COMPLETING, TESTING AND USING

The Musicolour II

Full circuit details for our new Musicolour audio light modulator unit were given in the December issue, together with most of the information describing its construction. In this article the author explains how to complete the unit, and then deals with troubleshooting possible faults and the choice of lighting displays.

by LEO SIMPSON

When mounting the transformers and L-shaped heatsinks for the Triacs, ensure that the board has been drilled correctly so that the attaching screws are well clear of the copper pattern. All screws should be fitted so that the nuts are on the component side of the board. It is a good idea to install lockwashers on all components mounted on the board, for reliability.

Having checked the board carefully for wiring errors, components may be installed in the chassis. Rubber feet are secured with a screw and nut, the nut being held in the foot itself. Potentiometer shafts should be cut to suit the knobs used. The mains cord is passed through a grommeted hole in the rear of the chassis and anchored by a clamp underneath the fuseholder. The active wire goes to the fuseholder while the neutral and earth wires are terminated on a three-way tagstrip, as shown in the wiring diagram. The earth wire connects to the "foot" terminal of the tagstrip, so that it is connected directly to chassis. When terminating the mains cord, the earth wire should be left with a loop of slack, as shown in the wiring diagram, so that if the cord is strained to the limit, the earth wire is the last to break.

Proper earthing of the chassis is the most essential step in the construction of the Musicolour. If it is not properly earthed a wiring mistake or component failure could make the chassis "live" and lethal!

Care is particularly necessary where the equipment is to be used in a public situation, in association with a public address system, musical instrument amplifiers, coloured spotlights, festoon lighting, etc. In these circumstances, the Musicolour unit itself should be checked by a qualified electrician, along with the lighting fixtures to be connected to it.

The holes in the chassis for the wires to the output sockets should be fitted with grommets to avoid chafing of the cable insulation. Note also that the wires to the output sockets should have the same current rating as the mains power cord, which itself should have a rating to suit a 2400W load.

Having installed all the mains wiring, the board may now be mounted. It is mounted using ⅛th inch screws and nuts, with two nuts used to space the board at least ¼-inch from the chassis. The connections from the board to the rest of the wiring may now be made. Note that neither side of the input wiring is connected to chassis, to avoid earth loop problems.

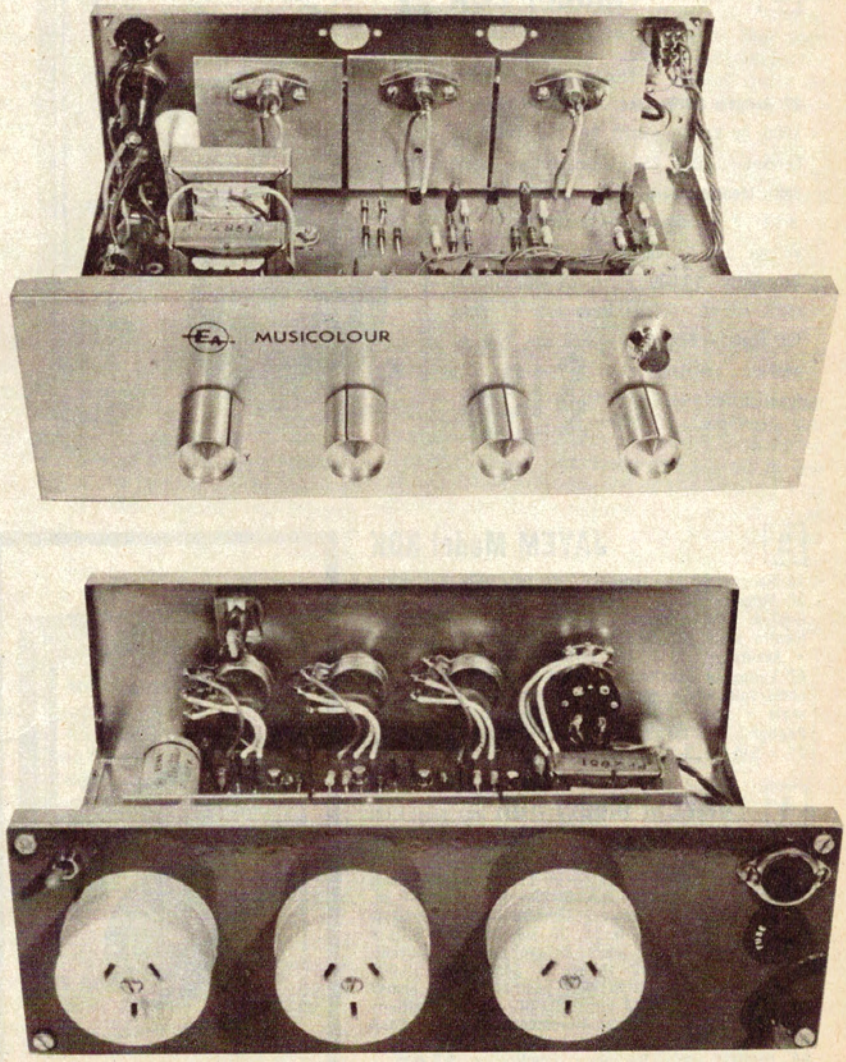
The pilot light is a neon bezel with a current limiting resistor incorporated. If a neon bezel without a limiting resistor is on hand a resistor of 150K should be connected in series with it. The neon bezel we used is moulded in red plastic. It is made by Telite and distributed by IRH Components Pty Ltd.

The standby switch used was a miniature type such as are available from Plessey or IRH Components Pty Ltd. It is a three-pole, double throw unit, used as a single-throw switch.

Before the unit is connected to the display lamps and power applied, several checks should be made. First and most important, check that there is a direct connection between the earth pin of the mains plug and the chassis. Also, check that there is high resistance (eg, several megohms) between the heatsinks of the Triacs and the neutral line of the mains. There should be high resistance between both sides of the mains and the chassis. These checks should be made with a multimeter.

In operation, it will be found that there is an optimum setting for sensitivity controls for the particular program in use. If the signal level is too high, the lamps will tend to glow continuously. If the signal level is too low, the lamps will be extinguished for most of the time. A little experimenting with controls will produce the most varied display for each program. It will also be noticed that the low channel is not as sensitive as the other two — this is quite normal and is mainly due to the characteristics of the input transformer.

Finally, if you are one of those unlucky readers whose Musicolour does not function, here are a few points on trouble-shooting. Remember, though, that this procedure can be



Two views of the Musicolour, showing rear chassis and Triac heatsink details.

extremely hazardous because the full mains voltage is present in the circuit. If you do not have a multimeter and/or do not feel confident about your ability to cure a fault in the device, leave it strictly alone. Take it, along with this article, to a competent serviceman.

Trouble-shooting can be made less hazardous if the mains active and neutral lines are exactly as shown in the circuit diagram, ie, with the common line of the circuitry tied to the neutral line. This can be verified with a multimeter: Measure the voltage, with multimeter switched to a high AC range, between the negative terminal of the 1000uF capacitor and chassis. If it is zero, okay. If it is 240 volts, swap the active and neutral leads on fuseholder and tagstrip. Remember though, that while most of the circuitry is now at chassis potential, the full mains voltage is applied to the neon pilot lamp, to the power switch terminals, to the fuseholder and if a load is connected, to the three Triac heatsinks.

Trouble-shooting should begin by ensuring that there are no wiring mistakes or incorrectly connected components. If not start with the Triacs. First, with no audio signal applied, switch the standby switch to either of its positions. In one position, all lamps should be at full brilliance; in the other, extinguished. If a lamp is alight in both conditions short the gate of the appropriate Triac to its A1 terminal; if the lamp is still alight, the Triac is faulty.

If the lamp stays extinguished in both positions of the Standby switch, the Triac or PUT may be faulty. The Triac may be tested by disconnecting the gate electrode and connecting a 1K resistor between A2 of the Triac and gate; the lamp should light. If not the Triac is faulty. If the lamp does light, the Triac is okay and the PUT stage is malfunctioning.

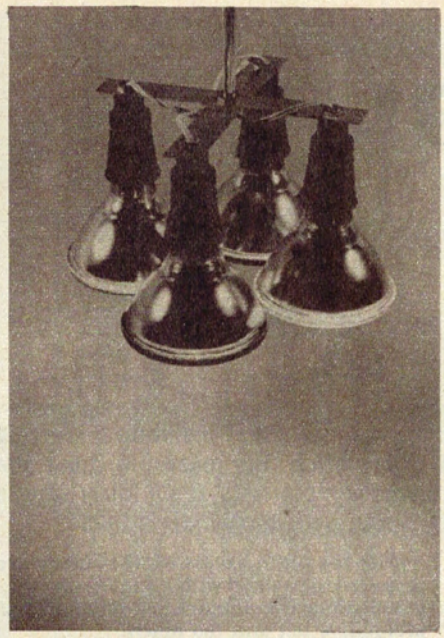
With the standby switch set for the Modulation mode, audio signal applied and sensitivity controls suitably adjusted, all lamps should be capable of being modulated. If not, the FETs can be checked for faults. If a lamp is partially alight with no signal applied, a cure may be effected by reducing the 390-ohm resistor. If the lamp will not light with signal applied, the FET may be short circuited. This can be checked by connecting a 9V battery across the 2.2M resistor, negative to gate. The lamp should light; if not, the FET is faulty.

If the FET is okay and the lamp still does not light, the diodes in the voltage-doubler network should be checked, in situ, with an ohmmeter. They should be about 300 ohms in the forward direction and several megohms in the reverse direction. If they are leaky, replace. Each of the filter stages can be checked for correct operation by measuring the voltage at the emitter of each transistor. This should be within 1 volt of half the supply voltage (ie, about 9V). DC voltages should be measured with respect to the negative terminal of the 1000uF capacitor. An operational transistor will have 0.6 volts drop from base to emitter. The preamplifier stage can be checked in a similar manner — ie, 9V at emitter of Tr2.

These checks will not find every fault but they should at least identify the stage where a fault is occurring. Again, remember that mains voltage is applied to the circuit, so absolute care is essential when working on the unit.

As noted previously, the possibilities for displays are endless and are limited only by the reader's imagination. The ideas outlined here are only a guide and we will be interested to hear from readers who have thought up other ideas.

Most of the displays can be built around 25-watt or 40-watt coloured globes. These are available from Philips and other manufactures in colours such as red, yellow, green and blue. It is interesting to note that the blue lamp will not appear nearly as bright as the red and yellow types. This is because the eye is less



Coloured Comptalux lamps project a fine display on to walls and ceilings.

sensitive to the blue end of the spectrum, and tungsten filaments emit most of their light in the red and yellow region of the spectrum. This means that a blue filter stops most of the light. In general then, the power needed for the blue lamps will be two or three times that needed for red and yellow lamps.

The displays should be arranged so that the lamps are not viewed directly. Looking directly at bright lights is tiring, to say the least. The basic materials needed to make interesting patterns are crinkled aluminium foil and frosted, fluted or patterned glass.

The simplest possible display is to mount three or more coloured lamps on a board and place them behind a stereo system cabinet so that they light the wall behind it. We suggest red for the low channel, green for the medium channel and blue for the high channel.

Another idea is to mount a number of lamps in a row along a board, place frosted glass in front of them and mount the whole display on top of the stereogram, organ or in the particular "interest point" in the room. Lights can be placed inside a cabinet, with crinkled aluminium foil behind them, and frosted glass in front. The result is a portable, completely enclosed display.

One of the most obvious tricks would be to modulate strings of "Christmas tree" lights. These could be strung around the house for the most novel Christmas decorations in your district.

For higher power displays, on stage for musical groups or in discotheques, coloured spotlights will be required. While you can buy your own spotlights and use gelatin filters to colour them to taste, coloured spotlights are marketed by Philips Electrical Pty Limited and available from many trade houses which specialise in lighting. The lamps are in the Philips Comptalux range and are available in red, yellow, green and blue. The remarks we made above about the brightness of different colours still hold for these lamps.

Many interesting displays could be obtained with these spot lamps aimed against walls, using beam splitting mirrors and rotating mirror balls. As we stated before, your imagination is the only limit.