CS-50 & CS-60
POLYPHONIC
SYNTHESIZERS

INSTRUCTION MANUAL

⊛ YAMAHA

Synthesizer controls referenced in the manual often
are followed by a number in brackets, like this: the
VOLUME control [2]. The numbers refer to the call-
outs on the synthesizer front panel illustrations: the
CS-50 on the inside front cover, the CS-60 on the in-
side rear cover. Consult the INDEX on page 1 to find
other pages where the same control is discussed.

Those who are already experienced with synthesizers
may wish to review the control functions as outlined in
Section IV. A more detailed and somewhat less techni-
cal explanation of these same controls is provided in
Sections II and III.

When portions of the control panels are shown in
examples, all controls not shown in the example should
be set at the nominal positions indicated by the inside
cover photo (unless otherwise suggested by the
accompanying text).

Try the example settings shown, and experiment
as you read the text. Feel free to use your own music,
and adjust your playing style to suit the nature of the
patch you have selected.

CS-50
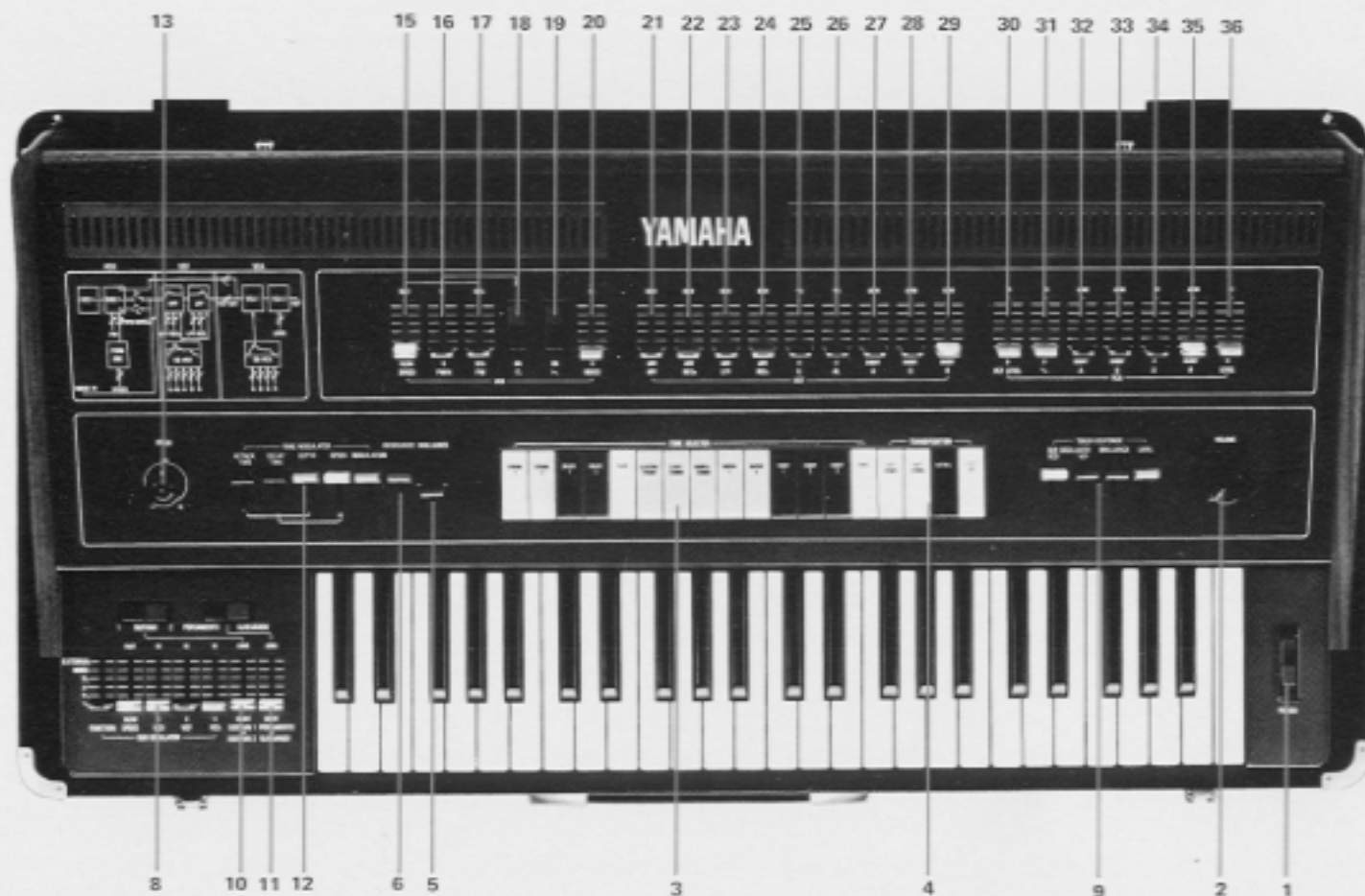
[1] AC POWER switch	[11] PORTAMENTO/GLISSANDO	[21] HPF filter cutoff
[2] Main VOLUME	[12] RING MODULATOR	[22] RES_H "Q"
[3] TONE SELECTORS	[13] PITCH (tuning)	[23] LPF filter cutoff
[4] TRANSPOSITION SELECTORS	[15] Pulse Width Modulation SPEED	[24] RES_L "Q"
[5] Overall BRILLIANCE	[16] PWM depth	[25] IL (Initial Level)
[6] Overall RESONANCE	[17] PW duty cycle	[26] AL (Attack Level)
[8] SUB OSCILLATOR	[18] Square wave ON/OFF	[27] A (Attack Time)
[9] TOUCH RESPONSE	[19] Sawtooth wave ON/OFF	[28] D (Decay Time)
[10] SUSTAIN	[20] White NOISE	[29] R (Release Time)

[30] VCF LEVEL
[31] Sine Wave
[32] A (Attack Time)
[33] D (Decay Time)
[34] S (Sustain Level)
[35] R (Release Time)
[36] VCA LEVEL

Controls shown at nominal settings. See Back Cover for CS-60.
Features [7] and [14] appear only on the CS-60.

QUICK SETUP INSTRUCTIONS

1. Physically assemble the legs (see instructions on page 2) or set the synthesizer atop a sturdy surface, allowing space for air to circulate through the top and bottom cooling vent panels.

2. Plug in the FOOT SWITCH (CS-60 only) and FOOT PEDAL (CONTROLLER) at the rear panel; **be sure to insert the plugs in the proper jacks.**

3. Using a guitar cord, connect the Rear-Panel Output Jack to a professional, wide-range speaker/amplifier unit, or to a guitar amp. (Hi-Fi music systems are **not** recommended for this application.)

   Alternately, connect a pair of stereo headphones to the PHONE JACK below the right side of the keyboard.

4. Open the storage panel below the synthesizer, remove the power cord, and plug it in to a suitable AC power outlet.

5. Set the rear-panel HIGH/LOW switch to LOW, turn ON the synthesizer power, and set all controls at nominal. If the volume is too low, even with the VOLUME control all the way up and the FOOT PEDAL flat (maximum level), then switch HIGH/ LOW to HIGH.

6. Try various preset patches by pressing down different TONE SELECTOR buttons [3]. Adjust BRILLIANCE [5] as you do this. See pages 26 and 31 for additional patches.

IMPORTANT INFORMATION

1. Always allow space below and above the synthesizer for air to circulate through the vent panels. This is essential for proper cooling of the circuitry. **If the vents are blocked, tuning instability and component failure may occur.**

2. Always plug the FOOT SWITCH (CS-60 only) and the FOOT PEDAL (CONTROLLER) into the proper jacks. THE SYNTHESIZER WILL NOT WORK AND MAY REQUIRE REPAIR.

3. Avoid exposing the synthesizer to direct sunlight or very high humidity environments.

4. Clean the keys and plastic parts with Yamaha Key Cleaner creme polish, or with a moistened soft cloth. Never use abrasives, cleansers, waxes or solvents, which may dull the keys or chemically attack the finish.

5. Leave internal adjustments to qualified Yamaha service personnel. **If you open up the unit and reset any trimmers, the unit may require a complete re-voicing by Yamaha.**

6. The **EXT IN** jack is designed for audio, line-level signals. Never connect it to an AC power line, or to a speaker-level output. Also, **do not connect the synthesizer output to the EXT IN** jack, as this may cause feedback and possible damage to your equipment.

7. While the synthesizer is constructed with an integral case of sturdy plywood and metal-reinforced corners, we recommend the use of an additional travel case for cartage, preferably built to ATA-300 specifications. (See page 50.)

INTRODUCTION

The CS-50 and CS-60 are easy to play. While they are high-technology musical instruments, you don't have to know about electronics to understand how to use them. We do recommend, however, that you read this manual thoroughly, and periodically refer back to it as you learn your instrument. If you're in a hurry, check the Quick Setup instructions on this page.

The Yamaha CS-50 and CS-60 are unique poly-phonic synthesizers which place the entire realm of musical expression at your fingertips. The CS-50 enables you to play 4 notes simultaneously; the CS-60, 8 notes simultaneously. These synthesizers are true musical instruments, not merely "special effects" tools. The sounds are infinitely variable. and, because the keyboard is touch sensitive, you have increased dynamic control over your music.

The CS-50 and 60 will give you an incredible variety of electronic sounds, but they go further than that. Having a CS-50 or CS-60 is like having a symphony orchestra to choose from. Largely due to touch sensitivity (keyboard dynamics), Yamaha has overcome a traditional challenge for synthesizers, namely, the difficulty in creating the sound of an acoustic instrument. For example, if you've ever tried to create a "violin" on the keyboard of most synthesizers, you probably found the result too "electronic." While you may have achieved a good basic violin sound, when you played it, there was something missing. . .but what?

Ask a great violinist to play the note "G" 4 consecutive times (not an open string). Request that he make them **absolutely** identical in pitch, timbre, volume and every other possible variable. You'll discover that he **cannot do it**. . .fortunately. Much of the charm of a musical performance is that it is not "textbook perfect," and this is why your well-programmed synthesized violin did not sound "right" to you. However, your CS-60 (or CS-50) is another story.

Touch response makes all the difference. You can set up a "violin" so that the way you press a key changes the vibrato, timbre, pitch, volume, brilliance . . .the whole essence of the sound. With this kind of expressive capability you too may not exactly duplicate 8 consecutive notes. However, the sound you do achieve will be much more realistic and musical than has ever before been practical with an electronic musical instrument.

The CS-50 and CS-60 are among the first of a whole new generation of **performer-oriented** electronic musical instruments, including the simultaneous 2-voice/ 8-note CS-80.

Only Yamaha, the world's leading manufacturer of fine musical instruments and high-quality sound equipment, could have built them.

INDEX TO CONTROLS & CONNECTIONS

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2

1. Unlatch the top cover and open it most of the way so the half-round hinges can be disengaged. Lift off the cover and set it aside.

2. Loosen the two wing-screws which secure the retaining flap for the four legs, hinge the flap open, and withdraw the legs.

   NOTE: Two legs are longer, and two are shorter. THE SHORTER LEGS ARE THE BACK LEGS.

3. Loosen the wing-screw on each of the two flaps which secure the leg braces, and remove the braces. Also, remove the thumbscrew from its mounting bracket in the top cover.

   NOTE: The two leg braces each have a rounded end and a flattened end. One flattened end has a round hole and one has a slot; THE SLOT IDENTIFIES THE RIGHT-HAND BRACE.

4. Tilt the synthesizer over so it rests on its back edge, and screw the four legs into their recessed mounting plates (long legs on the front edge, short legs on the back edge). DO NOT TIGHTEN THE FRONT LEGS AT THIS TIME.

5. Hold the left leg brace so the opening in its rounded end can be slipped over the tip of the left front leg (just above the foot). After positioning the brace around the leg, slide it up about three inches, as illustrated. Then position the other end of the brace so that the hole is aligned with the recessed socket on the bottom, back edge of the synthesizer.

   NOTE: If the leg brace hole cannot be positioned in alignment with the mounting socket, it will be necessary to move the other end of the brace along the leg. Tilt the brace outward to relieve the torque on the leg, slide the brace up or down as appropriate, and again align the mounting holes.

6. When the left brace is aligned above the mounting socket, insert the thumbscrew through the hole in the leg brace, and thread the screw into the socket. DO NOT TIGHTEN THE THUMBSCREW AT THIS TIME.

7. Attach the right leg brace to the tip of the right front leg, and adjust its position along the leg so you can move the flat, slotted end of the brace beneath the thumbscrew and the flat end of the left brace.

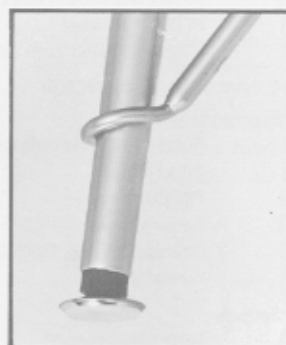8. Tighten the thumbscrew to secure the leg braces, and then tighten the two front legs.
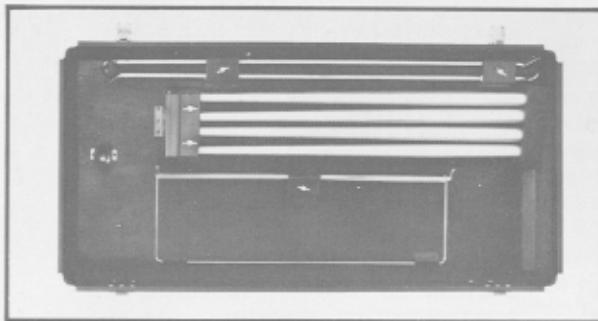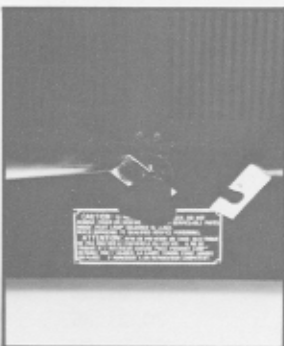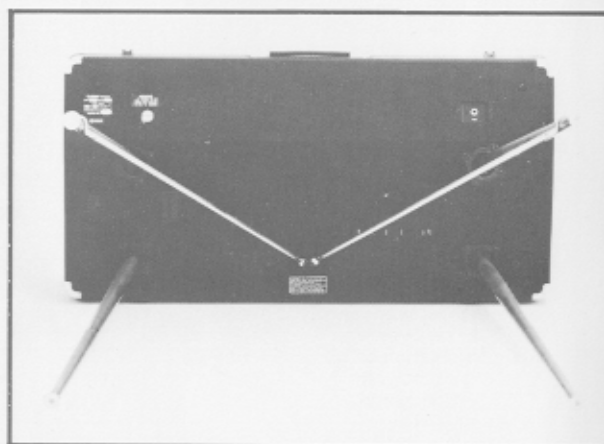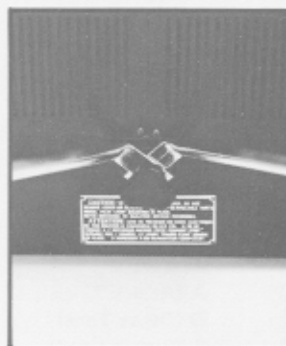

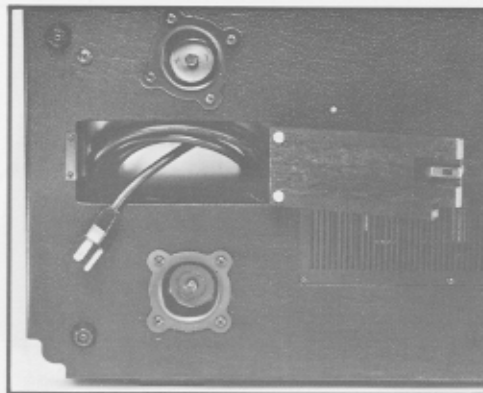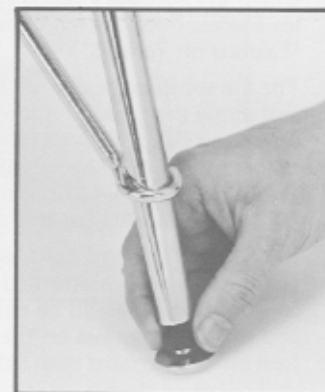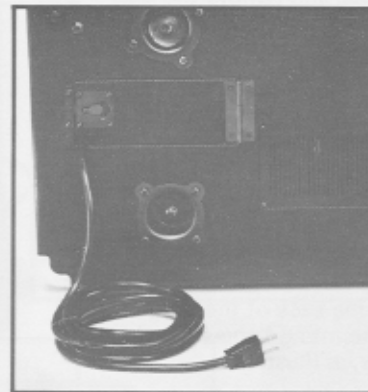
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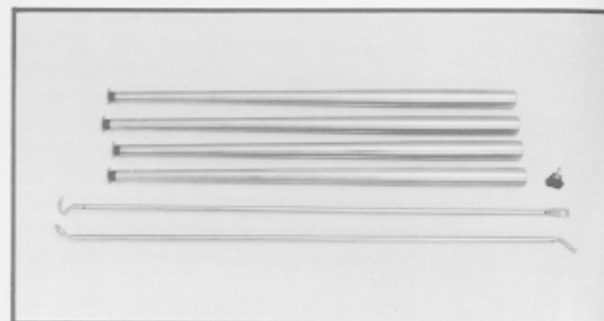
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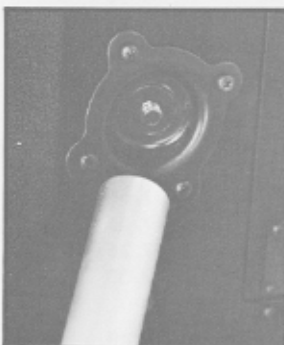
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9. Flip up the latch on the power cord storage compartment (beneath the synthesizer), and remove the power cord. Then close the compartment cover, routing the cord through the notched corner so the cover does not pinch the cord.

10. Lift the unit up and stand it on its legs. The knurled rings above the feet may be adjusted to steady the unit, if necessary.

11. Remove the Foot Controller (Expression Pedal) from its carrying bag and place it below the synthesizer. To keep the cable out of your way, route it behind the right leg brace. Plug the Pedal into the jack labeled "Foot Controller."
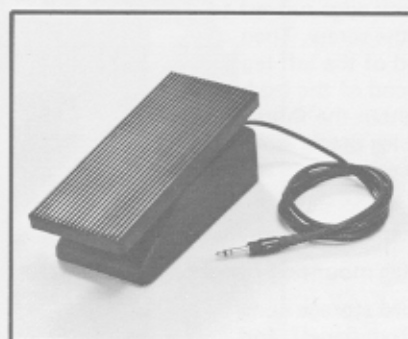
12. To keep the AC cord out of your way, route it behind the left leg brace. (Separating the power cord from audio cables is always a good idea since it avoids hum.)
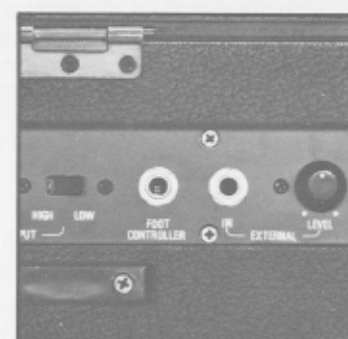
13. If you wish, remove the music stand from the cover and insert it in the two mounting holes along the wood-grained back panel of the synthesizer.

NOTE: When storing the synthesizer legs in the top cover, be sure that the longer legs are placed in the two mounting block holes with the deeper recesses. Also, when storing the leg brace thumbscrew in its bracket, tighten it no more than 1 turn after it touches the case.

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1. Unzip the accessory carrying bag, and remove the legs, leg braces, Foot Switch Pedal, and Foot Controller (Expression Pedal).

2. Tilt the synthesizer over so it rests on its back edge, and screw the trapped thumbscrews on the left leg's mounting flange into the sockets on the CS-60's bottom panel. Do the same with the right leg. Tighten the screws enough to hold the legs in place, but do not tighten securely at this time.

   NOTE: The left and right legs are mirror-images of one another. When attached to the CS-60, the knurled leveling screws should be near the back of the unit, and the thumbscrews on the mounting flanges should face inward, toward each other, as illustrated.

3. Insert the trapped, knurled screw on the one leg brace into the socket on the bottom, back edge nearest to the left leg, and partially tighten the screw. Then loosen the thumbscrew on the end of the left leg tube a few turns, and slide the slotted end of the leg brace over the thumbscrew threads. Tighten the thumbscrews to secure both ends of the leg brace. Follow this same procedure to install the other leg brace onto the right leg.

   NOTE: The two leg braces are interchangeable.

4. Tighten the thumbscrews on the leg mounting flanges.

5. Flip up the latch on the power cord storage compartment (on the synthesizer bottom panel), and remove the power cord. Then close the compartment cover, routing the cord through the notches corner so the cover does not pinch the cord.

6. Lift the unit up and stand it on its legs. The knurled leveling screws at the rear of the legs (where the braces attach) may be adjusted to steady the unit, if necessary.

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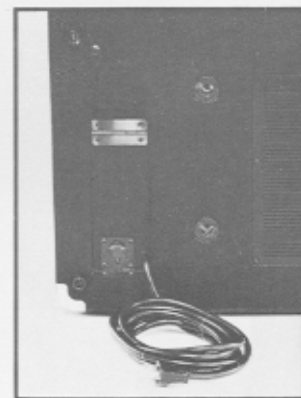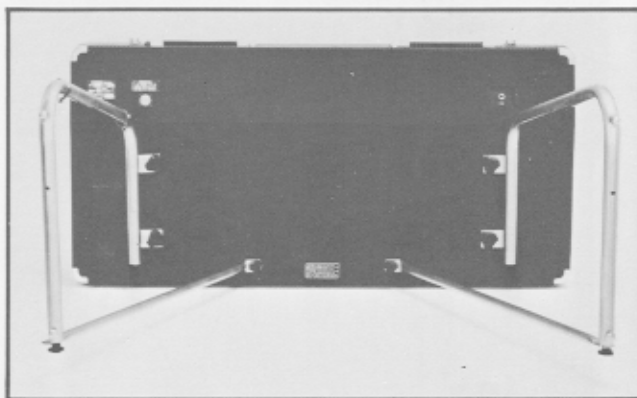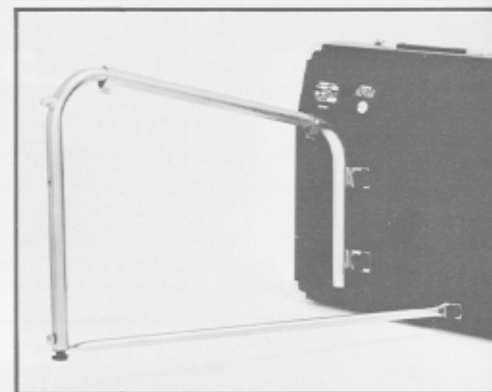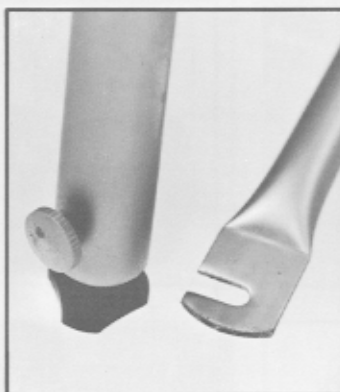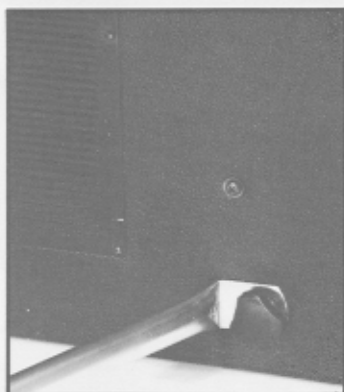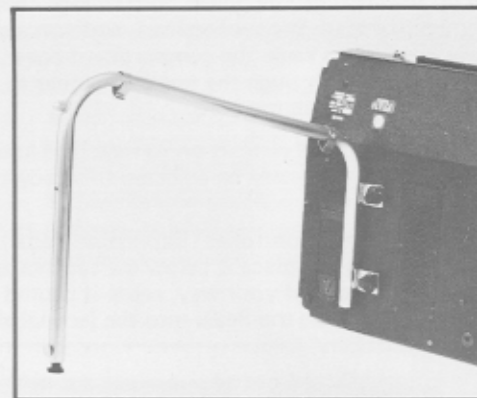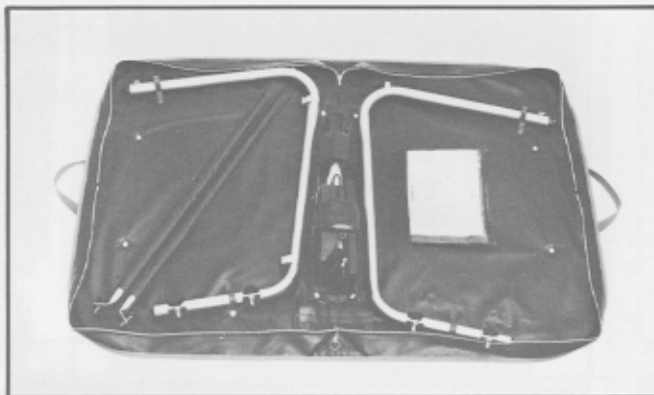7. Place the Foot Switch and Foot Controller (Expression Pedal) below the synthesizer. To keep the cables out of your way, slip them into the clips on the front of the legs. (As stated in "Connections," be sure you plug the two cables into the correct jacks; the Expression Pedal's three-circuit phone plug goes to the FOOT CONTROLLER jack.)

8. To keep the AC cord out of your way, route it behind the leg braces. (Separating the power cord from audio cables is always a good idea since it avoids hum.)

9. Unlatch the cover, open the cover and lift it off as the half-round hinges disengage. If you wish, remove the music stand from the cover and insert it in the two mounting sockets along the wood-grained back panel of the synthesizer.
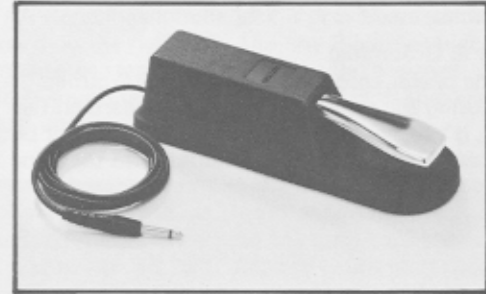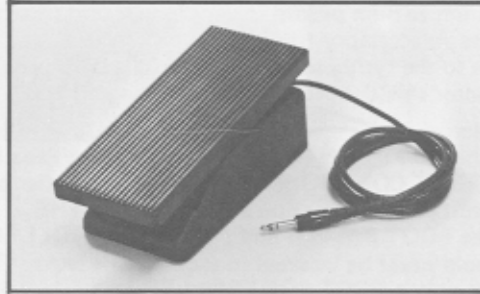
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6 NOTE: See Section VI for information on direct boxes, balanced lines, etc.

AC Power & Grounding

Plug the power cord into 50 or 60Hz AC outlet.*

When using the synthesizer with a standard guitar amplifier, it's a good idea to plug the AC cables of both the synthesizer and the guitar amplifier into the same AC outlet box or the same AC plug strip. If you use a plug strip, use the grounded type. **Do not defeat the ground connection (third pin on the AC plug) on either the synthesizer or the guitar amplifier.** By connecting the AC cables of both units to the same AC outlet and then connecting the synthesizer output to the guitar amp's input with a shielded cable ("output connections"), you insure that the chassis of both devices will be at the same ground potential, avoiding any possible shock hazard. **(Not applicable for the model with the 2P-plug.)**

Output Jack

The output is a low impedance, standard tip/sleeve phone jack. LOW line level is nominal −20dB (77.5 millivolts), and HIGH line level is 0dB (0.775V).

The output is unbalanced and will drive low-impedance (600-ohm) or high impedance inputs, either balanced or unbalanced; this includes mixers, guitar amps, tape recorders, and many other audio devices. If you are not sure about the sensitivity of your equipment, start with the HIGH/LOW switch at LOW to avoid excessive levels. Use any high quality phone-to-phone plug patch cable (guitar cord) to connect the synthesizer to a standard guitar amplifier, a high impedance mixer such as Yamaha's PM-170 or directly to an amplifier/speaker

CS-50

CS-60

*As is the case with any electric or electronic instrument, the AC power receptacle should be checked for correct voltage and polarity. For operation with power mains that do not meet these specifications, contact the Yamaha authorized dealer.

system combination such as the Yamaha A4115H.**

To minimize hum pickup in very long sound system cables, use an accessory transformer or line-level direct box close to the synthesizer and then run a balanced line (2-conductor shielded XLR mic cable) to the mixer.

Foot Jacks

Plug the FOOT CONTROLLER (Expression Pedal) into the FOOT CONTROLLER jack. The controller plug is a 3-circuit phone plug (tip/ring/sleeve). **ON THE CS-60, the FOOT SWITCH and FOOT CONTROLLER plugs should never be inserted in each other's jacks. (The CS-50 has only a FOOT CONTROLLER jack.)**

External Input Jack

The External Input jack is for special Sub Oscillator effects. It allows for modulation of the filter, oscillator or amplifier by line-level sources, such as oscillators, rhythm boxes, sequencers, other electronic instruments, etc. The input is high impedance, so it will not overload the external device. Sensitivity is adjustable with the EXTERNAL LEVEL control, but even at maximum sensitivity the input will not provide a discernable effect with mic-level or guitar pickup level signals.

Accessory Devices

You can use a variety of accessory devices between the synthesizer output and the sound system input: reverbs, echo boxes, phase shifters, and so forth. Remember that the synthesizer has built-in circuitry to produce wah-wah, tremolo, and vibrato effects (see SUB OSCILLATOR [8]).

The Speaker/Amplifier System

The sound of the synthesizer will depend to a large degree on the amplifier and speaker system; the wider the response, the better. We recommend use of the self-powered Yamaha A4115H speaker system, due to its

Yamaha A4115H Speaker/Amplifier

**Set the INPUT LEVEL switch on the PM-170 or the A4115H to the "0dBm" position (for nominal 0dB sensitivity).

wide, flat frequency response. However, the synthesizer may be used with almost any wide-range professional speaker/amplifier system (or tape recorder).

If you use several keyboards, you may also wish to use a keyboard mixer. In any case, it's a good idea to choose these items carefully. We recommend the Yamaha PM-170, a six-input stereo output mixer with
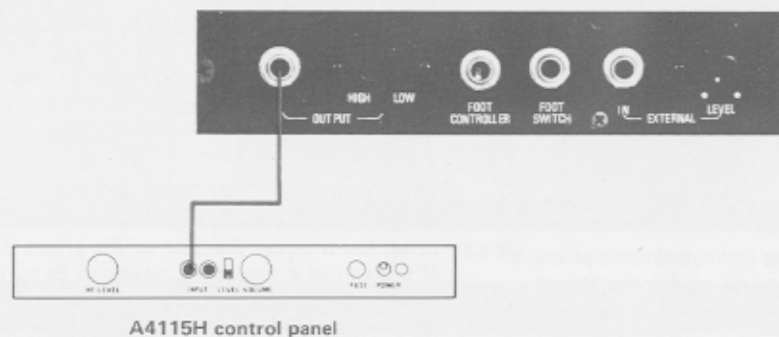

Yamaha PM-170 mixer

VU meters and BASS and TREBLE equalization on every input. This mixer can then feed any amplifier/speaker system. Alternately, use a self-powered mixer such as the Yamaha EM-150. The keyboard outputs, including the synthesizer output, can be fed to the mixer input, and its outputs can be connected directly to a pair of speakers such as Yamaha S4115H's.

Yamaha EM-150 self-powered mixer

A4115H control panel

THE A4115H SELF-POWERED SPEAKER SYSTEM

The Yamaha A4115H is a two-way speaker system with a built-in 100 watt power amp. It produces natural, accurate sound and smooth, wide dispersion. The A4115H can be driven directly from the synthesizer output, or from the output of a PM-170 or similar mixer. In the studio, the sound can be taken direct from the synthesizer, or excellent results can be obtained by placing a microphone near the A4115H. On the stage, the A4115H's high sensitivity and high power output generate high volume levels free of audible distortion.

To use the A4115H, set the synthesizer output HIGH/

LOW switch at HIGH, set the A4115H's INPUT LEVEL switch to the "0dBm" position, and set its INPUT VOLUME as required. The speaker's HF LEVEL control sets the volume level of the high frequency horn in relation to the low frequency woofer.

NOTE: If you wish to feed two or more A4115H's from one synthesizer's output, "chain" the A4115H's together; connect a phone-to-phone cable from the unused input jack of the A4115H being fed by the synthesizer to an input jack on the next A4115H, and so forth.
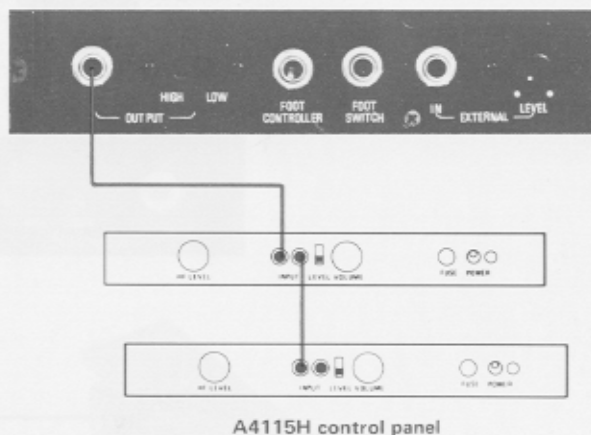
Headphones

A stereo headphone jack is provided under the keyboard on the right side. Use any 8-ohm or higher impedance stereo phones. As a rule, however, synthesizers sound best when monitored with speakers rather than phones.

Getting Sound

When all connections are made, turn ON the synthesizer and set all controls at nominal except its main VOLUME control [2], which you set minimum. Then bring up the sound system volume to a moderate setting and adjust the synthesizer volume while playing a chord. Remember, as with most multiple-oscillator synthesizers, the CS-50 and CS-60 require about from 10 to 30 minutes to warm up for full stability.

A4115H control panel