, ye/bl	Left control panel, SW 3, point 18	M/M sound comp., SC 5, plug 1, pin 9	M/M Cancel
419	W w/bn	Left control panel, SW 3, point 12	U/M sound comp., SC 5, plug 1, pin -9 1	U/M Cancel
420	W, w/bn	Left control panel, SW 3, point 28	L/M sound comp., SC 3, plug 2, pin 15	L/M Address A 3
421	W, w/bn	Left control panel, SW 3, point 25	L/M sound comp., SC 3, plug 2, pin 16	L/M Address A 2
422	W, w/bn	Left control panel, SW 3, point 26	L/M sound comp., SC 3, plug 2, pin 17	L/M Address A 1
423	W, w/bn	Left control panel, SVV3, point 27	L/M sound comp., SC 3, plug 2, pin 18	L/M Address A 0
424	W, ye/bk	Left control panel, SW 3, point 9	M/M sound comp., SC 5, plug 2, pin 14	M/M Address A 4
425	W, ye/bk	Left control panel, SW 3, point 22	M/M sound comp., SC 5, plug 2, pin 15	M/M Address A 3
426	W, ye/bk	Left control panel, SW 3, point 19	M/M sound comp., SC 5, plug 2, pin 16	M/M Address A 2
427	W, ye/bk	Left control panel, SW 3, point 20	M/M sound comp., SC 5, plug 2, pin 17	M/M Address A 1
428	W, ye/bk	Left control panel, SW 3, point 21	M/M sound comp., SC 5, plug 2, pin 18	M/M Address A 0
429	W, w/bk	Left control panel, SW 3, point 10	U/M sound comp., SC 5, plug Z, pin 14	U/M Address A 4
430	W, w/bk	Left control panel, SW 3, point 16	U/M sound comp., SC 5, plug 2, pin 15	U/M Address A 3
431	W, w/bk	Left control panel, SW 3, point 13	U/M sound comp., SC 5, plug 2, pin 16	U/M Address A 2
432	W, w/bk	Left control panel, SW 3, point 14	U/M sound comp., SC 5, plug 2, pin 17	U/M Address A 1
433	W, w/bk	Left control panel, SW 3, point 15	U/M sound comp., SC 5, plug 2, pin 18	U/M Address A 0
434	W, w	Program doubling switch	L/M sound comp., SC.3, plug 2, pin 13	
435	W, w	Program doubling switch	M/M sound comp., SC5, plug 2, pin 13	
436	W, w	Program doubling switch	U/M sound comp., SC5, plug 2, pin 13	
437	W, w	Program doubling switch	Left control panel, SW 3, point 6	

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