

CP-70B

electric grand operating manual



introduction

The Yamaha CP-70B Electric Grand incorporates significant advances in electric piano technology. It is a hybrid acoustic/electric piano with very nearly the sound and feel of an acoustic grand; yet it is considerably lighter and more compact. With its excellent tuning stability and small size, the CP-70B solves many of the problems formerly encountered by anyone using a grand piano on tour, in the studio or in a small club. The Electric Grand is a piano only Yamaha could have built.

The Electric Grand is built to travel, but it was conceived to be a lot more than just a portable piano. Consider the club that doesn't have room for a full sized grand piano. The Electric Grand will fit on almost any size stage. In the studio, the Electric Grand eliminates the need for microphones and pickups, avoiding problems with leakage and coloration. What's more, its recorded sound is very "acoustic."

Because of its small size and light weight, CP-70B lets you take your **own** instrument to the concert, rehearsal hall, club or studio. You can forget about troubles with rented instruments or unfamiliar "house" pianos that just don't have the sound or action you like.

If you choose, the Electric Grand can deliver sounds other than that of the traditional acoustic piano. Now you can get those "electric" sounds from a piano that has the expression and response you like. You can easily enjoy plug-in effects, like an echo/reverb unit or any pedal device, enhancing the available sound variations. Yet you can move quickly from electric sounds back to the sound of an acoustic grand piano . . . all without having to change keyboards.

The Electric Grand is a problem solver, but that's not all. **It is an instrument in its own right.** It actually expands upon the applications of the conventional piano. It can stand up to the rigors of a concert tour. It holds its tune under conditions that could easily put a standard piano badly out of tune. Since it interfaces with electronic effects units, the Electric Grand can sound as electric and funky as you want. Still, the Electric Grand embodies a unique blend of acoustic piano strings with sophisticated electronics so that, **when heard through a good sound reinforcement system, the Electric Grand can sound as acoustic as a conventional piano fitted with a microphone or pickup.**

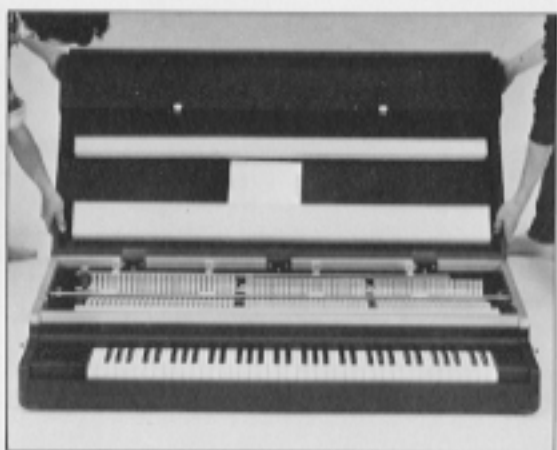
Play the Electric Grand and you'll understand and appreciate that Yamaha made this compact grand piano for a wide variety of applications.

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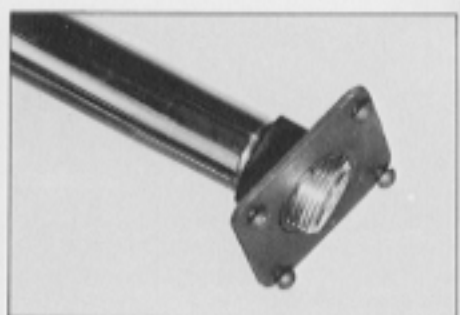
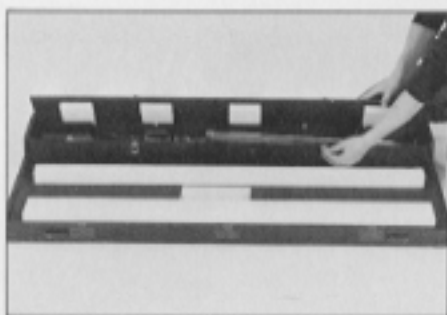
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setup

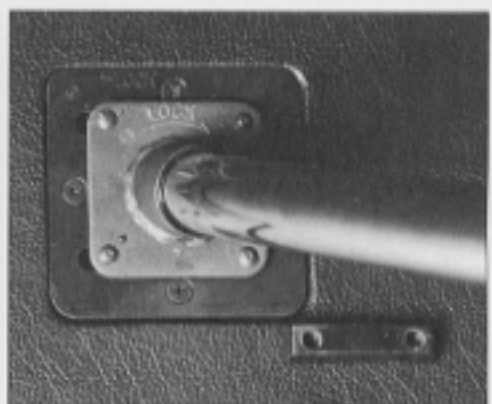
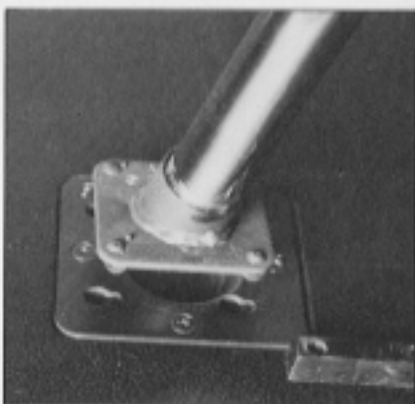
1. Remove the top cover from the keyboard section by unfastening the two latches on the front. Open the cover until the half-round hinges disengage, and lift the cover from the unit.



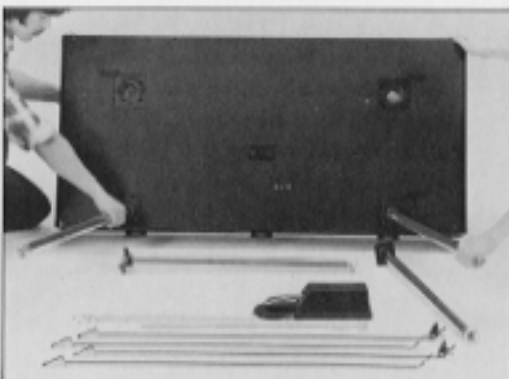
2. After lifting the two latches, open the accessories compartment in the cover you just removed from the keyboard section. Lift out AC adaptor, pedal assembly, four leg braces and the four legs with leg anchors partially screwed onto the ends of the legs.



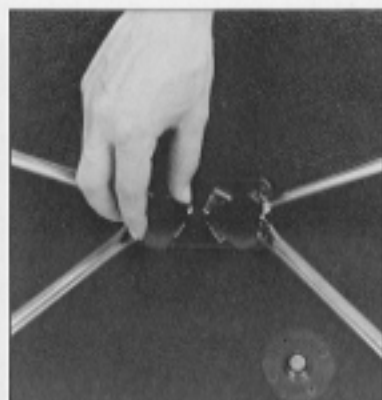
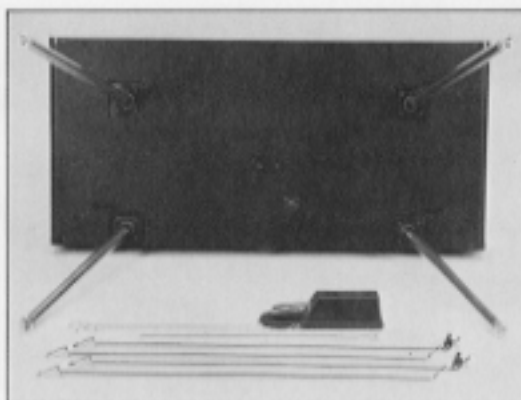
3. One at a time, beginning with the bottom legs, position the four legs over the mounting plates on the underside of the keyboard section. Notice that each leg anchor is angled; orient each anchor so the leg points outward, toward the nearest corner of the instrument. Slide the studs on each leg anchor into the keyed holes in the corresponding mounting plate.



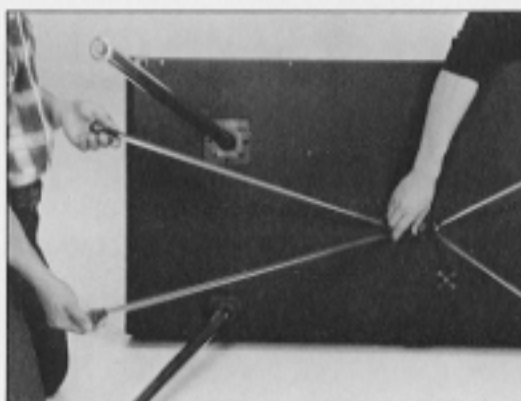
4. Screw each leg fully into the threaded leg anchor. It is necessary to tilt the keyboard section back slightly to allow clearance for the legs, so be sure to support the keyboard. Once the bottom legs are secured, the instrument is better balanced, and the upper legs can be screwed into place.



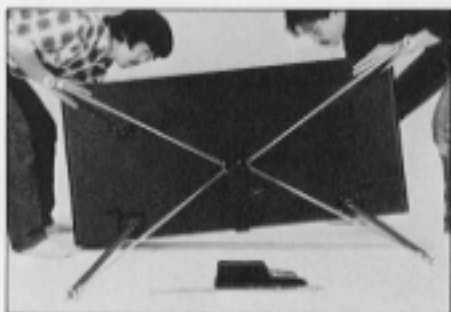
5. Insert one thumbscrew through the eyelet end of two of the four leg braces, and then loosely thread the screw into the underside of the keyboard section. Repeat this procedure with the other thumbscrew and the remaining two leg braces, but do not tighten either thumbscrew fully.



6. Place the hooked end of each leg brace over the "ankles" of the two corresponding legs. The hook should go between the round knurled leg screw and the leg tube, not between the screw and the foot. Tighten the knurled leg screws to hold the hooks against the leg tubes. Then tighten the thumbscrews from Step 5.



7. After checking the legs to be certain they are steady, set the keyboard section upright.



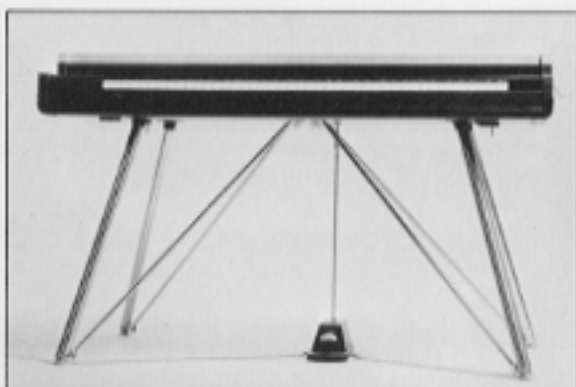
8. Place the sustain/damper pedal in position, to the right of center and at the rear edge of the keyboard section. Place the two pedal retaining chains over the top of the feet on the front legs (between the knurled thumb screw and the foot). The chains must not be twisted or tangled.

9. Reposition the sustain/damper pedal as necessary to take up any slack in the retaining chains.

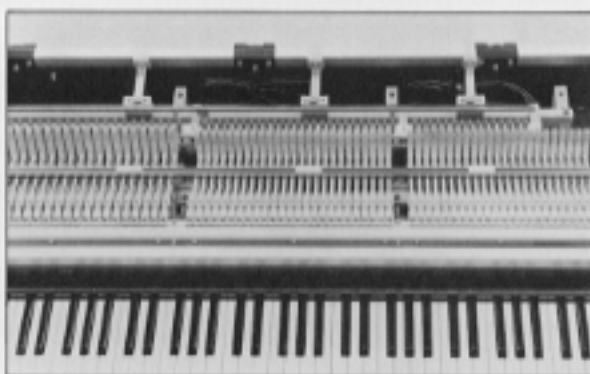
10. Insert the small end of the pedal upright rod into the hole in the top of the sustain/damper pedal.



11. Insert the large, threaded end of the pedal upright rod into the hole provided for it in the bottom of the keyboard section and screw it into place. The rod should be perpendicular to the floor.

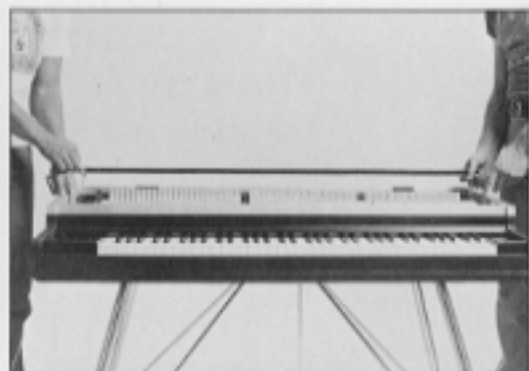
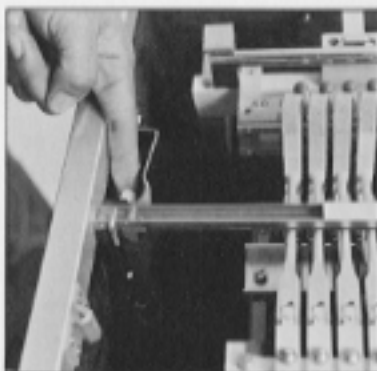


12. Remove the two speaker cables from the retaining straps in the rear of the keyboard section.

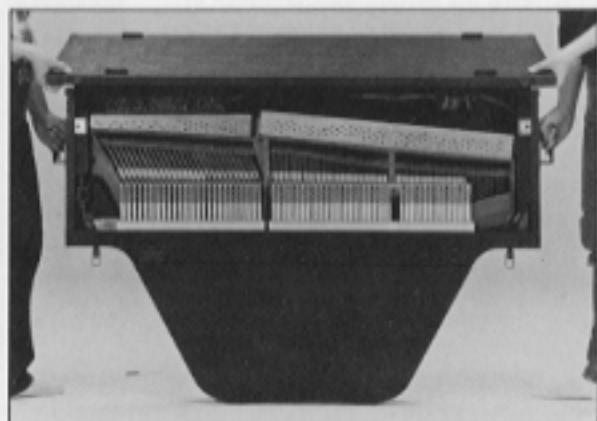


13. Release the hammer hold-down bar by pressing the two spring-loaded retaining brackets, one on each end of the bar and then lifting the hold-down bar. The bar will swing a full 180 degrees toward the rear of the keyboard section.

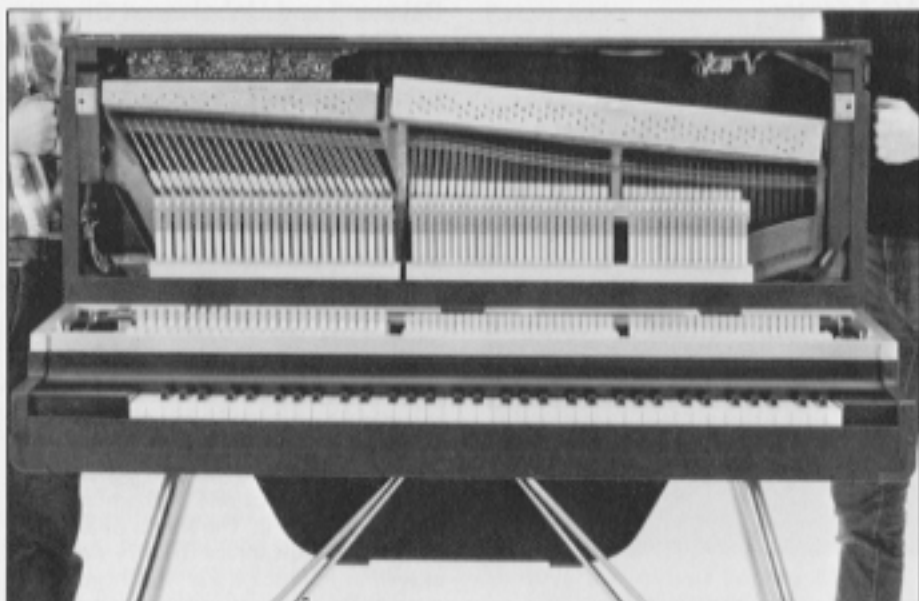
NOTE: The keyboard is now ready to accept the harp section. In the following steps, exercise caution to avoid damaging the exposed internal parts in both sections.



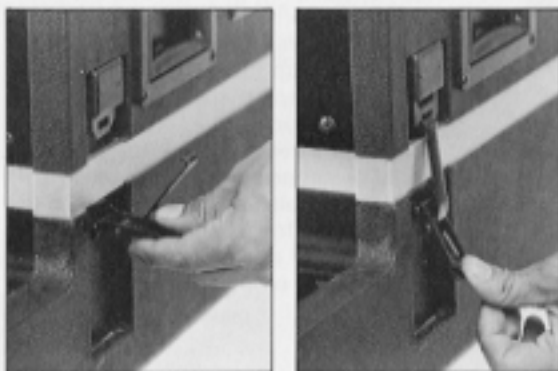
14. Lift the two rear latches on the bottom of the harp section. Then set the harp section on its back and remove the bottom cover by lifting it up until it can be slid out of its half-round hinges.



15. Locate the harp section on the floor, behind the keyboard section. Stand up the harp section on its narrow end, with the exposed mechanism facing toward the keyboard section. Lift up the harp and, tilting it forward slightly, engage the three half-round hinges on the rear of the keyboard section.

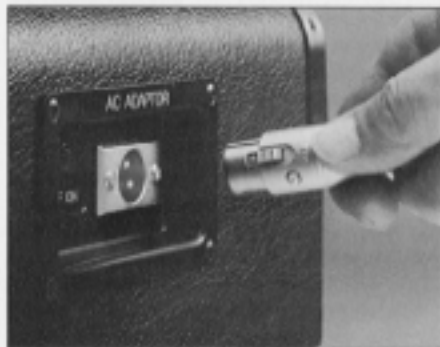


16. Be sure the three hinges are fully engaged, and then tilt the harp section down over the keyboard section. Fasten the two sections together with the pair of latches on the sides. This completes the physical assembly of the piano.



AC Adaptor

Connect the XLR type 2-pin female plug of the supplied AC adaptor to the XLR type 2-pin male plug labeled "AC ADAPTOR" on the right side of the CP-70B. Then plug in the male end of the AC adaptor.



The AC adaptor steps the AC line voltage down to the low voltage DC current needed to operate the CP-70B. If you go on the road and play in cities where the voltage differs from that in your area, all you have to do is to change the AC adaptor.

If the AC adaptor is damaged or misplaced, you can obtain a replacement from Yamaha only. Do not use an AC adaptor other than supplied from manufacturer to prevent fire or shock hazard. We can provide you the following types of the AC adaptor of the CP-70B.

U.S. & Canadian model: GA50063
(120V AC 60Hz)
Australian & South African model: GA50065
(220V AC 50/60Hz)
European model: GA50066
(220V AC 50Hz)
"General" export model: GA50069
(200V AC 50/60Hz)
Japanese model: GA50061
(100V AC 50/60Hz)

We recommend use of the self-powered Yamaha A4115H speaker system, due to its wide, flat frequency response. However, the CP-70B may be used with almost any speaker/amplifier system.

Balanced and Unbalanced Circuits

The terms "balanced" and "unbalanced" refer to a type of circuit, not to circuit stability. The fact that a circuit is balanced or unbalanced does not indicate anything about its impedance or its input or output level. A balanced, single channel circuit has two signal carrying wires, and usually has a third wire, the shield, wrapped or braided around the outside of the two signal carrying wires. The shield helps prevent external noises (hum, radio station pickup, and so on) from entering the circuit. In a balanced circuit, the shield does not carry any program or music signal. An unbalanced, single channel circuit also has two signal carrying wires, but one of them is usually the shield. The shield of an unbalanced circuit serves to carry signal as well as to block noise. Balanced circuits tend to reduce external noise pickup better than unbalanced circuits, especially over long cable runs. An unbalanced circuit will generally perform as well as a balanced circuit for short cable runs of up to about 8 meters (25 feet), except in areas having strong fields of electrical noise.

In most cases, balanced outputs should be connected to balanced inputs, and unbalanced outputs should be connected to unbalanced inputs. The CP-70B's XLR outputs are balanced, and its phone jack outputs are unbalanced,

High Impedance and Low Impedance Circuits

Low impedance circuits are usually defined as those with input or output impedances of 600-ohms or less. High impedance circuits are usually defined as those with input or output impedances of 5000-ohms or higher. Circuits with impedances between these two values may be either high or low impedance, or they may be called "medium impedance." The fact that a circuit is high or low impedance says nothing about its level or about whether it is balanced or unbalanced. In addition, there is nothing inherently good or bad about a high or a low impedance circuit.

A high impedance circuit, however, will sustain some high frequency losses if cable lengths are longer than about 8 meters (25 feet), whereas a low impedance circuit can tolerate longer cable lengths with minimal losses.

Generally, when making connections between two devices, their impedances should match (i.e. connect high impedance outputs to high impedance inputs and low impedance outputs to low impedance inputs).

Circuit Levels

Low level circuits include microphones and instrument pickups. Medium or "line" level circuits include preamplifier and mixer outputs. Sometimes hi-fi line level (typically -16dB, 123 millivolts) is considered to be a medium line level, whereas professional line level (+4dB, 1.23 volts) is considered to be a high line level. High level circuits, as compared to line level circuits, consist mainly of power amplifier outputs (speaker lines). Circuit levels may vary within these general categories. When making connections between two devices, their nominal (average) levels should be the same (i.e. microphones to microphone-level inputs, line level outputs to line level inputs, and so on).

CP-70B Output Jacks

The CP-70B has two sets of outputs. Two low impedance, balanced "XLR" jacks are provided to feed the CP-70B's output to a mixer or other device with a low impedance, balanced, low line level input. (The CP-70B's low line level output is -20dB , which is 77.5 millivolts). Two high impedance, unbalanced phone jacks are provided to feed an unbalanced, high impedance, low line level device such as a guitar amplifier or the Yamaha A4115H speaker system. (The output level of the phone jacks is the same as that of the XLR's, -20dB).

The TREMOLO discussion on Page 8 explains the distinction between the "CH 1" and "CH 2" output jacks. Essentially, if you are using only one amplifier/speaker, it makes no difference whether you connect it to output "1" or output "2." When using two amplifier/speaker units, the only time you will hear any difference between the "1" and "2" outputs is when the TREMOLO is in use.

To connect the CP-70B's outputs to a low impedance mixer like the Yamaha PM-180, PM-430, PM-700 or PM-1000, use a shielded XLR-to-XLR cable. Set

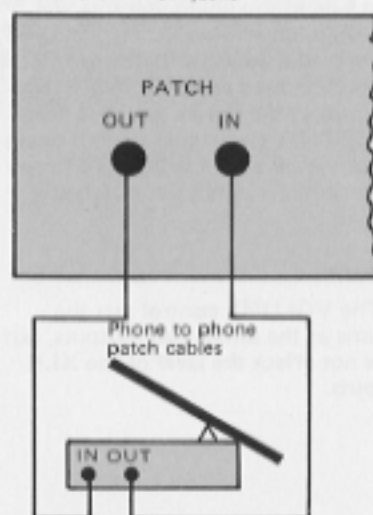
the INPUT level switch on the Yamaha mixer to the " -20dBm " position. The CP-70B's VOLUME control does not affect the XLR outputs. Thus, these outputs are ideal for feeding a tape recorder or a house sound system. In other words, if you adjust the VOLUME control to change the output level at the phone jacks (and the monitor amplifier/speaker system fed by those phone jacks), you won't interfere with the recording or with the balance of the house sound system.

Use a high quality phone-to-phone cable to connect the CP-70B's phone jack outputs to the Yamaha A4115H amplified speaker system, to a high impedance mixer input (such as Yamaha's PM-170) or to any standard guitar amplifier input. Guitar coil-cords will work, but they tend to have poor shielding and may cause hum in your system. When feeding the unbalanced inputs on the Yamaha PM-170 or on similar mixers, switch the INPUT level switch of the device to the " -20dBm " position (that is, to a nominal sensitivity corresponding to approximately 77.5 millivolts).

Patch Jacks

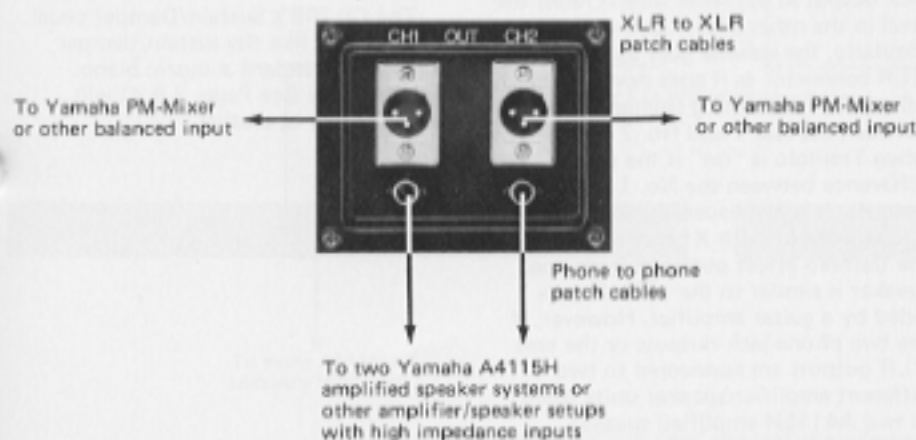
The two PATCH jacks on the front control panel are for effects devices such as "wah-wah," "phaser" and other pedals, or for echo/reverb units. Use a good quality phone-to-phone shielded cable from the PATCH OUT jack to the accessory device's input and another cable from the accessory device's output to the PATCH IN jack. The input and output levels at the PATCH jacks are compatible with most accessory pedals and echo/reverb units having phone jack inputs and outputs.

Use of the PATCH jacks

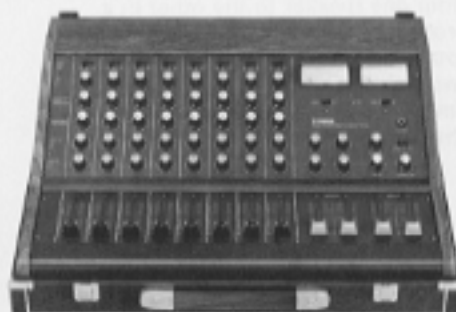


"Wah-wah" pedals, echo/reverb units or other effects devices may be connected to the PATCH OUT/IN jacks. Keep cables as short as possible.

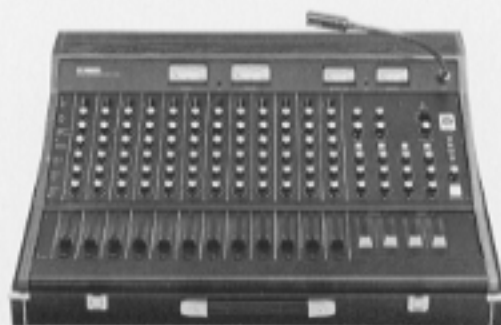
Output Jack Panel and connections



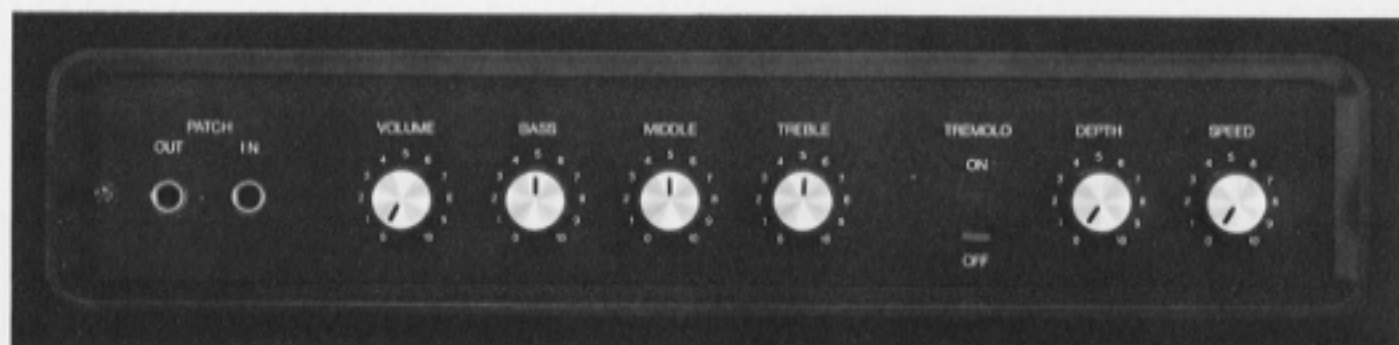
PM-180 mixer (balanced version)
PM-170 mixer (unbalanced version)



PM-430 mixer



PM-700 mixer



Power Switch

The Power switch is located on the right side of the piano. Because the CP-70B's sound is acoustically created, you can hear sound at decreased volume when the Power switch is "off." However, unless the Power switch is "on," the CP-70B's electronics are not operational and no sound will be fed to any external mixer, amplifier or speaker system.

Volume

The VOLUME control sets the volume at the phone jack outputs, but **does not affect the level of the XLR outputs.**

Tremolo (Depth/Speed/On-Off)

The Tremolo controls further enhance the CP-70B's available sounds. Tremolo automatically and smoothly varies the output volume up and down. The TREMOLO ON/OFF switch starts and stops the tremolo effect. The SPEED control varies the rate of the tremolo effect (the modulation frequency). Higher settings of the SPEED control cause the volume to vary more rapidly; lower settings cause the volume to vary more slowly. The DEPTH control sets the intensity of the tremolo effect (the modulation percentage). Lower settings yield a more shallow tremolo effect, higher settings yield a more intense tremolo effect.

When both outputs are used, tremolo lowers the volume level in one phone jack output at the same time it raises the level in the other phone jack output. Similarly, the volume goes up in one XLR connector as it goes down in the other. This alternating change in level between the No. 1 and No. 2 outputs when Tremolo is "on" is the only difference between the No. 1 and No. 2 outputs. It is not necessary to use both phone jacks or both XLR connectors; the tremolo effect obtained from one speaker is similar to the tremolo provided by a guitar amplifier. However, if the two phone jack outputs or the two XLR outputs are connected to two different amplifier/speaker units (such as two A4115H amplified speaker systems), the sound will seem to move from one speaker to the other in a "rotary" manner, similar to a true rotary organ speaker. In other words, two-channel tremolo gives more "motion" to the sound than single-channel tremolo.

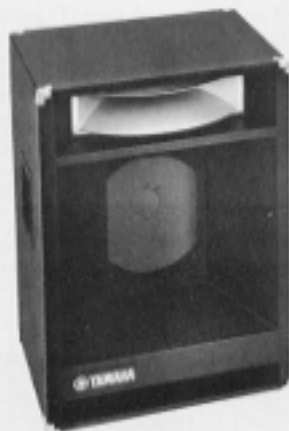
Bass, Middle, Treble

The three tone controls set the tonal character of both the XLR and the phone jack outputs. The CP-70B's frequency response is "flat" when all three tone controls are centered (No. 5 position), and the controls have center detents to help you quickly achieve the "flat" setting. **Each tone control affects the entire keyboard, not just one section.**

The three tone controls allow the musician to alter the piano's sound character to fit the mood of the performance. Experimenting will allow you to determine the optimum setting for a given style of music.

How to Use the Sustain/Damper Pedal

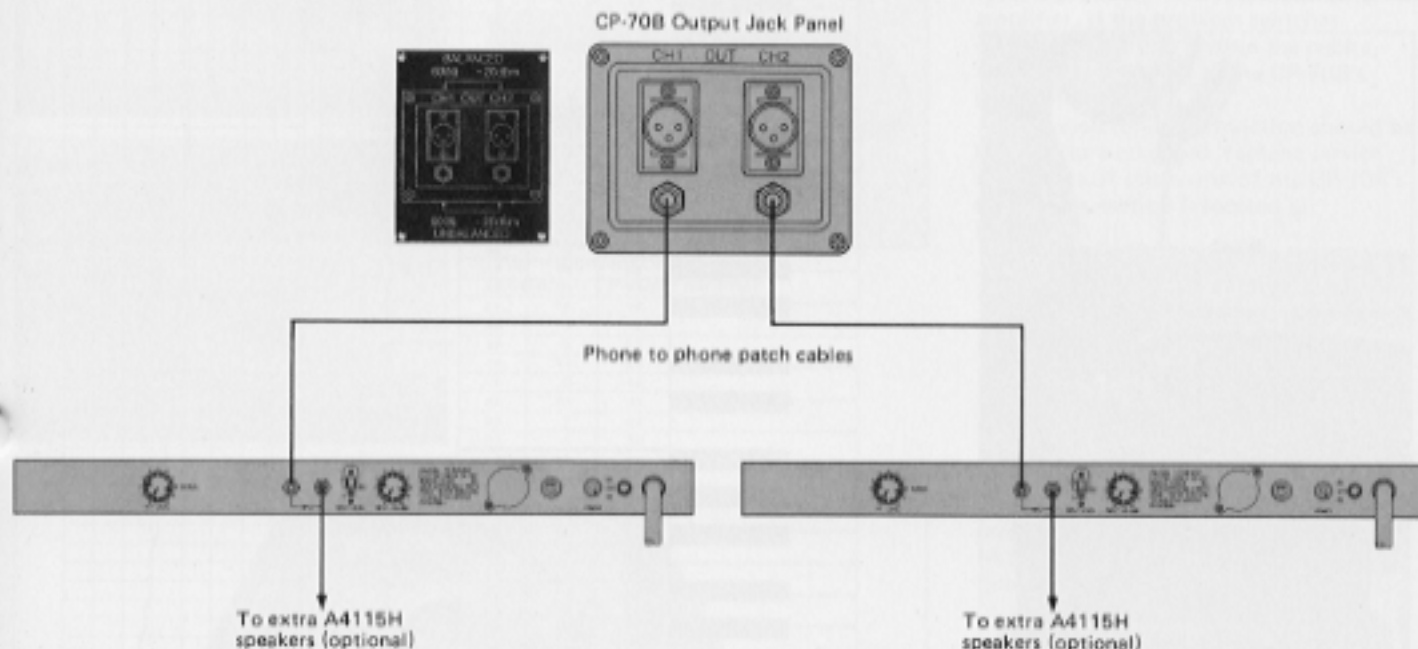
The CP-70B's Sustain/Damper pedal operates just like the sustain/damper pedal on a standard acoustic piano. Careful setup (see Pages 3 & 4) will assure proper operation.



The sound of the CP-70B will depend to a large degree on the amplifier and speaker system, so it's a good idea to choose these items carefully. We recommend the Yamaha A4115H amplified speaker system, which has a very smooth, natural sound. In the studio, the sound can be taken direct from the CP-70B's XLR output or from a microphone placed near the A4115H. With this setup, there should be little or no audible difference whether the piano is "direct" or the A4115H is miked. On the stage, the A4115H's high sensitivity and high power output mean that you can have high volume levels free of audible distortion. Also, because the CP-70B has piezoelectric pickups, so that you don't need any microphones, you don't have to be concerned about feedback (howling).

The A4115H's controls are simple to operate. If you are using just one A4115H, connect a phone-to-phone patch cable between the CP-70B and either one of the A4115H's input jacks. For two A4115H's, connect a cable from one of the two phone jack outputs on the CP-70B to one input on each A4115H. Set the A4115H's INPUT LEVEL switch to the "-20dBm" position, and set its INPUT VOLUME as required. The H.F. LEVEL control sets the volume level of the high frequency horn in relation to the low frequency woofer.

NOTE: If you wish to use more than two A4115H's, you can "bridge" two or more A4115H's together; connect a phone-to-phone cable from the unused input jack of the A4115H being fed by the CP-70B to an input jack on the next A4115H.



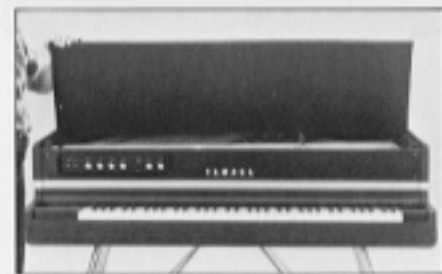
A4115H control/jack panel and typical connections to a CP-70B for "rotary" tremolo effect.

Tuning the CP-70B

These instructions are meant only for a qualified piano tuner.

The CP-70B's excellent tuning stability is partially attributable to its "Humid-A-Seal" pin block, its lack of a conventional soundboard and its unique downbearing-only bridge. Tuning stability means that you won't need to tune the CP-70B as often as a conventional acoustic piano, but when it does require tuning, the CP-70B tunes just like a conventional piano. Thus, any qualified piano tuner can do the job.

To gain access to the tuning pins, remove the 5 screws that secure the front section of the top panel, and fold it back. In order to hear all the harmonics for accurate tuning, the CP-70B and its amplifier and speaker system should be "on." Alternately, use a headphone amplifier and headphones. Take care to avoid contact with the CP-70B's electronics, especially when using metal tools.



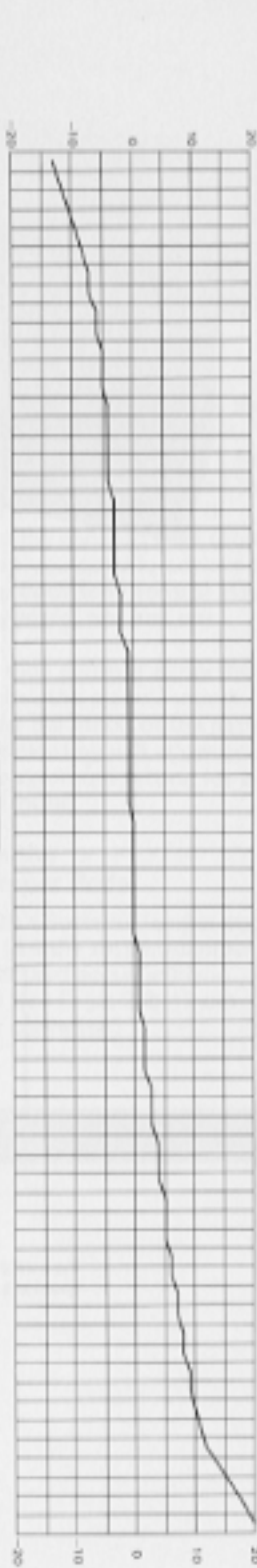
Because of the nature of the harmonics of a vibrating string, it is generally possible to have a string correctly tuned and still hear a "beat" when the string is sounded simultaneously with another tone one octave higher. This phenomenon may be more pronounced in the CP-70B due to its basic design concept aiming at the maximum portability.

The accompanying curve will be helpful when tuning.

Designated key and string numbers

Key	String no.	CP-70B key no.	Bass wire no.	Treble wire sizes
1 A	1			
2 A [#]	2			
3 B	3			
4 C	4			
5 C [#]	5			
6 D	6			
7 D [#]	7			
8 E	8			
9 F	9			
10 F [#]	10			
11 G	11			
12 G [#]	12			
13 A	13			
14 A [#]	14			
15 B	15			
16 C	16			
17 C [#]	17			
18 D	18			
19 D [#]	19			
20 E	20			
21 F	21			
22 F [#]	22			
23 G	23			
24 G [#]	24			
25 A	25			
26 A [#]	26			
27 B	27			
28 C	28			
29 C [#]	29			
30 D	30			
31 D [#]	31			
32 E	32			
33 F	33			
34 F [#]	34			
35 G	35			
36 G [#]	36			
37 A	37			
38 A [#]	38			
39 B	39			
40 C	40			
41 C [#]	41			
42 D	42			
43 D [#]	43			
44 E	44			
45 F	45			
46 F [#]	46			
47 G	47			
48 G [#]	48			
49 A	49			
50 A [#]	50			
51 B	51			
52 C	52			
53 C [#]	53			
54 D	54			
55 D [#]	55			
56 E	56			
57 F	57			
58 F [#]	58			
59 G	59			
60 G [#]	60			
61 A	61			
62 A [#]	62			
63 B	63			
64 C	64			
65 C [#]	65			
66 D	66			
67 D [#]	67			
68 E	68			
69 F	69			
70 F [#]	70			
71 G	71			
72 G [#]	72			
73 A	73			
74 A [#]	74			
75 B	75			
76 C	76			
77 C [#]	77			
78 D	78			
79 D [#]	79			
80 E	80			
81 F	81			
82 F [#]	82			
83 G	83			
84 G [#]	84			
85 A	85			
86 A [#]	86			
87 B	87			
88 C	88			

Tuning curve of the CP-70B

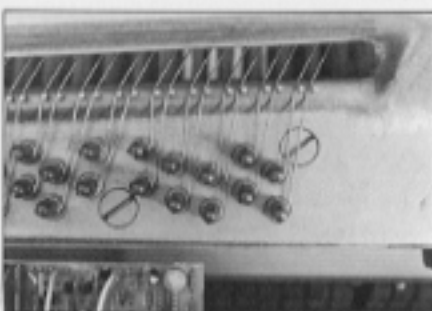


NOTE: Values may be varied with modification of specifications.

NOTE: Shaded keys are not included on the CP-70B.

String Replacement

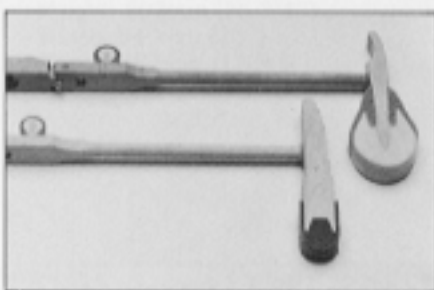
The CP-70B has no sound board, and its bridge is uniquely designed. Still, string replacement is straightforward and can be done easily by any qualified piano technician. Treble (non-wrapped) strings should be replaced with standard piano wire of the appropriate gauge. All wrapped strings should be replaced with Yamaha CP-70B strings. Order strings by string number. (See diagram on previous page.)



Voicing

Do not attempt to use conventional means to voice the CP-70B's hammers (sanding, filing or inserting needles into the felt). These are not applicable since the CP-70B has specially designed hammers for long wear. The photograph illustrates the difference between the CP-70B's hammers (which are covered with a durable, synthetic buckskin-like material and have a hard rubber core) and the hammers on a conventional acoustic grand piano.

After the CP-70B has been played for some time, a groove may appear in the hammers' covering. While a shallow groove is acceptable, a deep groove or cut will alter the tonality. To correct any change in tonality, the piano technician can replace the synthetic skin material. Alternately, remove the skin, shift its position slightly, and re-glue it using white glue.



Top - Conventional hammer
Bottom - CP-70B's hammer

Regulation

While the CP-70B is designed to take the abuses of touring, its action may need regulation from time to time. Since these adjustments are similar to regulation adjustments on a conventional acoustic grand piano, they can be performed by any qualified piano technician.

Electronic Service

If you suspect an electronic problem, first check all connecting cables and AC adaptor. Make sure there is AC power at the AC outlet, and check the settings of all controls and switches. If the problem seems to occur primarily in one speaker, and you have two speakers connected, first check connecting cables (the best way to check a cable is to replace it with a known good one). Then try reversing the cables in the CP-70B's output jacks. If the problem remains in the same speaker, the fault is probably in that speaker or its amplifier. If the problem switches speakers when you reverse the cables, the fault is probably in the CP-70B's electronics.

Any electronic malfunction should be referred to a qualified Yamaha service technician. A schematic of the CP-70B's electronics section is located on Pages 14 & 15.

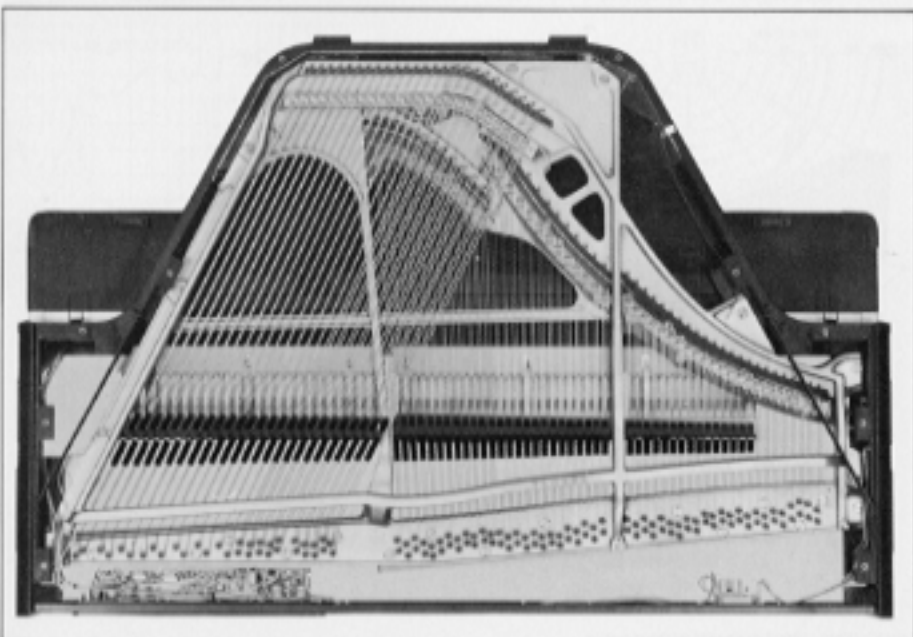
Travel Case

The CP-70B disassembles into two compact, easy to carry pieces that are suitable for light duty traveling, such as in a station wagon or van. For heavy cartage (commercial trucking or air freight as examples), we recommend you use additional travel cases. If you buy custom built cases, they should meet "ATA-300" specifications (ATA=Air Transport Authority). The following dimensions are for such cases:

NOTE: All dimensions are internal dimensions (inside the foam).

Keyboard Section: 51" long x 9-3/4" wide x 25" high. Use 2" foam on all sides.

Harp Section: 51" long x 6-3/4" wide x 35-1/2" high. Use 2" foam around the sides (the 6-3/4" wide area) and 3" foam on the large, flat top and bottom surfaces.



CP-70B specifications

Action: Similar to Yamaha's Grand Pianos with modified dampers for fast action, and synthetic "buck-skin" hammers for long wear.

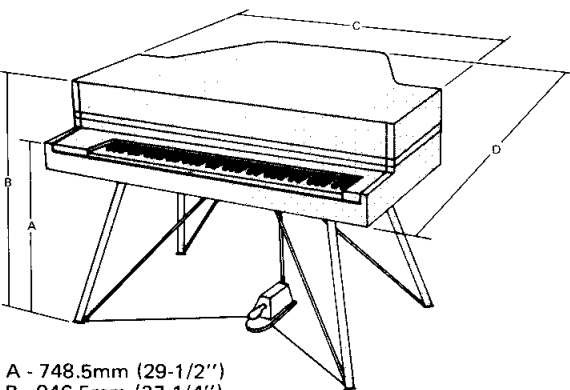
Strings: Key numbers 1-15, one string per tone. Key numbers 16-73, two strings per tone. First 59 strings made with highest grade solid copper wrapping.

Keys: 73 keys from No. 8E to No. 80E.

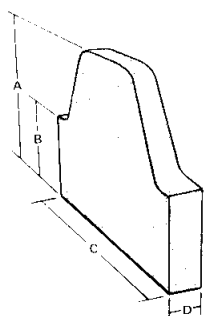
Pickups: Independent piezoelectric pickup system.

Controls: Power ON-OFF switch; over-all VOLUME control; BASS, MIDDLE and TREBLE tone controls (detented at "flat" response); TREMOLO ON-OFF Switch; Tremolo SPEED and DEPTH controls. Sustain/Damper pedal supplied.

Jacks: Two 600-ohm, balanced, transformer-isolated XLR output jacks (one for each phase of the Tremolo); two unbalanced, tip-sleeve (standard) phone jacks, carrying the same output as the XLR jacks, but subject to the VOLUME control; PATCH OUT and IN jacks for accessory devices.



A - 748.5mm (29-1/2")
 B - 946.5mm (37-1/4")
 C - 1,296mm (51")
 D - 1,045mm (41-1/8")
 Height to keyboard - 733mm (28-7/8")



A - 901mm (35-1/2")
 B - 461mm (18-1/8")
 C - 1,296mm (51")
 D - 173mm (6-3/4")

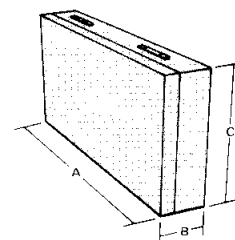
Power Consumption: AC, 50/60Hz; 2.5W (in case of the AC adaptor in use).

Net Weight: Lower section - 62kg (136.7 lbs.), (including lid, legs and sustain pedal). Top section - 68kg (149.9 lbs.) (including lid).

Finish: Black with leatherette siding and cover.

Other Features: Recessed carrying handles (upper section), Integral carrying handles (lower section), slip fittings, Metal corners.

Standard Accessories: AC adaptor, Sustain/Damper Pedal.



A - 1,296mm (51")
 B - 245mm (9-5/8")
 C - 636mm (25")

A4115H controls & jacks

Input Jacks: Two (parallel) standard tip-sleeve phone jack which accept unbalanced, line level sources.

Input Level Control: An input attenuator controls the volume level of the amplifier.

Input Level Switch: A slide switch selects -20dBm or 0dBm nominal input level: for compatibility with low or high level lines.

H.F. Level Control: An "L-Pad" attenuator (for constant impedance) adjusts the volume level of the high-frequency driver.

A4115H amplifier specifications

Output Power: 100 Watts continuous average sine wave power into an 8-ohm load at 0.1% T.H.D.

Frequency Response: 10Hz to 30kHz +0, -1dB with the INPUT LEVEL switch in the "0dBm" position; 40Hz to 50kHz +0, -3dB with the INPUT LEVEL SWITCH in the "-20dBm" position.

Power Bandwidth: 20Hz to 20kHz at 100 watts into an 8-ohm load at 0.1% T.H.D.

Total Harmonic Distortion: Less than 0.01% at 80 watts into 8 ohms.

Damping Factor: 90 from 20Hz to 3kHz, with an 8-ohm load.

Hum and Noise: -73dB (0.17mV)*

Slew Rate: 25 volts per microsecond

Input Sensitivity (input level for 100-watts into an 8-ohm load): 0dB (0.775 volts) with the INPUT LEVEL switch set at the "0dBm" position; -20dB (77.5mV) with the INPUT LEVEL switch set at the "-20dBm" position.

Input Impedance: 8k-ohms with the INPUT LEVEL CONTROL at the maximum clockwise position.

A4115H speaker specifications

System Impedance: 8-ohms nominal, 7-ohms minimum.

Sensitivity: 101dB SPL at 1 meter with 1 watt input (DIN and JIS standard)*; 52dB SPL at 30 feet, 1 milliwatt input (EIA standard).

Frequency Response: 70Hz to 15kHz, ±6dB (referred to 101dB SPL).

Dispersion: 70-degrees horizontal by 40-degrees vertical (angles between 6dB down points at 1kHz).

Crossover Transition Frequency and Slope: 2kHz at 12dB/octave

Enclosure Type: Combination: front-loaded horn/ducted-port bass reflex, with separate high frequency horn/compression driver.

Finish: Black leatherette with metal corner caps and black (removable) grille.

Dimensions:

Height: 908mm (35-3/4")

Width: 610mm (24")

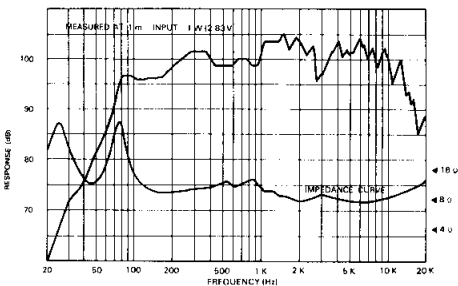
Depth: 452mm (17-3/4")

Weight: 58kg (127.9 lbs.)

Driver (Loudspeaker)	Model	Nominal Cone Diameter	Voice Coil Diameter	Nominal Impedance	Sensitivity **	Continuous Pink-Noise Power Rating	Peak Power	Rated Power Bandwidth	Magnet Weight	Flux Density
Woofer	JA 3803	15" (38cm)	2.6" (6.6cm)	8 ohms	99dB	120 Watts	240 Watts	20Hz-20kHz	6.0kg (13.2 lbs.)	12,500 Gauss
Horn/Driver	JA 4201	—	1.6" (4.2cm)	8 ohms	104dB	20 Watts	40 Watts	2kHz-20kHz	2.2kg (4.8 lbs.)	16,000 Gauss

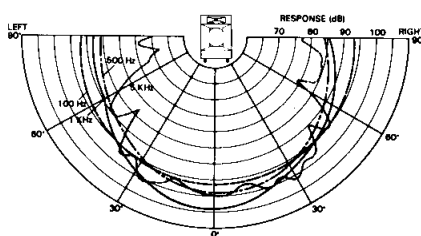
NOTE: The Yamaha S4115H speaker system is identical to the A4115H, except it contains no amplifier.

A4115H Frequency Response



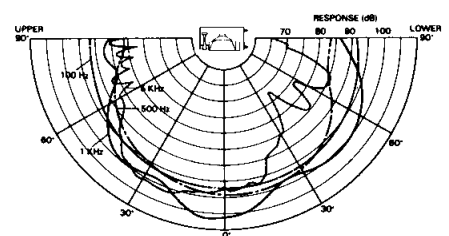
*Measured with a 6dB/octave filter at 12.5kHz (equivalent to a 20kHz filter with infinite dB/octave attenuation).

A4115H Horizontal 180° dispersion



*Sensitivity at 4 feet, with 1 watt is 1.75dB below DIN/JIS standard.

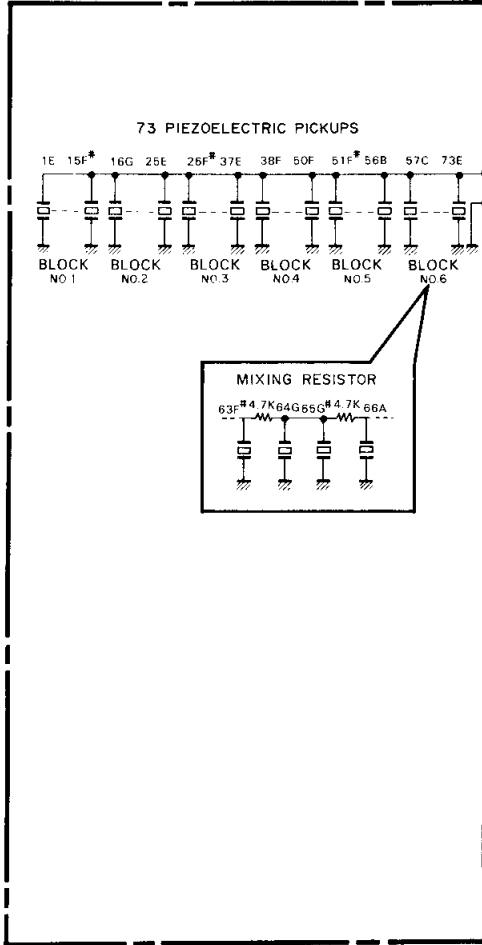
A4115H Vertical 180° dispersion



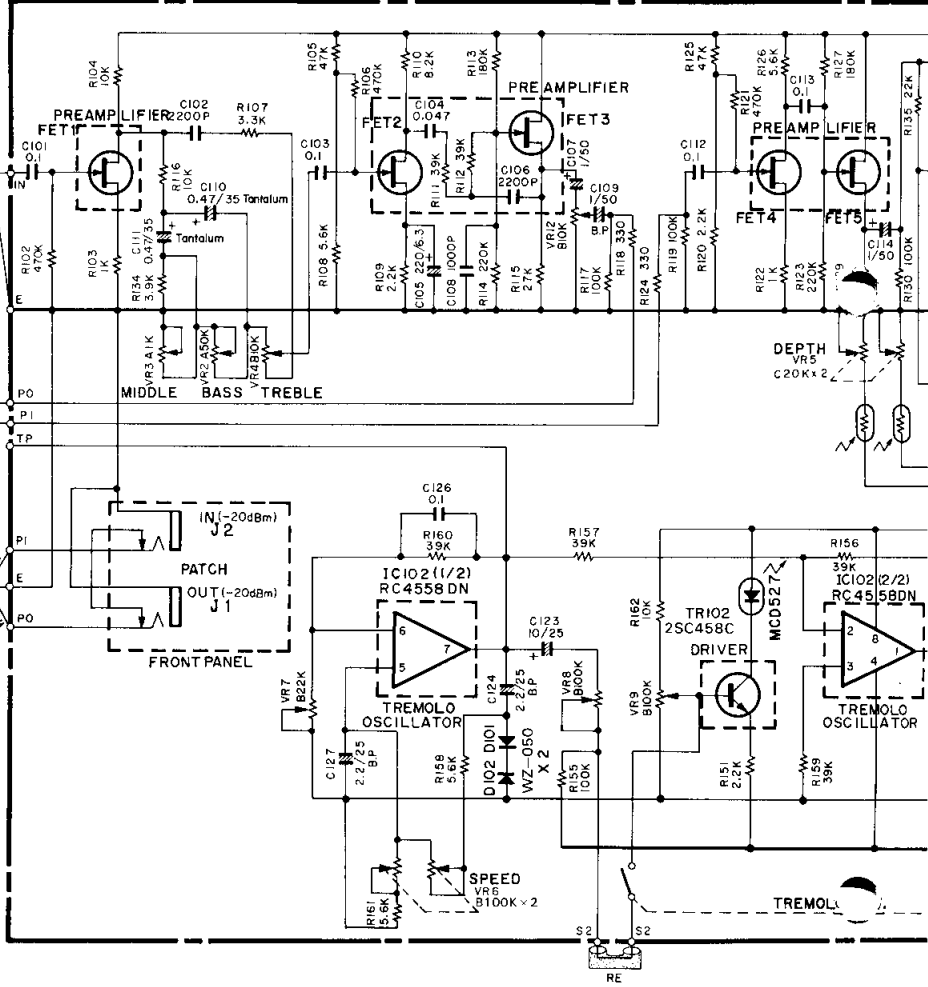
† Sensitivity is extremely significant, since an increase of only 3dB in sensitivity is equivalent to doubling the amplifier power. In other words, a 50-Watt amp used with a speaker that is 3dB more sensitive than another speaker, will produce the same sound level as a 100-Watt amp used with the less sensitive speaker.

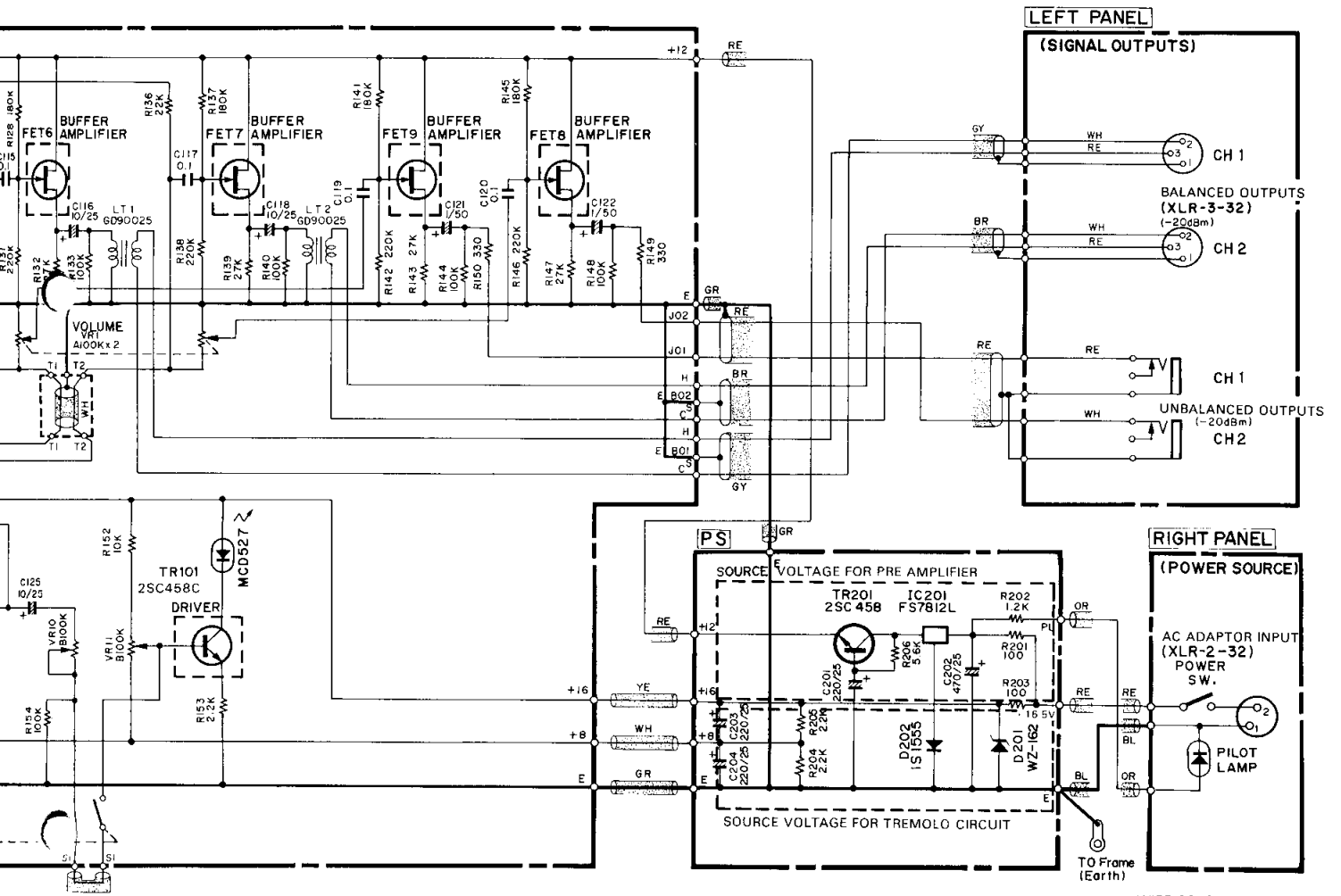
CP-70B overall circuit diagram

PICKUP UNIT



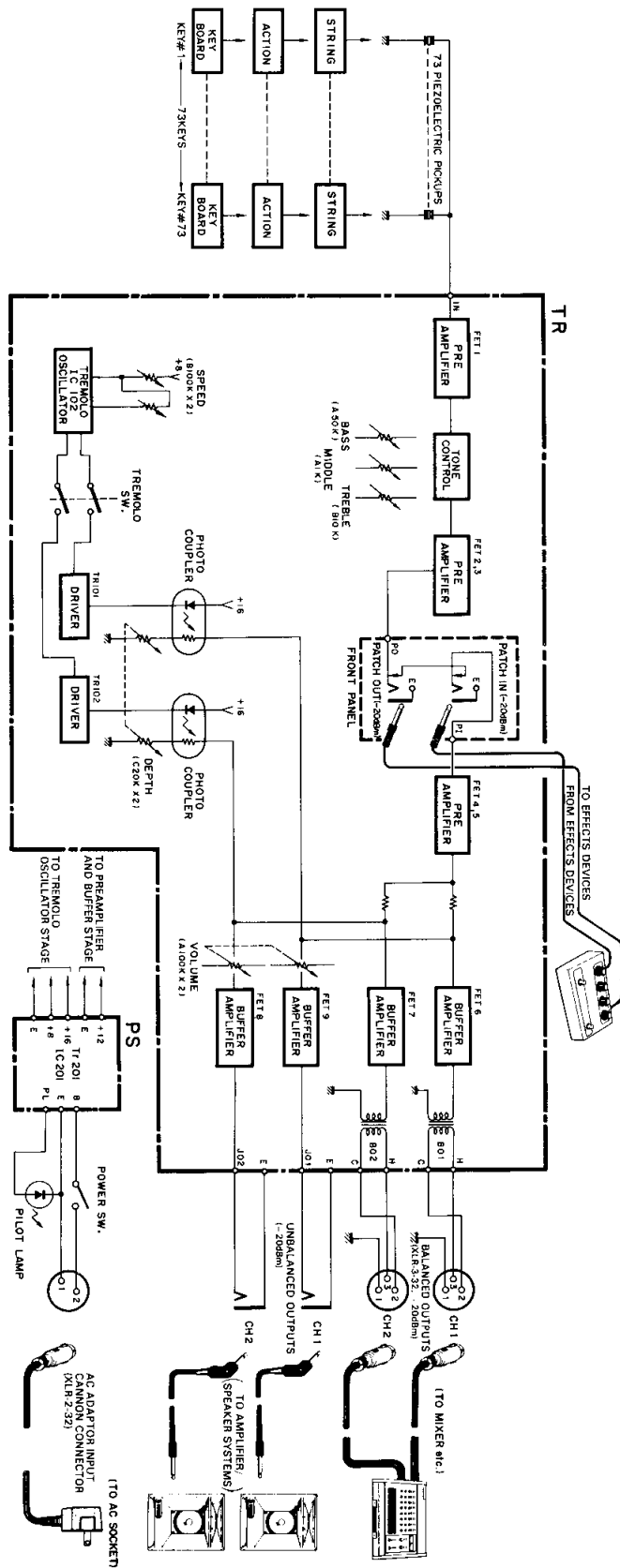
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- WIRE COLOR ABBREVIATIONS**
- | | |
|-------------|------------------|
| BL ▶ Black | VI ▶ Violet |
| BR ▶ Brown | GY ▶ Gray |
| RE ▶ Red | WH ▶ White |
| OR ▶ Orange | GG ▶ Grass Green |
| YE ▶ Yellow | SB ▶ Sky Blue |
| GR ▶ Green | PK ▶ Pink |
| BE ▶ Blue | |

CP-70B block diagram



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