



**FEATURES  
CELESTION  
SPEAKERS**

Congratulations on your purchase of the MTS3200 all tube amplifier. Carvin has been building tube guitar amplifiers since 1949. They have been used by top professionals like; Frank Zappa, Steve Vai, Craig Chaquico, Allan Holdsworth, Larry Carlton, Chet Atkins and other great musicians. You will discover that these amplifiers represent a significant sound improvement over conventional tube amplifiers. Spend time with your new MTS3200 head or your MTS3212 combo and get to know it's many sounds.

**TECHNICAL DESIGN OF THE MTS3200**

The MTS3200 design criteria was to build an all-tube guitar amp that sounded better than anything else on the market. This meant that the MTS3200 was going to be totally new from the ground up and that it was going to be an all tube design with no IC's or transistors.

**HIGH IMPEDANCE GUITAR INPUT**

Carvin has long known about the effects of miss-loading a guitar pickup which can cause high frequency loss. The MTS3200 guards against this loss with its ultra high input impedance. Also, we considered the capacitance of the average shielded guitar cable which can reduce the high frequency response of your guitar pickups. Unlike other amplifiers, we purposely avoided adding capacitance anywhere in the preamp to control high frequency oscillations. Instead, we controlled oscillations through careful component layout and lead placement allowing its shimmering highs to be reproduced.

**CLEAN AND OVERDRIVE CHANNELS**

The equalization of the clean and overdrive channel is designed to offer clarity to your instrument. Special mud-cutting circuits eliminate the unwanted sounds in the 500 to 700 Hz range which normally take away the tone definition of your instrument. You will also take notice of the clean channels PRESENCE switch which adds acoustic voicing to your instrument. This switch boosts only the guitars very highest harmonics which are in the 10k Hz range instead of the normal 3K Hz of a bright switch. The PRESENCE control on the lead channel is designed to adjust the "edge" on your sound. It's dynamic range allows for super-smooth sounds or an edge for

**RECEIVING INSPECTION—read before getting started**

INSPECT YOUR AMP FOR ANY DAMAGE which may have occurred during shipping. If any damage is found, please notify the shipping company and CARVIN immediately.

SAVE THE CARTON & ALL PACKING MATERIALS. In the event you have to re-ship your unit, always use the original carton and packing material. This will provide the best possible protection during shipment. CARVIN and the shipping company are not liable for any damage caused by improper packing.

SAVE YOUR INVOICE. It will be required for warranty service if needed in the future.

SHIPMENT SHORTAGE. If you find items missing, they may have been shipped separately. Please allow several days for the rest of your order to arrive before inquiring.

RECORD THE SERIAL NUMBER on the enclosed warranty card or below on this manual for your records. Keep your portion of the card and return the portion with your name and comments to us.

your lead channel to reach out.

**DYNAMIC 5881 POWER TUBES**

Your amp is equipped with 5881 power tubes because of their smooth distortion, responsive sound and reliability. The compression characteristics of these "soft clip" power tubes respond to the dynamic range of lead guitar playing. These tubes react even to the most subtle touch—if you play soft, the tubes remain clean and if you increase your attack they respond accordingly.

**TONE CONTROLS**

The T-Bridge passive BASS, MID and TREBLE tone controls offer a wide range of tone settings. Take full advantage by setting them where they sound best. Your sound may not be at center 5 on the dial. These controls will not affect or color your sound when set at extreme settings, nor do they interact with each other. The greater range of these controls comes from the high impedance 1 meg sealed pots (most guitar amps use 250k pots). The frequency of the bass control is set at 80 Hz while the mid control is set at 650 Hz. The treble control is set at a very high 11k Hz giving the MTS3200 it's dynamic highs.

**REVERB**

The FS22 footswitch for the long tailed REVERB system in the MTS3200 switches only the reverb "send" leaving the tail of the reverb to decay naturally, the way it's done in the studio. A special pre filter eliminates the spring "boing" normally heard in other systems giving it a "lush" sound. The all tube reverb system offers vibrant clarity with full depth reminiscent of the sixties tube amps. Guitar Player magazine rated this system as one of the best they have heard.

**MODEL MTS3200 HEAD SPECS:**

**RMS Power:** 50 or 100 watts  
**Output Impedance:** 4, 8 & 16Ω  
**Input Impedance:** 100,000 ohms  
**Tone Controls:** BASS: 80Hz  
 MID: 600-700Hz  
 TREBLE: 11k Hz  
**Both Channels:** 1mV for clipping  
**Ch 1 Sensitivity:** 16mV for full output  
**Ch 2 Sensitivity:** 2—switching  
**Channels:** 1.5 VAC @ 100 watts RMS  
**Voiced Line Out:** 5—12AX7's (dual stage)  
**Preamp Tubes:** 4—5881's (power pentode)  
**Power Amp Tubes:** 120VAC, 300VA  
 3A 250V slow blow, 5 x 20mm  
**USA Model:** 230VAC, 300VA  
**Export Model:** 1.5A 250V slow blow, 5 x 20mm  
**Export Fuse:** 24.25W x 10.5H x 9.5"D  
**Cabinet Size:** 7-ply poplar wood  
**Cabinet:** 35 lbs  
**Net Weight:** One Year  
**Warranty:** CV3200 cover, FS22 footswitch  
**Options:**

**MODEL MTS3212 COMBO SPECS:**

**Speakers:** 2 Celestion G12T-75 speakers  
**RMS Power:** 50 or 100 watts  
**Output Impedance:** 4, 8 & 16Ω  
**Input Impedance:** 100,000 ohms  
**Tone Controls:** BASS: 80Hz  
 MID: 600-700Hz  
 TREBLE: 11k Hz  
**Both Channels:** 1mV for clipping  
**Ch 1 Sensitivity:** 16mV for full output  
**Ch 2 Sensitivity:** 2—switching  
**Channels:** 1.5 VAC @ 100 watts RMS  
**Voiced Line Out:** 5—12AX7's (dual stage)  
**Preamp Tubes:** 4—5881's (power pentode)  
**Power Amp Tubes:** 120VAC, 300VA  
 3A 250V slow blow, 5 x 20mm  
**USA Model:** 230VAC, 300VA  
**Export Model:** 1.5A 250V slow blow, 5 x 20mm  
**Export Fuse:** 26W x 10.25D x 17.5"H  
**Cabinet Size:** 7-ply poplar wood  
**Cabinet:** 55 lbs  
**Net Weight:** One Year  
**Warranty:** CV3212 cover, FS22 footswitch  
**Options:**

For your records, you may wish to record the following information.

Serial No. \_\_\_\_\_ Invoice Date \_\_\_\_\_



# MTS3200 FRONT & REAR PANEL CONTROLS

## GETTING STARTED QUICKLY

If you are like most players, you probably want to plug in your new amp and get started playing it right away. You can read the rest of the manual later to learn the finer points of operating your amp. In order to get started you will need your MTS3200 amp, a 120 or 230 AC grounded power outlet, your instrument and a standard guitar cord. With the amp turned off, you may now plug it into the proper AC voltage.

Now turn all the volume and drive controls off and set tone controls at their mid center position. If you have purchased the FS22 foot switch, plug it into the rear foot switch jack for switching the channels and reverb. Note: The channel SELECT button must be in the OUT position (CH 1) for the FS22 to function (a hum will be heard if it's in the wrong position).

Now, turn the power switch and standby switch ON. Allow 60 seconds for the tubes to warm up. Gradually raise the volume controls and re-adjust the tone controls and your ready to go. The brass knobs can feel hot after the amp has been on awhile. This is normal because brass conducts heat while plastic does not. This will not cause a problem for the controls. Please call if you feel your amp is malfunctioning. Occasionally tubes are damaged in shipping.

## FRONT PANEL

### 1. GUITAR INPUT

A standard 1/4" input jack feeds both channels through using the SELECT switch. Use a professional quality guitar cord no longer than 25 feet. Typical cable capacitance should be under 50pf—the longer the cord, the greater the capacitance (you can measure this with a capacitance meter). A long cable with high capacitance will reduce the overall treble response from your pickups.

### 2. CHANNEL SELECT

Set the channel SELECT switch to the desired channel. The LED's next to the volume controls will let you see what channel is functioning. Use channel 2 for clean playing. Use channel 1 for overdrive/sustain. For the FS22 foot switch to function, set the channel SELECT to the "OUT" channel 1 position.

## LEAD CHANNEL 1

### 3. LEAD CHANNEL INDICATOR

The red LED will illuminate when the LEAD channel is selected.

### 4. LEAD VOLUME

The volume of the lead channel is to be used as a master level control. For partial clean output, set the VOLUME control to 10 and turn the DRIVE nearly off—under 1. By reducing the guitar volume, you can use this channel as an alternate clean channel.

### 5. LEAD DRIVE

For mild tube saturation, set the DRIVE control between 1 & 2. For some of the best saturation, set the control between 4 & 6. For full blown overdrive, set the control between 6 and 10 (your guitar volume should be turned all the way up). Because the MTS3200 has been "Hot Rodded" with so much gain in the DRIVE control, you will have an abundance of guitar feedback. However, if feedback is a problem, reduce the amount

of DRIVE or move the guitar to the side or away from the speaker(s).

### 6. LEAD—BASS, MID & TREBLE

To start off with, set the BASS, MID & TREBLE controls at their center (5) position. These controls are to be set according to the type of pickups used (dual or single coil). It's normal to decrease the BASS at higher playing levels. Try the PRESENCE control also when adjusting the treble.

### 7. LEAD PRESENCE

Channel 1 features it's own LEAD PRESENCE control for added clarity. It's frequency range is set at the mid range of the tonal spectrum. Careful adjustment with the TREBLE control will make this feature very useful.

## CLEAN CHANNEL 2

### 8. CLEAN CHANNEL INDICATOR

The red LED will illuminate when the CLEAN channel is selected.

### 9. CLEAN VOLUME

Channel switching from the Lead channel into Channel 2 gives you crisp, clean playing. Thanks to special mud-cutting circuits that work between the frequencies of 500 and 700 Hz, your guitar tones will be full and vibrant.

### 10. CLEAN PRESENCE

For added clarity, the CH 2 PRESENCE switch increases only the highest guitar harmonics in the 8-10k Hz range which is ideal for acoustic guitars. A normal bright switch works only in the 3k Hz range leaving your sound somewhat flat. Single or dual coil pickups will determine the need for this switch.

## 11. CLEAN—BASS, MID & TREBLE CONTROLS

You can start at 5 on the dial for each of the tone controls. However, these settings do not represent a normalize (flat) sound. You need to set them where they sound best! Most musicians like to reduce the MID'S between 1 and 4 for deeper bass and crisper highs. If your sound is too bright with single coil pickups, you may want to keep the PRESENCE switch off.

## MASTER SECTION

### 12. MASTER REVERB

Set the REVERB control for the desired amount (this works in both channels).

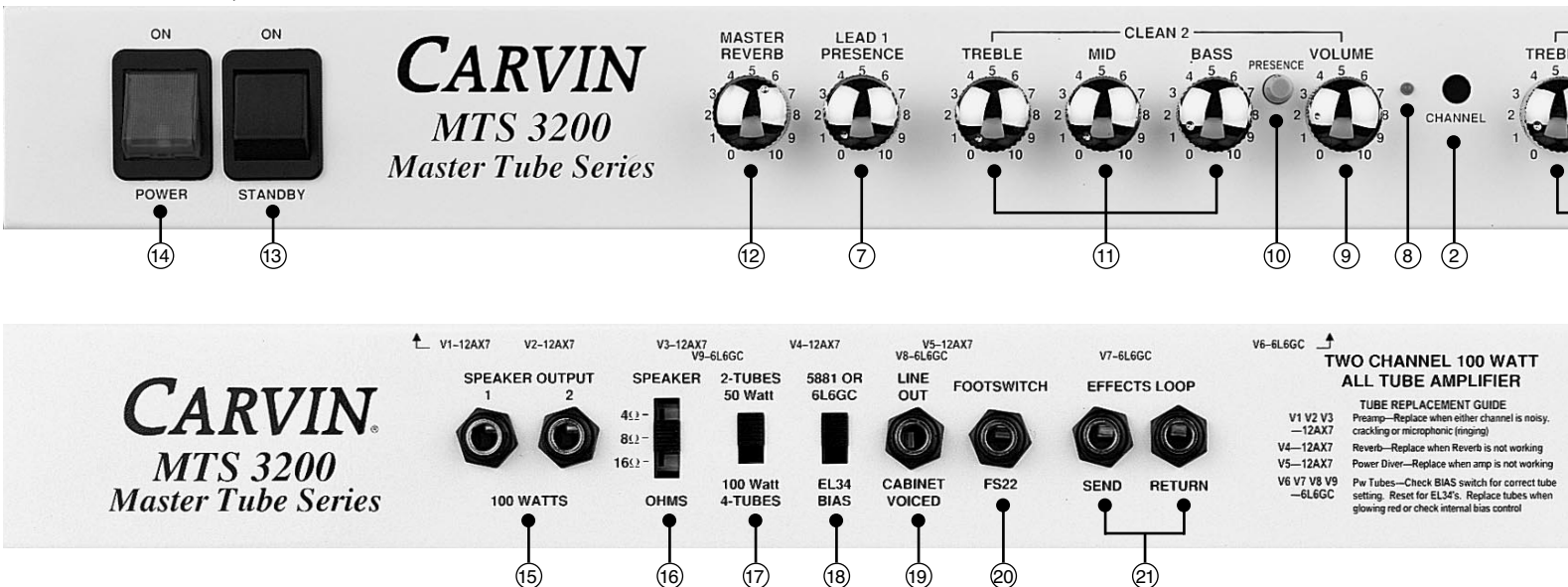
### 13. STANDBY SWITCH

Use the STANDBY SWITCH if you are taking a break. This turns the high voltage off, increasing the life of your power tubes while keeping the power and preamp tube filaments on for immediate use.

### 14. POWER SWITCH & INDICATOR

The power switch is to be utilized as the master ON/OFF switch. As the amp is turned on, the RED portion of the power switch will illuminate as your ON indicator.

MTS3200 Head as shown  
MTS3212 Combo front & rear panels reversed



## REAR PANEL

### 15. SPEAKER JACKS

Two 1/4" SPEAKER JACKS are featured to operate several speaker systems at the same time. Calculate the total speaker impedance based on parallel wiring as both speaker jacks are wired in parallel. Select the IMPEDANCE SWITCH for the correct impedance.

### 16. SPEAKER IMPEDANCE SWITCH

The IMPEDANCE SWITCH offers the selection of 4, 8 or 16 ohms to match your speaker system. The correct setting for two 16Ω speakers or cabinets would be 8 ohms. Select the proper impedance. The impedance of the MTS3212 combo amp is 8 ohms. In the case of adding another 8 ohm extension cabinet, keep the switch at 4 ohms.

### 17. 4 TUBE 100 WATT OR 2 TUBE 50 WATT OPERATION

For maximum output power, be sure the power tube selector switch is selected for 4 TUBE operation. For lower overall levels and early power amp clipping, move this switch to the 2 TUBE operation. The volume reduction will only be 3 dB.

### 18. POWER TUBE BIAS SWITCH

If you desire to change from 5881 (6L6GC) to EL34 power tubes, you may do so by selecting the external BIAS switch to the EL34 position on the rear panel. Be sure that this switch is selected to the proper position or excessive heat will damage your tubes.

The internal P11 bias trim control can be set by a qualified technician. To set the bias, measure the current across the terminals of the STAND BY switch (set this switch to the off position when the amp is on). Set the idle current to 100 mA for all tube types.

### 19. VOICED LINE OUT

The LINE OUT 1/4" jack is "CABINET VOICED" to prevent excessive bass or highs going to your mixer. This greatly aids in sound quality because you do not have to move your mixer EQ setting to the extreme. The 1.5 VAC output (reference to 100 watts output at 8 ohms) is more than adequate to drive any professional mixer or power amp.

### 20. FS22 FOOTSWITCH

Most foot pedals with 2 switches, a stereo cord and plug will work. However, Carvin's FS22 is recommended because of the correct identification label on the foot switch. First, the channel SELECT switch on the front panel must be selected to the "OUT" channel 1 position before the footswitch will work. Now that you are connected correctly, the channels and reverb can be switched remotely. If a hum is heard in the speakers, the select switch is in the wrong position (this will not harm the amp).

### 21. EFFECTS LOOP

For the lowest possible noise from an effects processor, use the effects loop instead of plugging the guitar into the effects and then into the amp. To use the EFFECTS LOOP, plug the INPUT of your effects into the SEND jack and the OUTPUT of your effects into the RETURN jack. Use shielded cables, not speaker cables. It's normal to have a slight gain reduction of several dB with some effects units. However, the amp has plenty of gain to overcome any loss.

## 22. AC POWER & FUSE

The detachable AC POWER CORD supplied is designed to operate with one type of voltage (the European 230V export model uses a CEE-7 plug cord set). Check the rear power cord label for the proper voltage and fuse value. Make sure the cord is securely inserted into the back of the unit. Plug the cord into a grounded "3" prong" power source. No attempt should ever be made to defeat or use the amp without the ground connected.

The FUSE (some models have circuit breakers) is located within the AC power cord receptacle. To check or replace the fuse, remove the power cord, place a screwdriver under the "FUSE" cap and pull the fuse holder out. The fuse type is a 250V Slow Blow SB 5 x 20mm rated at 3A for 120V & 1.5A for 230V models. Do not use fast acting fuse, only a SLOW BLOW (SB) type fuse will work.

## HELP SECTION

### a) FEEDBACK FROM THE LEAD CHANNEL

The MTS3200 will feedback when the LEAD volume, DRIVE, TREBLE and PRESENCE are turned all the way up. Like other highly modified tube amps, this is normal. To help reduce feedback and noise, keep the DRIVE control set around 5 to 7 on the dial. Some of the best lead saturation will be at around 5—not 10. Sometimes replacing V1 (12AX7A) can help reduce feedback.

### b) TUBE REPLACEMENT GUIDE

It is not uncommon for tubes to malfunction during shipping. If your amp is not working properly, please call or refer to the following replacement guide.

- 1) The 12AX7A preamp tubes are located in the following order on your chassis: V1, V2, V3, V4, V5. To start with, V1 is located next to the outside of your chassis behind the output transformer. It is recommended to turn your amp upside down to replace tubes. Replacing V1 will help reduce feedback in channel 1. Replacing V2 and V3 can also help but V1 is the main tube to replace. Replacing V4 will correct problems with the reverb system unless there is a defective reverb tank or tank cables. If the power amp is not functioning, check or replace the 5881 power tubes and check V5 by inserting a signal into the Effects RETURN jack. All tubes are keyed in the same direction.
- 2) The 5881 power tubes are located in the following order on your chassis: V6, V7, V8, V9. Normally you'll want to replace these tubes as a set. Please call for our latest prices. Sometimes you can spot defective power tubes when they are glowing red-hot along with an audible hum in the speaker when the amp is idling. If this happens, shut the amp down immediately. After they have cooled down, remove by pushing the retainers on the base of the tubes down and rock the tubes in a circular motion while pulling them out. It is recommended to turn your amp upside down to replace tubes. All tubes are keyed in the same direction. Running defective power tubes could damage the amp. It is recommended that you have a spare set of power tubes along with several 12AX7A preamp tubes.



## Guitarist Magazine, England

### MTS3212 Combo Review—By Simon Bradley

"Actually, the MTS3212 is a more versatile beast than I at first assumed, because, in the process of turning the drive control all the way up, there are some excellent crunch tones along the way.

Maybe it's the British Series (BR12) speakers, or the simple fact that the amp bristles with glowing tubes of loveliness, but these mid-driven sounds are of that responsive type that you just can't beat. It's warm, of course, but vibrant enough to cut through, and the tone's dynamic qualities would seem to offer musical assistance to all but the most colourless of blues players.

However, I would argue that it's at high gains that this Carvin comes into its own. In this situation, it's one of the most satisfying amps I have played in a long time. EVH was once quoted as saying that you know when you have a good sound when the guitar seems to play itself, and if Sir Edward of Van plugged into this combo, he would be more than happy with the brown-ness of the tone.

High octane rock sounds? No problem. Is mid-scooped thrash of angst-core your bag? Just step this way, Sir. The EQ is simple because it has no reason to be anything else, such is the efficiency of both the amp section and speakers to kick out a tone full of balsy clout and high end shimmer. Putting it through a 2 x 12 extension cab merely enhances the tone further.

Just when you thought it was safe to think 'so...it's like a Peavey 5150' (yes, the overdrives really are that good), a flick to Clean 2 will see you reaching for a Strat and switching to position 4. An amp's clean sound is, if anything, a more subjective affair than its dirty compadre, but I would say that the MTS3212 has the best clean sound I've ever heard from a 100w combo. Others might prefer a black-faced Fender Twin or even a Roland JC120, but the bass end available here is nothing short of incredible. It has the potential to turn the sound of a single coil solid into something akin to that of a monstrous f-hole jazz beast (should you so desire). Those in-betweeny Strat tones are well served, as is the neck position of a Gibson ES335, and the fact that the combo can handle such diverse sounds with equal aplomb is a major feat.

### Conclusion

Whatever styles of music you play, I have a feeling that you may well be blown away by this Carvin. The price tag represents excellent value, and it could give other amplifiers costing twice as much a serious run for their money."



This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

## CAUTION

RISK OF ELECTRIC SHOCK  
DO NOT OPEN



This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.



### IMPORTANT! FOR YOUR PROTECTION, PLEASE READ THE FOLLOWING:

**WATER AND MOISTURE:** Appliance should not be used near water (near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc). Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.

**POWER SOURCES:** The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.

**GROUNDING OR POLARIZATION:** Precautions should be taken so that the grounding or polarization means of an appliance is not defeated.

**POWER CORD PROTECTION:** Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.

**SERVICING:** The user should not attempt to service the appliance beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.

**FUSING:** If your unit is equipped with a fuse receptacle, replace only with the same type fuse. Refer to replacement text on the unit for correct fuse type.

### SAFETY INSTRUCTIONS (EUROPEAN)

The conductors in the AC power cord are colored in accordance with the following code.  
**GREEN & YELLOW—Earth BLUE—Neutral BROWN—Live**

**U.K. MAIN PLUG WARNING:** A molded main plug that has been cut off from the cord is unsafe. NEVER UNDER ANY CIRCUMSTANCES SHOULD YOU INSERT A DAMAGED OR CUT MAIN PLUG INTO A POWER SOCKET.

### LIMITED WARRANTY

Your Carvin product is guaranteed against failure for ONE YEAR unless otherwise stated. Vacuum tubes are guaranteed for 90 days. Carvin will service and supply all parts at no charge to the customer providing the unit is under warranty. Shipping costs are the responsibility of the customer. CARVIN DOES NOT PAY FOR PARTS OR SERVICING OTHER THAN OUR OWN. A COPY OF THE ORIGINAL INVOICE IS REQUIRED TO VERIFY YOUR WARRANTY. Carvin assumes no responsibility for horn drivers or speakers damaged by this unit. This warranty does not cover, and no liability is assumed, for damage due to: natural disasters, accidents, abuse, loss of parts, lack of reasonable care, incorrect use, or failure to follow instructions. This warranty is in lieu of all other warranties, expressed or implied. No representative or person is authorized to represent or assume for Carvin any liability in connection with the sale or servicing of Carvin products. CARVIN SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

When RETURNING merchandise to the factory, you may call for a return authorization number. Describe in writing each problem. If your unit is out of warranty, you will be charged the current FLAT RATE for parts and labor to bring your unit up to factory specifications.

### HELP SECTION

#### 1) AMP WILL NOT TURN ON

Check the power to the amp. Check for tripped circuit breakers, unplugged extension cords or power-strip switches that may be turned off. Check the fuse. If a dark brownish color or no wire can be seen within the glass tube, then replace. The amp may be perfectly fine but occasionally a fuse may blow because of high AC voltage surges. After the fuse has been replaced with the proper Slow Blow value and if the fuse fails again, the amp will require servicing.

#### 2) NO OUTPUT with POWER LIGHT ON

Tubes damaged in shipping will be the primary reason for your amp to not function properly. Please give us a call to help guide you through this simple repair.

#### 3) KEEP YOUR AMP LOOKING NEW

Use a damp cloth to wipe the controls on the front & rear chassis panels. Wipe the black vinyl covering with a damp cloth.

## REPLACEMENT PARTS LIST (for circuit cards)

Ref. No.	Carvin P/N	Description	Ref. No.	Description	Ref. No.	Description
B1	Jumper, 0.35", 0Ω		C37	Capacitor, Poly, 0.01μF 100V, 10%	46-10312	Regulator, 7805 +5V, 1A
B2	Jumper, 0.50", 0Ω		C38	Capacitor, Electrolytic, 10μF 50V, 20%	47-10051	Q1 Spade Terminal, QC Vertical, 0.205
B3	Jumper, 0.35", 0Ω		C39	Capacitor, Poly, 0.001μF 400V, 10%	46-10242	Q2 Spade Terminal, QC Vertical, 0.205
B4	Jumper, 0.35", 0Ω		C40	Capacitor, Poly, 0.047μF 100V, 10%	46-47312	Q3 Spade Terminal, QC Vertical, 0.205
B5	Jumper, 0.35", 0Ω		C41	Capacitor, Ceramic, 27PF 500V, 5%	45-27052	Q4 Spade Terminal, QC Vertical, 0.205
B6	Jumper, 0.50", 0Ω		C42	Capacitor, Mylar, 0.047μF 400V, 10%	41-47342	Q5 Spade Terminal, QC Vertical, 0.250
B7	Jumper, 0.50", 0Ω		C43	Capacitor, Mylar, 0.047μF 400V, 10%	41-47342	Q6 Spade Terminal, QC Vertical, 0.250
B8	Jumper, 0.50", 0Ω		C44	Capacitor, Electrolytic, 47μF 63V, 20%	47-47061	Q7 Spade Terminal, QC Vertical, 0.250
B9	Jumper, 0.8", 0Ω		C45	Capacitor, Mylar, 0.047μF 630V, 10%	46-47362	Q8 Spade Terminal, QC Vertical, 0.250
B10	Jumper, 0.35", 0Ω		C46	Capacitor, Ceramic, 10PF 500V, 5%	45-10052	Q9 Spade Terminal, QC Vertical, 0.250
B11	Jumper, 0.8", 0Ω		C47	Capacitor, Electrolytic, 1000μF 25V, 20%	47-10225	Q10 Spade Terminal, QC Vertical, 0.250
B12	Jumper, 0.35", 0Ω		C48	Capacitor, Electrolytic, 22μF 500V, 20%	42-22052	Q11 Spade Terminal, QC Vertical, 0.250
B13	Jumper, 0.35", 0Ω		C49	Capacitor, Electrolytic, 22μF 500V, 20%	42-22052	Q12 Spade Terminal, QC Vertical, 0.250
B14	Jumper, 0.35", 0Ω		C50	Capacitor, Electrolytic, 22μF 500V, 20%	42-22052	Q13 Spade Terminal, QC Vertical, 0.250
B15	Jumper, 0.50", 0Ω		C51	Capacitor, Electrolytic, 22μF 500V, 20%	42-22052	Q14 Spade Terminal, QC Vertical, 0.250
B16	Jumper, 0.8", 0Ω		C52	Capacitor, Electrolytic, 22μF 500V, 20%	42-22052	Q15 Spade Terminal, QC Vertical, 0.250
B17	Jumper, 0.50", 0Ω		C53	Capacitor, Mylar, 0.047μF 630V, 10%	46-47362	Q16 Spade Terminal, QC Vertical, 0.250
B18	Jumper, 0.35", 0Ω		C54	Capacitor, Electrolytic, 2200μF 6.3V, 20%	47-22260	Q17 Spade Terminal, QC Vertical, 0.250
B19	Jumper, 0.8", 0Ω		C55	Capacitor, Electrolytic, 22μF 500V, 20%	42-22052	Q18 Spade Terminal, QC Vertical, 0.250
B20	Jumper, 0.35", 0Ω		C56	Capacitor, Ceramic, 180PF 500V, 5%	45-18152	Q19 Spade Terminal, QC Vertical, 0.250
B21	Jumper, 0.8", 0Ω		C73	Capacitor, Poly, 0.0047μF 100V, 10%	46-47212	Q26 Spade Terminal, QC 90° Horizontal, 0.250
B22	Jumper, 0.50", 0Ω		D1	Diode, 1N4745A 16V, 1W	60-47450	Q27 Spade Terminal, QC 90° Horizontal, 0.250
B23	Jumper, 0.8", 0Ω		D2	Diode, 1N4745A 16V, 1W	60-47450	Q28 Spade Terminal, QC 90° Horizontal, 0.250
B24	Jumper, 0.50", 0Ω		D3	Diode, 1N4745A 16V, 1W	60-47450	Q29 Spade Terminal, QC 90° Horizontal, 0.250
B25	Jumper, 0.50", 0Ω		D4	Diode, 1N4745A 16V, 1W	60-47450	Q31 Spade Terminal, QC Vertical, 0.250
B26	Jumper, 0.8", 0Ω		D5	Diode, 1N4003, 1A 200V	60-40030	Q32 Spade Terminal, QC Vertical, 0.250
B27	Jumper, 0.35", 0Ω		D6	Diode, 1N4007A 1000V, 1A	60-10000	Q33 Spade Terminal, QC Vertical, 0.250
B28	Jumper, 0.35", 0Ω		D7	Diode, 1N4007A 1000V, 1A	60-10000	Q34 Spade Terminal, QC Vertical, 0.250
B29	Jumper, 0.35", 0Ω		D8	Diode, 1N4007A 1000V, 1A	60-10000	Q35 Spade Terminal, QC Vertical, 0.250
B30	Jumper, 0.35", 0Ω		D9	Diode, 1N4007A 1000V, 1A	60-10000	Q36 Spade Terminal, QC Vertical, 0.250
B31	Jumper, 0.35", 0Ω		D10	Diode, 1N4007A 1000V, 1A	60-10000	Q40 Spade Terminal, QC Vertical, 0.250
B32	Jumper, 0.35", 0Ω		D11	Diode, 1N4007A 1000V, 1A	60-10000	Q41 Spade Terminal, QC Vertical, 0.250
B33	Jumper, 0.35", 0Ω		D12	Diode, 1N4007A 1000V, 1A	60-10000	Q42 Spade Terminal, QC Vertical, 0.250
B34	Jumper, 0.35", 0Ω		D13	Diode, 1N4007A 1000V, 1A	60-10000	Q43 Spade Terminal, QC Vertical, 0.250
B35	Jumper, 0.50", 0Ω		D14	Diode, 1N4007A 1000V, 1A	60-10000	Q50 Spade Terminal, QC 90° Horizontal, 0.250
B36	Jumper, 0.50", 0Ω		D15	Diode, 1N4007A 1000V, 1A	60-10000	Q51 Spade Terminal, QC 90° Horizontal, 0.250
B37	Jumper, 0.50", 0Ω		D16	Diode, 1N4007A 1000V, 1A	60-10000	Q52 Spade Terminal, QC 90° Horizontal, 0.250
B38	Jumper, 0.50", 0Ω		D17	LED, Red small, 3mm T-1.0	60-75320	Q53 Spade Terminal, QC 90° Horizontal, 0.250
B39	Jumper, 0.50", 0Ω		D18	LED, Red small, 3mm T-1.0	60-75320	Q54 Spade Terminal, QC 90° Horizontal, 0.250
B40	Jumper, 0.50", 0Ω		F1	Fuse Clips, (1 pair)	23-03529	Q55 Spade Terminal, QC 90° Horizontal, 0.250
B41	Jumper, 0.50", 0Ω		H1A	Conn. Header, 4 Pin Vert, 2.5mm	23-11004	Q56 Spade Terminal, QC 90° Horizontal, 0.250
B42	Jumper, 0.50", 0Ω		H1B	Conn. Header, 4 Pin Vert, 2.5mm	23-11004	R1 Resistor, 100K, .35 prep., 5% Carbon
B43	Jumper, 0.50", 0Ω		H2A	Conn. Header, 2 Pin Vert, 2.5mm	23-10002	R2 Resistor, 1.5K, .35 prep., 5% Carbon
B44	Jumper, 0.50", 0Ω		H2B	Conn. Header, 2 Pin Vert, 2.5mm	23-10002	R3 Resistor, 220K, .5W, 0.5 prep., 5% Carbon
B45	Jumper, 0.50", 0Ω		H3A	Conn. Header, 4 Pin Vert, 2.5mm	23-11004	R4 Resistor, 150K, .35 prep., 5% Carbon
B46	Jumper, 0.50", 0Ω		H3B	Conn. Header, 4 Pin Vert, 2.5mm	23-11004	R5 Resistor, 100K, .35 prep., 5% Carbon
B47	Jumper, 0.50", 0Ω		H5A	Conn. Header, 2 Pin Vert, 2.5mm	23-10002	R6 Resistor, 1.5K, .35 prep., 5% Carbon
B48	Jumper, 0.50", 0Ω		H5B	Conn. Header, 2 Pin Vert, 2.5mm	23-10002	R7 Resistor, 220K, .5W, 0.5 prep., 5% Carbon
B49	Jumper, 0.50", 0Ω		H7A	Conn. Header, 2 Pin Vert, 2.5mm	23-10002	R8 Resistor, 2.2K, .35 prep., 5% Carbon
B50	Jumper, 0.50", 0Ω		H7B	Conn. Header, 2 Pin Vert, 2.5mm	23-10002	R9 Resistor, 1.5K, .35 prep., 5% Carbon
B51	Jumper, 0.50", 0Ω		H8	Conn. Header, 4 Pin Vert, 2.5mm	23-11004	R10 Resistor, 220K, .5W, 0.5 prep., 5% Carbon
B52	Jumper, 0.50", 0Ω		J1	Phone Jack, 1/4, 90° Rev Threaded Neck	21-01804	R11 Resistor, 47K, .35 prep., 5% Carbon
C1	Capacitor, Electrolytic, 10μF 50V, 20%	47-10051	J2	Phone Jack, 1/4, 3 Pin Plastic, 24mm	21-06453	R12 Resistor, 1.5K, .35 prep., 5% Carbon
C2	Capacitor, Mylar, 0.047μF 400V, 10%	41-47342	J3	Phone Jack, 1/4, 3 Pin Plastic, 24mm	21-06453	R13 Resistor, 220K, .5W, 0.5 prep., 5% Carbon
C3	Capacitor, Poly, 0.001μF 100V, 10%	46-10212	J4	Phone Jack, 1/4, 3 Pin Plastic, 24mm	21-06453	R14 Resistor, 150K, .35 prep., 5% Carbon
C4	Capacitor, Poly, 0.033μF 100V, 10%	46-33312	J5	Phone Jack, 1/4, 7 Pin Plastic Stereo, 24mm	21-06457	R15 Resistor, 100K, .35 prep., 5% Carbon
C5	Capacitor, Ceramic, 120PF 500V, 10%	45-12152	JMP1	Jumper, .35 prep., 0.0Ω	50-00035	R16 Resistor, 22K, .35 prep., 5% Carbon
C6	Capacitor, Poly, 0.01μF 100V, 10%	46-10312	L1	Relay, 30V/2A, 5V DIP DPDT, PCB MNT	70-05305	R17 Resistor, 22K, .35 prep., 5% Carbon
C7	Capacitor, Ceramic, 330PF 1000V, 10%	45-33113	P1	Potentiometer, B100K, 0 Shaft, Pot 16, RX.250 90°	71-14052	R18 Resistor, 3.3K, .35 prep., 5% Carbon
C8	Capacitor, Ceramic, 560PF 500V, 10%	45-56152	P2	Potentiometer, B1Meg, 0 Shaft, Pot 16, RX.250 90°	71-14070	R19 Resistor, 100K, 0.5 prep., 5% Carbon
C9	Capacitor, Electrolytic, 10μF 50V, 20%	47-10051	P3	Potentiometer, 25A25K, 0 Shaft, Pot 16, RX.250 90°	71-14050	R20 Resistor, 22K, .35 prep., 5% Carbon
C10	Capacitor, Mylar, 0.047μF 400V, 10%	41-47342	P4	Potentiometer, B1Meg, 0 Shaft, Pot 16, RX.250 90°	71-14070	R21 Resistor, 180K, .35 prep., 5% Carbon
C11	Capacitor, Poly, 0.001μF 100V, 10%	46-10212	P5	Potentiometer, B1Meg, 0 Shaft, Pot 16, RX.250 90°	71-14060	R22 Resistor, 150K, .35 prep., 5% Carbon
C12	Capacitor, Ceramic, 560PF 500V, 10%	45-56152	P6	Potentiometer, B1Meg, 0 Shaft, Pot 16, RX.250 90°	71-14070	R23 Resistor, 0.562K, .35 prep., 5% Carbon
C13	Capacitor, Electrolytic, 10μF 50V, 20%	47-10051	P7	Potentiometer, B1Meg, 0 Shaft, Pot 16, RX.250 90°	71-14070	R24 Resistor, 470Ω, .35 prep., 5% Carbon
C14	Capacitor, Mylar, 0.0022μF 400V, 5%	46-22212	P8	Potentiometer, 25A25K, 0 Shaft, Pot 16, RX.250 90°	71-14050	R25 Resistor, 2.2K, .35 prep., 5% Carbon
C15	Capacitor, Electrolytic, 10μF 50V, 20%	47-10051	P9	Potentiometer, B1Meg, 0 Shaft, Pot 16, RX.250 90°	71-14070	R26 Resistor, 100K, .35 prep., 5% Carbon
C16	Capacitor, Mylar, 0.01μF 400V, 10%	41-10342	P10	Potentiometer, B100K, 0 Shaft, Pot 16, RX.250 90°	71-14052	R27 Resistor, 100K, .35 prep., 5% Carbon
C17	Capacitor, Poly, 0.001μF 100V, 10%	46-10212	P11	Potentiometer, B100K, 0 Shaft, Pot 16, RX.250 90°	71-14052	R28 Resistor, 100K, .35 prep., 5% Carbon
C18	Capacitor, Poly, 0.022μF 100V, 10%	46-22212	P15	Potentiometer, Trimmer, 20K, PCB MTG	71-22012	R29 Resistor, 0.562K, .35 prep., 5% Carbon
C19	Capacitor, Ceramic, 250PF 500V, 5%	45-25152	P15	Potentiometer, 5A500K, 0 Shaft, Pot 16, RX.250 90°	71-14060	R30 Resistor, 0.562K, .35 prep., 5% Carbon
C20	Capacitor, Electrolytic, 1000μF 25V, 20%	47-10225	PL1	Receptacle AC, Jack AC w/ 20mm Fuse	21-02804	R31 Resistor, 0.0Ω, .35 prep., 5% Carbon
C21	Capacitor, Poly, 0.0022μF 100V, 10%	46-22212	Q1	Transistor, 2N5550 NPN, 250V, TO-92	60-55500	R32 Resistor, 2.2K, .35 prep., 5% Carbon
C22	Capacitor, Poly, 0.0047μF 100V, 10%	46-47312				
C23	Capacitor, Poly, 0.022μF 100V, 10%	46-22212				
C24	Capacitor, Poly, 0.0047μF 400V, 10%	41-47342				
C25	Capacitor, Ceramic, 250PF 500V, 5%	45-25152				
C26	Capacitor, Electrolytic, 1000μF 25V, 20%	47-10225				
C27	Capacitor, Poly, 0.0022μF 100V, 10%	46-22212				
C28	Capacitor, Electrolytic, 2200μF 6.3V, 20%	47-22260				
C29	Capacitor, Electrolytic, 2200μF 6.3V, 20%	47-22260				
C30	Capacitor, Electrolytic, 2200μF 6.3V, 20%	47-22260				
C31	Capacitor, Ceramic, 82PF 500V, 5%	45-82052				
C32	Capacitor, Electrolytic, 10μF 50V, 20%	47-10051				
C33	Capacitor, Mylar, 0.047μF 400V, 10%	41-47342				
C34	Capacitor, Poly, 0.0022μF 100V, 10%	46-22212				
C35	Capacitor, Electrolytic, 10μF 50V, 20%	47-10051				
C36	Capacitor, Poly, 0.001μF 400V, 10%	46-10242				
R33	Resistor, 220Ω, .35 prep., 5% Carbon	50-22025	R34	Resistor, 47K 1W, 0.8 prep., 5% Carbon	53-47045	
R35	Resistor, 2.2M, .35 prep., 5% Carbon	50-22065	R36	Resistor, 220K, .35 prep., 5% Carbon	50-22055	
R37	Resistor, 1.5K, .35 prep., 5% Carbon	50-15035	R38	Resistor, 220K 5W, 0.5 prep., 5% Carbon	52-22055	
R39	Resistor, 100K, .35 prep., 5% Carbon	50-10055	R40	Resistor, 100K, .35 prep., 5% Carbon	50-10055	
R41	Resistor, 1.0M, .35 prep., 5% Carbon	50-10065	R42	Resistor, 1.5K, .35 prep., 5% Carbon	50-15035	
R43	Resistor, 100K, .35 prep., 5% Carbon	50-10055	R44	Resistor, 22K, .35 prep., 5% Carbon	50-22045	
R45	Resistor, 100K, .35 prep., 5% Carbon	50-10055	R46	Resistor, 22K, .35 prep., 5% Carbon	50-22045	
R47	Resistor, 100K, .35 prep., 5% Carbon	50-10055	R48	Resistor, 100K, .35		