## LECACK



W hen I considered having a signature series amp built, there were several important issues that needed to be addressed. F irst, it had to sound superior to any other amp I 'd ever come across and it had to be built to withstand the abuse that a world tour could give it. It al so had to be something affordable for most musicians and not just a few privileged ones! It had to have the appearance of class and integrity that reflects the sound. I 'm thrilled to say The Legacy is all that I dreamed it could be.


Congratulations on your purchaseof the Legacy all tubesignatureamplifier. Steve Vai worked very closely with Carvin Engineering to develop the sound and look of the Legacy Amplifiers. Exhaustive listening tests of various tube and electronic circuitry were performed by Vai. He also tested dozens of prototype enclosures loaded with various vintage and prototype speakers. His choice of 日 34 tubes and Celestion ${ }^{\text {TM }}$ Vintage 30 speakers provide the finishing touches on a truly original amp.

## CLEAN AND OVERDRIVE CHANNELS

The equalization of the clean and overdrive channel is designed to offer clarity to your instrument. You will also take notice of the clean channels PRESENCE which adds acoustic voicing to your instrument. This switch boosts only the guitars very
highest harmonics which are in the 10 k Hz range instead of the normal 3 KHz 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 turned the other way, it can add bite to your leads.

## DYNAMIC EL3 4 POWER TUBES

Your amp is equipped with 且34 power tubes because of their smooth distortion, responsive sound and reliability. The compression characteristics of these "high-output" 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 TRBBLEtone 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 11 k Hz giving the Legacy it's dynamic highs.

## REVERB

The FS22 footswith for the long tailed REVERB system in the Legacy switches only the reverb "send" leaving the tail of the reverb to decay naturally, the way it's done in the studio. Aspecial prefilter eliminates the spring "boing" normally heard in other systems giving it a "lush" sound. Theall 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.

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

## MODEL VL100 HEAD SPECS:

| RMS Powe | 50 or 100 watts | Speakers: | Two Vintage 30 Celestion ${ }^{\text {Tw }}$ Sp |
| :---: | :---: | :---: | :---: |
| Output Impedance: | 4, 8 \& 16 $\Omega$ | RMS Power: | 50 or 100 watts |
| Input Impedance: | 470,000 ohms | Output Impedance: | 4,8 \& $16 \Omega$ |
| Tone Controls: | BASS: 80 Hz | Input Impedance: | 470,000 ohms |
| (Both Channels) | MID: $600-700 \mathrm{~Hz}$ | Tone Controls: | BASS: 80 Hz |
|  | TREBLE: 11 kHz | (Both Channels) | MID: $600 \cdot 700 \mathrm{~Hz}$ |
| Ch 1 Sensitivity: | 16 mV for clipping |  | TREELE: 11 kHz |
| Ch 2 Sensitivity: | 30 mV for full output | Ch 1 Sensitivity: | 16 mV for clipping |
| Channels: | 2-switching | Ch 2 Sensitivity: | 30 mV for full output |
| Voiced Line Out: | $1.5 \mathrm{VAC} @ 100$ watts RMS | Channels: | 2 -switching |
| Preamp Tubes: | 5-12AX7's (dual stage) | Voiced Line Out: | $1.5 \mathrm{VAC} @ 100$ watts RMS |
| Power Amp Tubes: | 4-EL34's (power pentode) | Preamp Tubes: | 5-12AX7's (dual stage) |
| USA Model: | $120 \mathrm{VAC}, 300 \mathrm{VA}$ | Power Amp Tubes: | 4-EL34's (power pentode) |
| Export Model: | $230 \mathrm{VAC}, 300 \mathrm{VA}$ | USA Model: | $120 \mathrm{VAC}, 300 \mathrm{VA}$ |
| Cabinet Size: | $24.25 \mathrm{~W} \times 10.5 \mathrm{H} \times 9.5$ "D | Export Model: | $230 \mathrm{VAC}, 300 \mathrm{VA}$ |
| Cabinet: | 7-ply poplar wood | Cabinet Size: | $26 \mathrm{~W} \times 10.25 \mathrm{D} \times 19.5 \mathrm{H}$ |
| Net Weight: | 40 lbs | Cabinet: | 7 -ply poplar wood |
| Warranty: | One Year | Net Weight: | 62 lbs |
| Options: | CV3200 cover, FS22 footswitch | Warranty: | One Year |
|  |  | Options: | CV3212 cover, FS22 footswitch |

For your records, you may wish to record the following information.
Serial No.

## VL100 / VL2 12 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 Legacy amp, a 120 or 230 AC grounded power outlet, your instrument and a standard guitar cord. With the amp turned off, 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 footswitch, plug it into the rear foot switch jack for switching the channels and reverb. Note: The channel SEEECT button must be in the OUT position (OH1) for the FS22 to function
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're ready to go. Please call if you feel your amp is malfunctioning. Occasionally tubes are damaged in shipping.

## FRONT PANEL

## 1. GUITAR INPUT

A standard $1 / 4^{\prime \prime}$ input jack feeds both channels through using the SEECT 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). Along cable with high capacitance will reduce the overall treble response from your guitar pickups.

## 2. CHANNEL SELECT

Set the channel SEEECT switch to the desired channel. The LD'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 SEECT to the " OU" 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 around 3 \& 6. For full blown overdrive, set the control between 8 and 10. Drive settings above 8 are subject to over saturation depending on the output of the guitar pickups used. High-output pickups can over saturate causing sluggish distortion. Play your guitar with it's volume at 10 and decrease the amount of drive until the crisp highs come back.

## 6. LEAD-BASS, MID \& TREBLE

To start off with, set the BASS, MID \& TRBLE 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 onal spectrum. Careful adjustment with the TRBLE 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 OH2 PRESENCEswitch increases only the highest guitar harmonics in the $8-10 \mathrm{kHz}$ range which is ideal for brightening up middy single coil neck pickups. A normal bright switch works only in the 3 kHz 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 ONOF switch. As the amp is turned on, the RED portion of the power switch will illuminate as your ON indicator.

VL100 Head as shown
VL212 Combo front \& rear panels reversed

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TUBE REPLACENENT
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## REAR PANEL

## 15．SPEAKER JACKS

Two 1／4＂SPEAKRR 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 IMPEDANCESWITCH offers the selection of 4,8 or 16 ohms to match your speaker system．The correct setting for use with one C412 cabinet is $16 \Omega$ ．For use with two C412 cabinets，the correct setting would be 8 ohms．The impedance of the Legacy V 212 combo amp is 8 ohms．In the case of adding another 8 ohm system such as the C212E 8 ohm extension cabinet，move the switch to 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 100 watt operation．For lower overall levels and early power amp clipping，move this switch to the 2 TUBE 50 watt operation．The volume reduction will only be 3 dB ．

## 18．POWER TUBE BIAS SWITCH

If you desireto change from 日 34 to 5881 （6L6GC）power tubes，you may do so by select－ ing the external BIAS switch to the 5881 （6L6GC）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 LINEOU $1 / 4$＂jack is＂CABINET VOCED＂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 EQsetting 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．FS2 2 FOOTSW ITCH

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 SEEECT switch on the front panel must be selected to the＂OU＂channel 1 position before the footswitch will work．Now that you are connected correctly，the chan－ nels 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 possiblenoisefrom an effects processor，use the effects loop instead of plug－ ging the guitar into the effects and then into the amp．To use the 1 TECTS LOOP，plug the INPUT of your effects into the SEND jack and the OUTPU of your effects into the REIURN jack．Use shielded cables，not speaker cables．It＇s possible 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 ACPOWERCORD supplied is designed to operate with one type of volt－ age（theEuropean 230 V export model uses aCE－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 Legacy features a circuit breaker that protects itself from damage that would oth－ erwise be caused by power surges，or short circuits from damaged cables．

## HELP SECTION

## a）USING THE VAI＂HIDDEN FEATURE＂

One of the＂hidden＂features of the Legacy amp is using a technique that Steve Vai requested be part of the amp for his own use．While playing on the lead channel with a generous amount of DRIVE（around 6），back off the volume on your guitar．You will find the channel actually＂cleaned up＂with your guitar at a lower volume．This is a great fea－ ture for playing both rhythm and lead without switching channels．You will also find that the amp will be very responsive to your＂attack＂．An advanced player knows how to vary his／her attack when picking or strumming，and the Legacy is designed to respond to this．

## b）FEEDBACK FROM THE LEAD CHANNEL

The Legacy will feedback when the LEAD volume，DRIVE，TRBLEE 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 DRIVEcontrol 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．

## c）TUBE REPLACEMENT G UIDE

It is not uncommon for tubes to malfunction during shipping．If your amp is not work－ ing properly（popping noises，bad ringing，or power tube problems），pleasecall for assis－ tance or refer to the following tube replacement guide．
1）The 12AX7A preamp tubes V1 and V2 are the most critical tubes for noise problems with V1 being the most sensitive（try exchanging V1 and V2）．Replace these tubes if you have poping or abad ringing in the Lead Drive channel．Note：Low noisetubes are very hard to get and have to be tested for low noise．V3，V4，and V5 generally do not generate noise into the amp regardless of how noisy the tubes may be．V3 and V5 drives the Cean channel and power amp stage．V4 drives the Reverb system． If the reverb fails，check the cables before you replace V4．Sometimes the small lead wires inside the tank break．If the power amp section is not working，check V3 \＆V4 by inserting a signal into the rear 日TECTSRETURNjack．If the power amp still does not work，read about the power tubes V6 through V9．12AX7 LOCATIONS：V1 is located next to the outside（left or right depending on the model）．The other tubes following consecutively with V 5 twards the middle of the chassis．
2）The 旦 34 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 hap－ pens，shut the amp down immediately．Check the rear bias switch to be sure that it is selected for the proper tubes．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 samedirection．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．
 sound samples．www．carvin．com／vai

[^0]AThis symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of suf-
ficient magnitude to constitute a risk of electric shock to persons.

CAUTION

## RISK OF ELECTRIC SHOCK DO NOT OPEN

$C$

This symbol is
intended to alert the user to the presence important operating tions in the literature accompanying the appliance.

IMPORTANT! FOR YOUR PROTECTION, PLEASE READ THEFOLLOWING:
WATER AND MOSTURE 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.
POWERSOURCES: Theappliance should be connected to apower supply only of the typedescribed in the operating instructions or as marked on the appliance.
GROUNDINGORPOLARIZATION: Precautions should be taken so that the grounding or polarization means of an appliance is not defeated.
POWER OORD 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 INVOICEIS REQUIREDTOVERIFY 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 OONSEQUENTIAL DAMAGES.
When REIURNING merchandise to thefactory, 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 PLAT 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) NOOUTPUT with POWER LIGHT ON

Tubes damaged in shipping will bethe primary reason for your amp to not function properly. Please give us a call to help guide you through this simple repair.
3) K巴Р YOUR AMP LOOKINGNEW

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)

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL! THIS UNIT CON-

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Jumper, 0.35",0\Omega
Jumper, 0.50",0\Omega
Jumper, 0.35",0\Omega
    Jumper, 0.35",0\Omega
    Jumper, 0.50",0\Omega
    Jumper, 0.50",0\Omega
    Jumper, 0.50",0\Omega
    Jumper, 0.8",0\Omega
    Jumper, 0.35",0\Omega
    Jumper, 0.8",0\Omega
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    Jumper, 0.35",0\Omega
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    Jumper,, 0.35,",\Omega
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    Jumper, 0.35",0\Omega
    Jumper, 0.50", }\Omega
    Capacitor, Bectrolytic,, 10\muF50V, 20%
    Capacitor,Mylar, 0.047\muF400V,10%
    Capacitor, Poly, 0.001\muF 100V, 10%
    Capacitor, Poly, 0.033HF 100V, 10%
    Capacitor, Ceramic, 120PF500V, 10%
    Capacitor, Poly, 0.014F 100V, 10%
    Capacitor, Ceramic, 330PF 1000V, 10%
    Capacitor, Ceramic, 560PF500V, 10%
    Capacitor, Bectrolytic, 10\muF50V, 20%
    Capacitor, Mylar, 0.047\muF 400V,10%
    Capacitor, Poly, 0.001\muF 100V, 10%
    Capacitor, Ceramic, 560PF500V,10%
    Capacitor, Bectrolytic, 10\muF50V, 20%
    Capacitor,Mylar, 0.0022\muF400V,5%
    Capacitor, Mylar, 0.01\muF400V, 10%
    Capacitor, Poly, 0.001\muF100V, 10%
    Capacitor, Poly, 0.022\muF 100V, 10%
    Capacitor, Ceramic, 250PF500V, 5%
    Capacitor, Bectrolytic, 1000\muF25V, 20%
    Capacitor, Poly, 0.0022\muF 100V, 10%
    Capacitor, Poly, 0.0047\muF 100V, 10%
    Capacitor, Poly, 0.022\muF 100V, 10%
    Capacitor, Poly, 0.0047\muF 400V, 10%
    Capacitor, Ceramic, 250PF 500V,5%
    Capacitor, Bectrolytic, 1000\muF25V, 20%
    Capacitor, Poly, 0.0022\muF 100V, 10%
    Capacitor, Bectrolytic, 2200\muF6.3V,20%
    Capacitor, Bectrolytic, 2200\muF6.3V, 20%
    Capacitor, Ceramic, 82PF500V, 5%
    Capacitor, Bectrolytic, 10\muF50V, 20%
    Capacitor,Mylar, 0.047\muF400V,10%
    Capacitor, Poly, 0.0022\mu\textrm{F 100V, 10%}
    Capacitor, ,ectrolytic, 10\muF50, 20%
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[^1] Capacitor, Poly, $0.01 \mu$ F $100 \mathrm{~V}, 10 \%$ Capacitor, Bectrolytic, 10 10 F 50V, $20 \%$ Capacitor, Poly, $0.001 \mu$ F 400V, 10\% Capacitor, Poly, $0.047 \mu \mathrm{~F} 100 \mathrm{~V}, 10 \%$ Capacitor, Ceramic, 27PF500V, 5\% Capacitor, Mylar, 0.047 $\mathrm{HF} 400 \mathrm{~V}, 10 \%$ Capacitor, Mylar, $0.047 \mathrm{FF} 400 \mathrm{~V}, 10 \%$ Capacitor, Bectrolytic, 47 C F63V, $20 \%$ Capacitor, Mylar, 0.047 C F630V, $10 \%$ Capacitor, Ceramic, 10PF500V, 5\% Capacitor, Bectrolytic, $1000 \mu \mathrm{~F} 25 \mathrm{~V}, 20 \%$
Capacitor, Bectrolytic, $22 \mu \mathrm{~F} 500 \mathrm{~V}, 20 \%$ Capacitor, Bectrolytic, $22 \mu \mathrm{~F} 500 \mathrm{~V}, 20 \%$ Capacitor, Bectrolytic, $22 \mu \mathrm{~F} 500 \mathrm{~V}, 20 \%$
Capacitor, , lectrolytic, $22 \mu \mathrm{~F} 500 \mathrm{~V}, 20 \%$ Capacitor, Bectrolytic, $22 \mu \mathrm{~F} 500 \mathrm{~V}, 20 \%$
Capacitor, Bectrolytic, $22 \mu \mathrm{~F} 500 \mathrm{~V}, 20 \%$ Capacitor, Bectrolytic, $22 \mu \mathrm{~F} 500 \mathrm{~V}, 20 \%$
Capacitor, Bectrolytic, $22 \mu \mathrm{~F} 500 \mathrm{~V}, 20 \%$ Capacitor, Bectrolytic, $22 \mu \mathrm{~F} 500 \mathrm{~V}, 20$
Capacitor, Mylar, $0.047 \mu \mathrm{~F} 630 \mathrm{~V}, 10 \%$ Capacitor, Bectrolytic, $2200 \mu \mathrm{~F} 6.3 \mathrm{~V}, 20 \%$ Capacitor, Bectrolytic, $22 \mu \mathrm{~F} 500 \mathrm{~V}, 20 \%$ Capacitor, Ceramic, 180PF500V, 5\% Capacitor, Poly, 0.0047 FF 100V, 10\% Diode, 1N4745A 16V, 1W Diode, 1N4745A 16V, 1 W Diode, 1N4745A 16V, 1W Diode, 1N4745A 16V, 1W Diode, 1N4003, 1A 200 V Diode, 1N4007A 1000V, 1A Diode, 1N4007A 1000V, 1A Diode, 1N4007A 1000V, 1A Diode, 1N4007A 1000V, 1A Diode, 1N4007A 1000V, 1A Diode, 1N4007A 1000V, 1 A
Diode, 1N007A 1000V, 1 A
Diode, 1N4007A 1000V, 1 A
Diode, 1N4007A 1000V, 1A
Diode, 1N4007A 1000V, 1A
Diode, 1N4007A 1000V, 1 A
LED, Red small, 3mm T-1.0
Fuse Cips, (1 pair)
Fuse Qips, (1 pair)
Conn. Header, 4 Pin Vert, 2.5 mm
Conn. Header, 4 Pin Vert, 2.5 mm
Conn. Header, 4 Pin Vert, 2.5 mm
Conn. Header, 2 Pin Vert, 2.5 mm
Conn. Header, 2 Pin Vert, 2.5 mm
Conn. Header, 2 Pin Vert, 2.5 mm
Conn. Header, 4 Pin Vert, 2.5 mm
Conn. Header, 4 Pin Vert, 2.5 mm
Conn. Header, 2 Pin Vert, 2.5 mm
Conn. Header, 2 Pin Vert, 2.5 mm
Conn. Header, 2 Pin Vert, 2.5 mm
Conn. Header, 2 Pin Vert, 2.5 mm
Conn. Header, 4 Pin Vert, 2.5 mm
Phone Jack, $1 / 4,90^{\circ}$ Rev Threaded Neck
Phone Jack, $1 / 4,3$ Pin Plastic, 24 mm
Phone Jack, $1 / 4,3$ Pin Plastic, 24 mm
Phone Jack, $1 / 4,3$ Pin Plastic, 24 mm
Phone Jack, $1 / 4,7$ Pin Plastic Stereo, 24 mm
Jumper . 35 prep., $0.0 \Omega$
Relay, 30V/2A, 5V DIP DPDT, PCBMNT
Potentiometer, B100K, OShaft, Pot 16, RX. $25090^{\circ}$
Potentiometer, B1Meg, OShaft, Pot 16, RX. $25090^{\circ}$
Potentiometer, B1Meg, OShaft, Pot 16, RX. $25090^{\circ}$
Potentiometer, 25A25K, OShaft, Pot 16, RX $25090^{\circ}$
Potentiometer, B1Meg, OShaft, Pot 16, RX $25090^{\circ}$
Potentiometer, 5A500K OShaft, Pot 16, RX $25090^{\circ} 7114070$
Potentiometer, 5 A500K, O Shaft, Pot 16, RX.250 $90^{\circ} 71-14060$
Potentiometer, B1Meg O Shatt Pot 16, RX $25090^{\circ} 7114670$
Potentiometer, B1Meg, OShaft, Pot 16, RX250 90 $0^{\circ}$ 71-14070
Potentiometer, B1Meg, OShaft, Pot 16, RX250 $90^{\circ}$
Potentiometer, 25A25K, OShaft, Pot 16, RX. $25090^{\circ} 71-14050$
Potentiometer, B1Meg, OShaft, Pot 16, RX $25090^{\circ}$ 71-14070
Potentiometer, B1Meg, OShaft, Pot 16, RX $25090^{\circ}$
Potentiometer, B100K, OShaft, Pot 16, RX $25090^{\circ}$
Potentiometer, B100K, OShaft, Pot 16, PX
Potentiometer, Trimmer, 20K, PCB MTG

$\begin{array}{lr}\text { Potentiometer, Trimmer, 2OK, PCB MTG } & 71-22012 \\ \text { Potentiometer, 5A500K OShaft, Pot 16, }\end{array}$
Potentiometer, 5A500K, OShaft, Pot 16, RX $25090^{\circ}$
Transistor, 2N5550 NPN, 250V, TO-92
$\infty$

Regulator, $7805+5 \mathrm{~V}$, 1 A
Spade Terminal, QC Vertical, 0.205
Spade Terminal, @CVertical, 0.205
Spade Terminal, ©CVertical, 0.205
Spade Terminal, ©CVertical, 0.205
Spade Terminal, ©CVertical, 0.205
Spade Terminal, QCVertical, 0.250
Spade Terminal, © Vertical, 0.250
Spade Terminal, QC Vertical, 0.250
Spade Terminal, QCVertical, 0.250
Spade Terminal, QC Vertical, 0.250
Spade Terminal, @C Vertical, 0.250
CC11 Spade Terminal, QCVertical, 0.250
CC12 Spade Terminal, QCVertical, 0.250
47-10051
$47-10051$
$46-10242$
$46-47312$
$46-10242$
$46-47312$
$45-27052$
$46-47312$
$45-27052$
41
$45-270522$
$41-47342$

ઠ ర્ઠ ర્ઠ C2 Spade C2 Spade QC4
वC5 $41-47342$
$47-47061$ $47-47061$
$46-47362$ $46-47362$
$45-10052$
47 N NㅡN

 N N 14 Spade Terminal, ©CVertical, 0.250 C14 Spade Termina, QC Vertical, 0.250 C16 Spade Terminal, QC Vertical, 0.250 C16 Spade Terminal, QCVertical, 0.250 C18 Spade Terminal, QCVertical, 0.250 C19 Spade Terminal, QCVertical, 0.250 Spade Terminal, QC $90^{\circ}$ Horizontal, 0.250 Spade Terminal, $Q c 90^{\circ}$ Horizontal, 0.250
Spade Terminal, $\propto \subset 0^{\circ}$ Horizontal, 0.250 Spade Terminal, QC $90^{\circ}$ Horizontal, 0.250 Spade Terminal, $\propto 90^{\circ}$ Horizontal, 0.250 Spade Terminal, QC Vertical, 0.250 Spade Termina, QCVertical, 0.250
Spade Terminal, QC Vertical, 0.250 Spade Terminal, QCVertical, 0.250
Spade Terminal, QC Vertical, 0.250 Spade Terminal, QC Vertical,
Spade Terminal, QC Vertical, 0.250 Spade Terminal, QC Vertical, 0.250 Spade Terminal, QCVertical, 0.250 Spade Terminal, QC Vertical, 0.250 Spade Terminal, ©C Vertical, 0.250 Spade Terminal, QC Vertical, 0.250 Spade Terminal, QCVertical, 0.250 Spade Terminal, QC $90^{\circ}$ Horizontal, 0.250
Spade Terminal, $\propto \subset 90^{\circ}$ Horizontal, 0.250 Spade Terminal, $\propto \subset 90^{\circ}$ Horizontal, 0.250 Spade Terminal, ©C $90^{\circ}$ Horizontal, 0.250
Spade Terminal, $\propto 90^{\circ}$ Horizontal, 0.250 Spade Terminal, $\propto 90^{\circ}$ Horizontal, 0.250 Spade Terminal, $\propto \subset 90^{\circ}$ Horizontal, 0.250
Spade Terminal, $\propto \subset 90^{\circ}$ Horizontal, 0.250 Spade Terminal, $Q \subset 90^{\circ}$ Horizontal, 0.250
Spade Terminal, $Q \subset 90^{\circ}$ Horizontal, 0.250 Spade Terminal, QC $90^{\circ}$ Horizontal, 0.250
Resistor, $100 \mathrm{~K}, .35$ prep., $5 \%$ Carbon Resistor, 100K, .35 prep., $5 \%$ Carbon Resistor, $220 \mathrm{~K} .5 \mathrm{~W}, 0.5$ prep., $5 \%$ Carbon Resistor, $22 \mathrm{~K} .5 \mathrm{~W}, 0.5$ prep., $5 \%$ Carban
Resistor, $150 \mathrm{~K}, .35$ prep., $5 \%$ Carbon Resistor, $150 \mathrm{~K}, .35$ prep., $5 \%$ Carbon
Resistor, $100 \mathrm{~K}, .35$ prep., $5 \%$ Carbon Resistor, $1.5 \mathrm{~K}, .35$ prep.. $5 \%$ Carbon
Resistor, $1.5 \%$ Carbon Resistor, $1.5 \mathrm{KK}, 35$ prep., $5 \%$ Carbon
Resistor, $220 \mathrm{~K} .5 \mathrm{~W}, 0.5$ prep., $5 \%$ Carbon Resistor, 2.2M, .35 prep., $5 \%$ Carbon Resistor, $1.5 \mathrm{~K}, .35$ prep.., $5 \%$ Carbon Resistor, $220 \mathrm{~K} .5 \mathrm{~W}, 0.5$ prep., $5 \%$ Carbon Resistor, $47 \mathrm{~K}, .35$ prep., $5 \%$ Carbon Resistor, $1.5 \mathrm{~K}, .35$ prep., $5 \%$ Carbon Resistor, $220 \mathrm{~K} .5 \mathrm{~W}, 0.5$ prep., $5 \%$ Carbon Resistor, $150 \mathrm{~K}, .35$ prep., $5 \%$ Carbon Resistor, 100K, . 35 prep., $5 \%$ Carbon Resistor, 22K, . 35 prep., $5 \%$ Carbon Resistor, 22K, . 35 prep., $5 \%$ Carbon Resistor, $3.3 \mathrm{~K}, .35$ prep., $5 \%$ Carbon Resistor, $100 \mathrm{~K}, 0.5$ prep., $5 \%$ Carbon
Resistor, $180 \mathrm{~K}, 35$ prep., $5 \%$ Carbon Resistor, 180K, . 35 prep., 5\% Carbon Resistor, 22K, 35 prep., $5 \%$ Carbon Resistor, $0.56 \Omega$, .35 prep., $5 \%$ Carbon Resistor, $150 \Omega$, .35 prep., $5 \%$ Carbon Resistor, $470 \Omega, .35$ prep., $5 \%$ Carbon
Resistor, $2.2 \mathrm{~K}, 35$ prep, $5 \%$ Carbon Resistor, $2.2 \mathrm{~K}, .35$ prep., $5 \%$ Carbon
Resistor, $100 \Omega, 35$ prep., $5 \%$ Carbon Resistor, $100 \Omega, .35$ prep., $5 \%$ Carbon
Resistor, $100 \Omega, .35$ prep., $5 \%$ Carbon Resistor, $100 \Omega,, 35$ prep., $5 \%$ Carbon
Resistor, $0.56 \Omega, .35$ prep., $5 \%$ Carbon Resistor, $0.56 \Omega,, 35$ prep., $5 \%$ Carbon
Resistor, $0.56 \Omega, 35$ prep $5 \%$ Carbon Resistor, $0.56 \Omega, .35$ prep.
Jumper, $0.0 \Omega 0.35$ prep. Resistor, 2.2M, 35 prep., $5 \%$ Carbon
60-55500 Transistor, 2N5550 NPN, 250V, TO-92

| 60-78050 | R33 | Resistor, $220 \Omega$, .35 prep., $5 \%$ Carbon |
| :---: | :---: | :---: |
| 06-40045 | R34 | Resistor, $47 \mathrm{~K} 1 \mathrm{~W}, 0.8$ prep., $5 \%$ Carbon |
| 06-40045 | R35 | Resistor, 2.2M, .35 prep., $5 \%$ Carbon |
| 06-40045 | R36 | Resistor, 220K, 35 prep., 5\% Carbon |
| 06-40045 | R37 | Resistor, 1.5K, . 35 prep., $5 \%$ Carbon |
| 06-40050 | R38 | Resistor, $220 \mathrm{~K} .5 \mathrm{~W}, 0.5$ prep., 5\% Carbon |
| 06-40050 | R39 | Resistor, $100 \mathrm{~K}, .35$ prep., $5 \%$ Carbon |
| 06-40050 | R40 | Resistor, 1.0M, .35 prep., $5 \%$ Carbon |
| 06-40050 | R41 | Resistor, $1.5 \mathrm{~K}, .35$ prep., $5 \%$ Carbon |
| 06-40050 | R42 | Resistor, 100K, .35 prep., $5 \%$ Carbon |
| 06-40050 | R43 | Resistor, $22 \mathrm{~K}, .35$ prep., $5 \%$ Carbon |
| 06-40050 | R44 | Resistor, 22K, . 35 prep., 5\% Carbon |
| 06-40050 | R45 | Resistor, 100K, .35 prep., $5 \%$ Carbon |
| 06-40050 | R46 | Resistor, $560 \Omega$, .35 prep., $5 \%$ Carbon |
| 06-40050 | R47 | Resistor, 100K, 35 prep., $5 \%$ Carbon |
| 06-40050 | R48 | Resistor, 100K, 35 prep., $5 \%$ Carbon |
| 06-40050 | R49 | Resistor, $100 \mathrm{~K}, .35$ prep., $5 \%$ Carbon |
| 06-40050 | R50 | Resistor, $220 \mathrm{~K}, .35$ prep., $5 \%$ Carbon |
| 06-40050 | R51 | Resistor, $220 \mathrm{~K}, .35$ prep., $5 \%$ Carbon |
| 06-40050 | R52 | Resistor, $220 \mathrm{~K}, .35$ prep., 5\% Carbon |
| 06-40060 | R53 | Resistor, $22 \mathrm{~K}, .35$ prep., $5 \%$ Carbon |
| 06-40060 | R54 | Resistor, $100 \mathrm{~K}, 35$ prep., $5 \%$ Carbon |
| 06-40060 | R55 | Resistor, $4.7 \mathrm{~K} 1 \mathrm{~W}, 0.8$ prep., $5 \%$ Carbon |
| 06-40060 | R56 | Resistor, 2.2K 1W, 0.8 prep., 5\% Carbon |
| 06-40050 | R57 | Resistor, $350 \Omega 10 \mathrm{~W}$ SDOF, Sand Bar, 10\% |
| 06-40050 | R58 | Resistor, $0.56 \Omega$, .35 prep., 5\% Carbon |
| 06-40050 | R59 | Resistor, $0.56 \Omega, .35$ prep., $5 \%$ Carbon |
| 06-40050 | R60 | Resistor, 0.56 , , 35 prep., 5\% Carbon |
| 06-40050 | R61 | Resistor, 100K, 35 prep., $5 \%$ Carbon |
| 06-40050 | R70 | Resistor, $4.7 \mathrm{~K}, .35$ prep., $5 \%$ Carbon |
| 06-40050 | R71 | Resistor, 4.7K, . 35 prep., 5\% Carbon |
| 06-40050 | R72 | Resistor, $350 \Omega 5 \mathrm{~F}$ SDOF, Sand Bar, 5\% |
| 06-40050 | R73 | Resistor, $350 \Omega 5 \mathrm{~W}$ SDOF, Sand Bar, 5\% |
| 06-40050 | R74 | Resistor, $4.7 \mathrm{~K}, .35$ prep., $5 \%$ Carbon |
| 06-40060 | R75 | Resistor, 4.7K, . 35 prep., 5\% Carbon |
| 06-40060 | R76 | Resistor, 350 5 W SDOF, Sand Bar, 5\% |
| 06-40060 | R77 | Resistor, $350 \Omega 5 \mathrm{~S}$ SDOF, Sand Bar, 5\% |
| 06-40060 | R78 | Resistor, $100 \Omega$, .35 prep., $5 \%$ Carbon |
| 06-40060 | R79 | Resistor, $100 \Omega$, .35 prep., $5 \%$ Carbon |
| 06-40060 | R91 | Resistor, 10K, .35 prep., $5 \%$ Carbon |
| 06-40060 | R92 | Resistor, 470K, 35 prep., $5 \%$ Carbon |
| 50-10055 | R93 | Resistor, $22 \mathrm{~K}, .35$ prep., $5 \%$ Carbon |
| 50-15035 | S1 | Switch, DP3T Lft Tall Bat, PCB MTG |
| 52-22055 | S2 | Switch, DPDT Lft sm Bat, DPDT, PCB MTG |
| 50-15055 | S3 | Switch, DPDT Lft Tall Bat, DPDT, PCBMTG |
| 50-10055 | S6 | Switch, DPDT $90^{\circ} \mathrm{Lg}$, Chassis, PCBMTG |
| 50-15035 | S7 | Switch, DPDT $90^{\circ} \mathrm{Lg}$, Chassis, PCBMTG |
| 52-22055 |  | Switch, Stand By, Switch LGDPDT, STAND BY |
| 50-22065 |  | Switch, ON / OF, Power with Light |
| 50-15035 | SPK1 | Phone Jack, 1/4, 7 Pin Plastic Stereo, $0.25,24 \mathrm{~mm}$ |
| 52-22055 | SPK2 | Phone Jack, 1/4, 7 Pin Plastic Stereo, $0.25,24 \mathrm{~mm}$ |
| 50-47045 | T1 | Transformer, 120V power |
| 50-15035 | T2 | Transformer, Output |
| 52-22055 | V1 | Socket For Tube, 12AX7A 12VAC, 9 Pin, SINRUS |
| 50-15055 |  | Vacuum Tube, Type 12AX7 |
| 50-10055 | V2 | Socket For Tube, 12AX7A 12VAC, 9 Pin, SINRUS |
| 50-22045 |  | Vacuum Tube, Type 12AX7 |
| 50-22045 | V3 | Socket For Tube, 12AX7A 12VAC, 9 Pin, SINRUS |
| 50-33035 |  | Vacuum Tube, Type 12AX7 |
| 51-10055 | V4 | Socket For Tube, 12AX7A 12VAC, 9 Pin, SINRUS |
| 50-18055 |  | Vacuum Tube, Type 12AX7 |
| 50-22045 | V5 | Socket For Tube, 12AX7A 12VAC, 9 Pin, SINRUS |
| 50-05605 |  | Vacuum Tube, Type 12AX7 |
| 50-15025 | V6 | Socket For Tube, 5881, 8 Pin, PCBMTG |
| 50-47025 |  | Vacuum Tube, Type 5881 |
| 50-22035 | V7 | Socket For Tube, 5881, 8 Pin, PCBMTG |
| 50-10025 |  | Vacuum Tube, Type 5881 |
| 50-10025 | V8 | Socket For Tube, 5881, 8 Pin, PCBMTG |
| 50-05605 |  | Vacuum Tube, Type 5881 |
| 50-05605 | V9 | Socket For Tube, 5881, 8 Pin, PCBMTG |
| 50-00035 |  | Vacuum Tube, Type 5881 |
| 50-22065 |  |  |

[^2]
[^0]:    （22）Press firmly until cord clicks in．

[^1]:    \& B

[^2]:    $50-22025$
    $53-47045$ $53-47045$
    $50-22065$ $50-22065$
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    $25-31350$
    25-31353
    $21-06457$

