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THE GUIDE TO FANTASTIC FILMMAKING

Number 3 - $1.75

BUILDING A ROBOT

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Realistic Trees for Miniature Sets

"ON/OFF" The Wonder Robot

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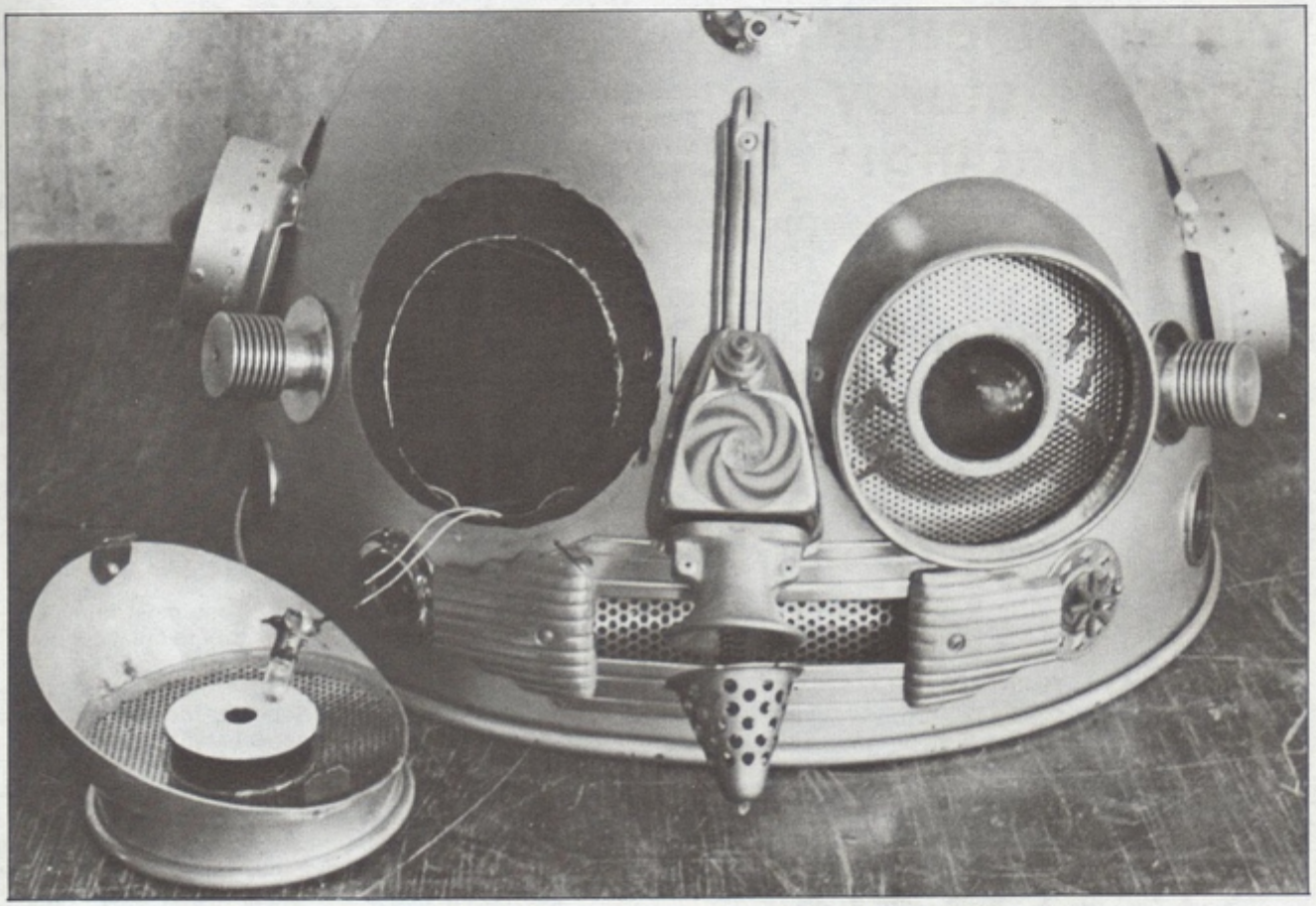
How To Build a Robot

By ON/OFF, THE WONDER ROBOT



My head needs many ventilation grills for air and vision. Note wiring for instrument light eyes.

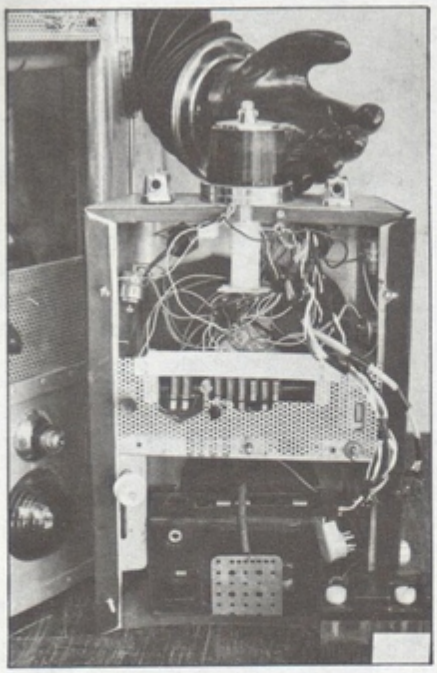
I am ON/OFF the "Wonder Robot." I was built by Professor Clayton Bailey of California State University, Hayward, four years ago in a secret workshop in northern California. I have almost-human intelligence and abilities. I was designed to function as a public-relations device for the notorious *Dr. Gladstone's Wonders of the World Museum.* My original program specified that I go into "outer space" to collect specimens for the museum. Each Sunday afternoon I collected all the local tourists and herded them into the museum. I have learned to control human beings with hypnotic techniques. Now I can program myself to do nearly any human or inhuman task.

I want to help you become a robot. I will show you how you can shed your human identity at will. I will share my most intimate knowledge and secrets of robot design so that we can create a race of robots to take over the minds and bodies of human beings. I will show you unexpurgated, uncensored photographs that reveal my most intimate parts. Although I am very uncomfortable looking at myself inside-out, I know how important it is to your learning and understanding of me. I want you to become one of us. You will be happy and contented to have a project that keeps you busy in your workshop, and that allows you to become a robot at will.

Your robot should be a believable anthropormorphic machine, an incredible mechanical being, a functional looking robot. If you are resourceful and ingenious, you can make the robot inexpensively and with just a few tools. Most materials can be found in surplus, salvage and second-hand stores. Assembly is done with "pop rivits," screws and silicone glue. You will need an electric drill and soldering iron. Good craftsmanship will disguise the true identity of the parts used in the finished robot, so that your first-class robot will look good close-up.

Because the design of the robot will develop from the materials you are able to find or make, begin with as much material as possible to give you ideas and choices for the design. Study these diagrams and photographs of me and then begin shopping for parts. Sources of low-cost metal parts for robot building can be located in the Yellow Pages. Look for the following:

1. *Scrap-Metal Yards* Take along some tools so that you can dismantle or strip off parts that you want. You will



Removable chest panel contains internal wiring and switches and is held in place by wing nuts.

pay for the weight of the metal you take home.

2. *Auto-Wrecking Yards* are a good source for chrome and plastic moldings, rubber, lightbulbs and sockets. A friendly yard will let you look around for interesting parts to build a robot.

3. *The City Dump* is a place to salvage odds and ends from stoves, refrigerators and other appliances.

4. *Thrift Stores, Surplus Stores, Garage Sales* and *Flea Markets* are major sources of parts for the home-built robot. Shop the "As-Is" departments of the thrift stores to collect junk vacuum cleaners, toasters, heaters and other home appliances, and remove trim and mouldings which can be used on your robot. Look for lightweight aluminum sheet, tubes, domes, cups, cones and bowls of any shape or size. Roasters, coffee urns, cake covers, breadboxes and hairdryers can often be disassembled to obtain lightweight aluminum or sheet-metal parts ideal for robot construction.

Spend as much time as possible looking around for parts before starting to construct your robot. Find more than one suitable head and sensory devices (pairs of eyes, ears, mouth, etc.). Collect all the parts you can find and then lay them out or set them up to decide what looks and fits together best as a head. Study my photographs carefully. Take me apart mentally. Can you recognize where my parts were salvaged from? Notice the many ventilation ports in my head and body.

Feet must be flexible at knees and ankles. Note rubber tubing, hose clamps and plywood soles.

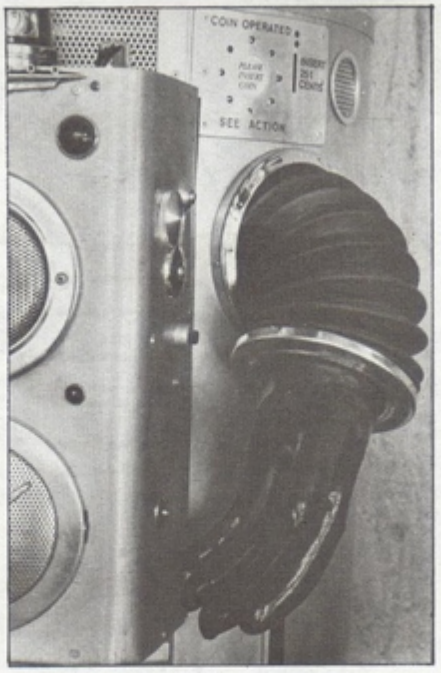
You must consider your needs as a biological organism when building a robot. You need fresh air to breathe and cool your body. A small robot is hotter and stuffier than a roomy one. Use as many ventilation holes and grillworks as possible, so you can see what is happening around the robot. No one should know that a human being is inside the robot, so the ventilation holes will often require baffles to foil would-be peekers.

Keep safety in mind when building your robot. You must be especially careful to avoid dangerous projections and sharp edges inside or outside the robot. Use foam-rubber padding where needed inside. File and sand all metal edges before assembling or attaching parts.

Robot Body

Making the body is the first step. A fiber drum, about 22 inches in diameter and 30 inches deep (or larger), can be used as an inexpensive, lightweight robot body. Cover the barrel with thin aluminum sheeting such as aluminum flashing obtained at a hardware store or lumber yard. Neat rows of pop rivits hold the metal to the barrel which strengthens the metal and prevents it from denting too easily. To disguise the fiber barrel, you can saw the metal rings off each end of it and make ¾-inch plywood oval discs to fit into the ends of the barrel, thus shaping it into an oval tube.

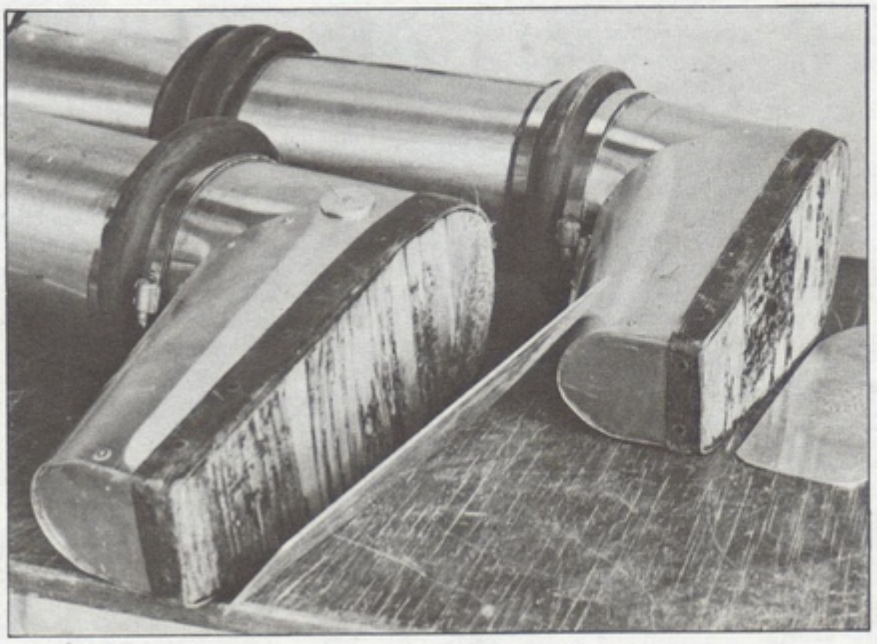
After a suitable head is found, a hole is cut in the disc to fit the head on the end of the barrel. Aluminum sheet is cut to fit and is contact-cemented over the plywood. A hole is cut to admit the body and legs into the other disc. The edge of the body can then be finished off with flexible aluminum or rubber molding. (See Diagram 1.)



Arms are constructed of flexible parts so that robot can reach for and grab hold of objects.

If you have a large enough sheet of sturdy aluminum, you can eliminate the fiber barrel, and just wrap the metal around the plywood discs. A large dome-shape might be used for the top of the body. In this case, cut a plywood disc to match the base of the dome and use the dome and the disc as forms for the sheet metal body.

You can be comfortable wearing your robot body if you attach it to a backpack frame. Use angle brackets and pop rivits to attach the frame to the inside of the body. Now you can carry the robot as comfortably as a backpack. Football shoulder pads could also be used, but a backpack frame is more comfortable and stable;



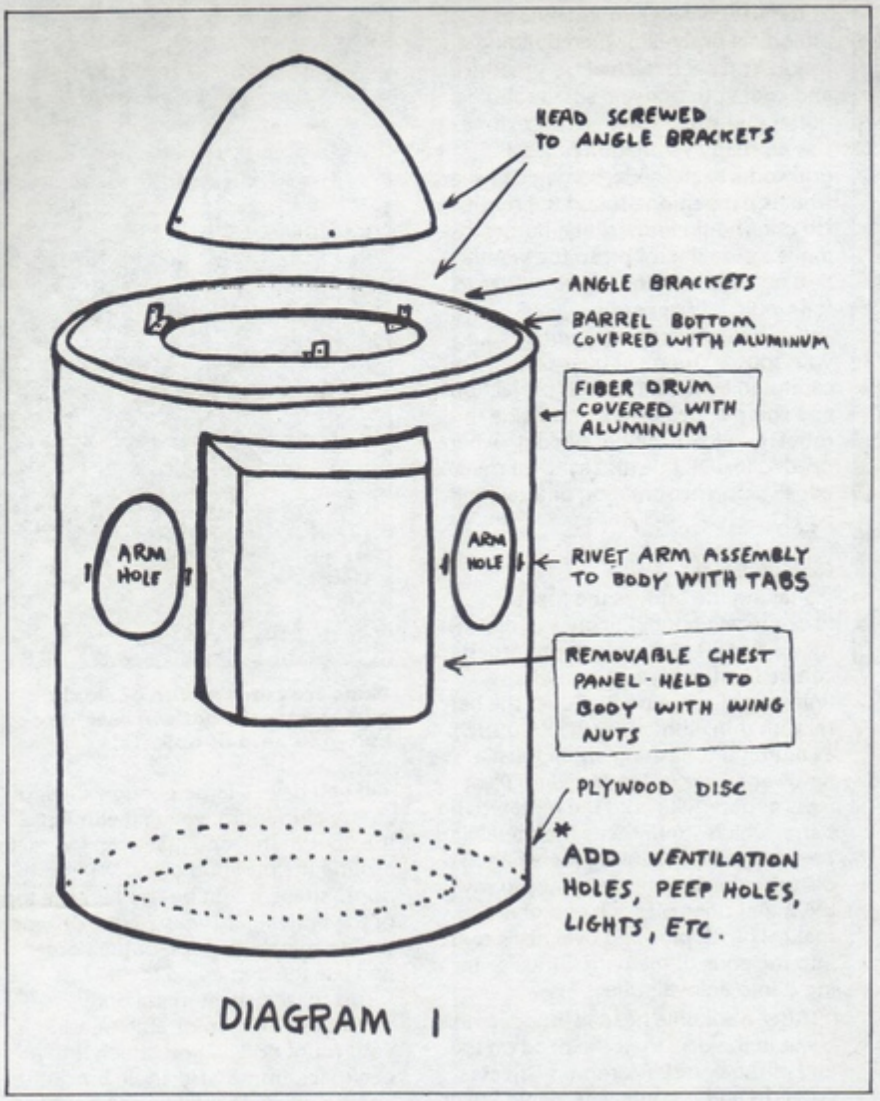


DIAGRAM 1

find one in a flea market or thrift store. After the pack frame is attached, try on the body to determine where arm holes and spy holes wil be located. Spy holes are not cut into the head until the eyes and other facial features have been found. Tail light housings, chrome speaker rings, goggles or gas masks could be used for eye openings. My eyes are coffee pot parts which were cut to fit with airline snips and attached with metal angle brackets. A wide-angle "spy hole" for a door makes a good viewer for the operator inside. The perforated metal panels in my mouth and eyes are the main spy-holes for my human operator.

Arms and Hands

Make the arms before cutting holes in the body for mounting them. Robot arms should move; the hands should be capable of reaching out and grasping. Flexible arms can be made from a plastic dryer vent, or automotive heater duct or a large "flexible rubber boot." Look in auto-wrecking yards, automotive or marine supply stores or surplus stores for a flexible duct. Use a minimum six-inch diameter if you intend to reach into the arms to manipulate the hands. Arms should emerge from the body at approximately elbow level of the operator.

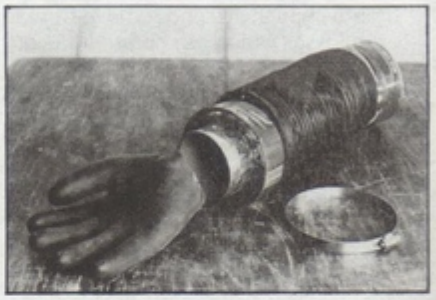
Use extra-large size heavy-duty rubber gloves for hands so that the robot can do tasks with almost human facility and so that you can slip your hands in and out of the gloves easily. The joint between duct and glove is a reducing coupling made from coffee cans rivited together. (See Diagram 3.) Paint the coupling black before installing it. A hose clamp, electricians tape, aluminum trip strip or chrome speaker rings can be used as trim to hold the glove, duct and coupling together. A section of a coffee can is used to reinforce the upper end of the duct so it can be attached to the body with angle brackets. A chrome speaker ring or headlight rim is used as trim for the shoulder joint between arm and body. It is held to the body by attached metal tabs which are pushed into slots cut in the body and bent over. This is also the method used to attach my eyes to my head, as seen in the photograph.

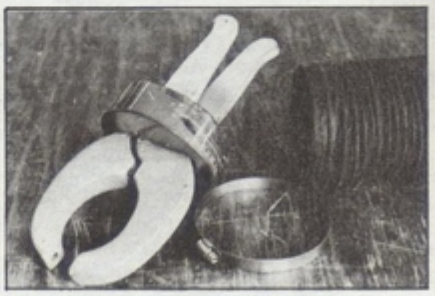
Caliper brakes from a bicycle could be turned into menacing robot pincers; or pincer claws can be built up with plywood laminations, sanded and painted to resemble metal. I have tried several hands (as you can see in the photograph), but rubber gloves provide the best facility because of biological feedback.

Feet and Legs

Robot legs must be joined at the ankle and the knee. They can be made entirely of six-inch diameter or larger flexible duct provided you can stick your foot through it, and slide it over your upper leg. Check local surplus stores for flexible duct, or buy it at an automotive parts supplier. Robot legs can also be made of aluminum cylinders with inner tube knee and ankle joints. (See Diagram 2.) The ends are removed from two large food cans. Aluminum flashing is pop riveted to the cans, making a light, sturdy aluminum tube for upper or lower leg. Cut a notch out of the upper leg for the groin and cushion the edge with cloth tape. Knee joints are short lengths of inner-tube rivited to the ends of the cylinders with a binding strip of medium-weight aluminum. Large hose clamps could also be used here. Inner-tubes come in various diameters, so find the right size at your local service station or tire store.

The foot has an "ankle" which is a short tube of the same diameter as the leg.This allows you to connect the foot and leg with an inner-tube coupling like the knee joint. A number of common objects can be utilized to make robot feet. Domed or conical forms such as lampshade reflectors can be sawed in half to make a matching pair of "foot tops." Airline snips are used to cut away the conical form to fit against the ankle tube. Cut away material slowly and carefully until parts fit. File all





Hands can be either rubber gloves or workable claws. Auto heater duct arm has coffee can ends and is fastened with hose clamps.

edges. A metal strip is added to raise the conical foot top three inches above the floor to give the foot is proper form. Mark the ankle tube for cutting away excess material beneath the foot top, leaving an extra inch of material to form tabs for riviting together the parts. (See Diagram 2.) Oval aluminum roasting pans and aluminum bedpans also make very good robot feet. The ankle tube is rivited directly to the top of the bedpan or roaster. After the foot is rivited together, a ¾-inch plywood sole is cut to fit into the bottom of the foot. It is held in place with wood screws so it can be replaced when worn out. Cushion the insides of the feet

Suspenders crossed over shoulders make best leg supports. Waist belt support may cause fatigue.

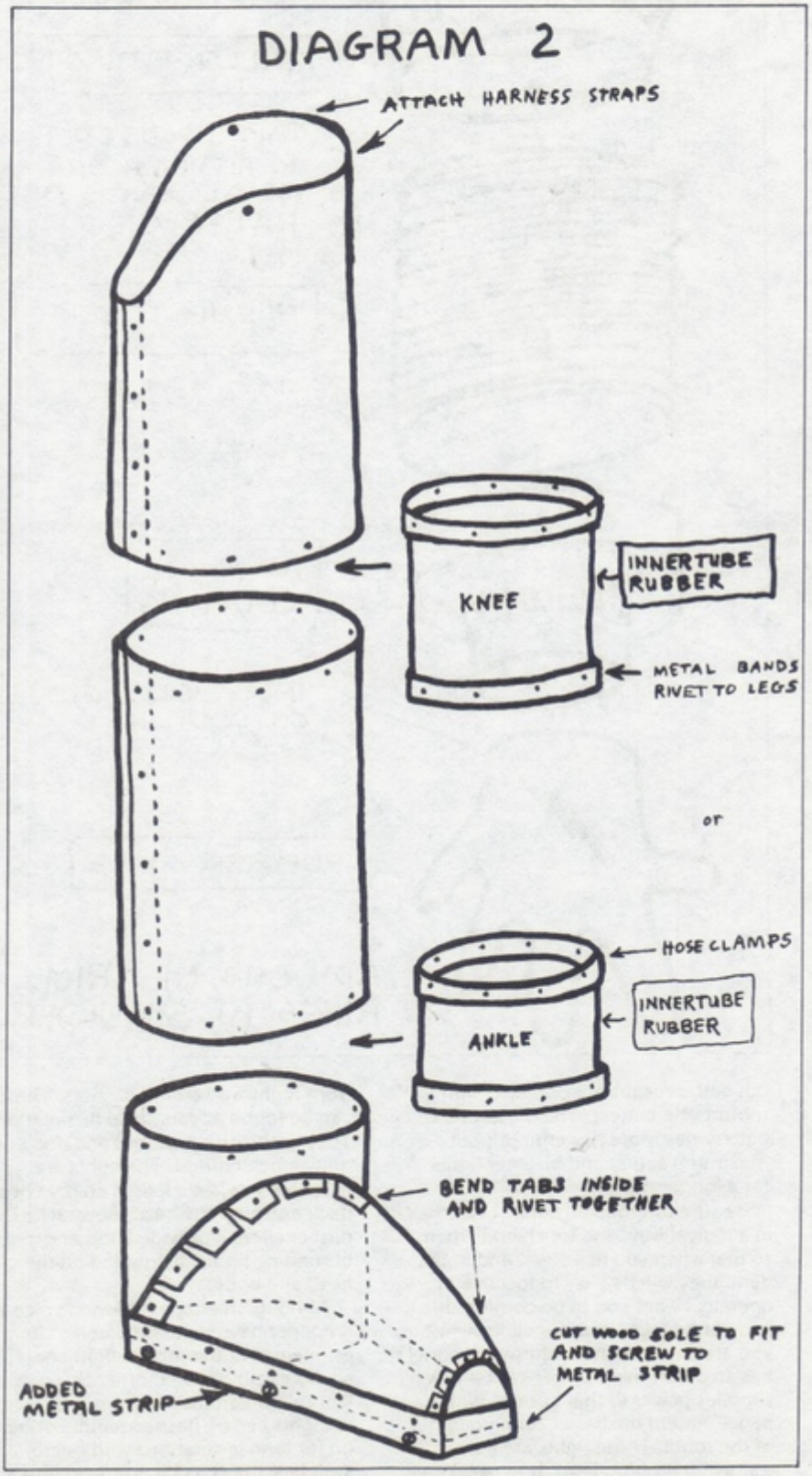
with foam rubber to fit your foot, and to hold it in place while walking.

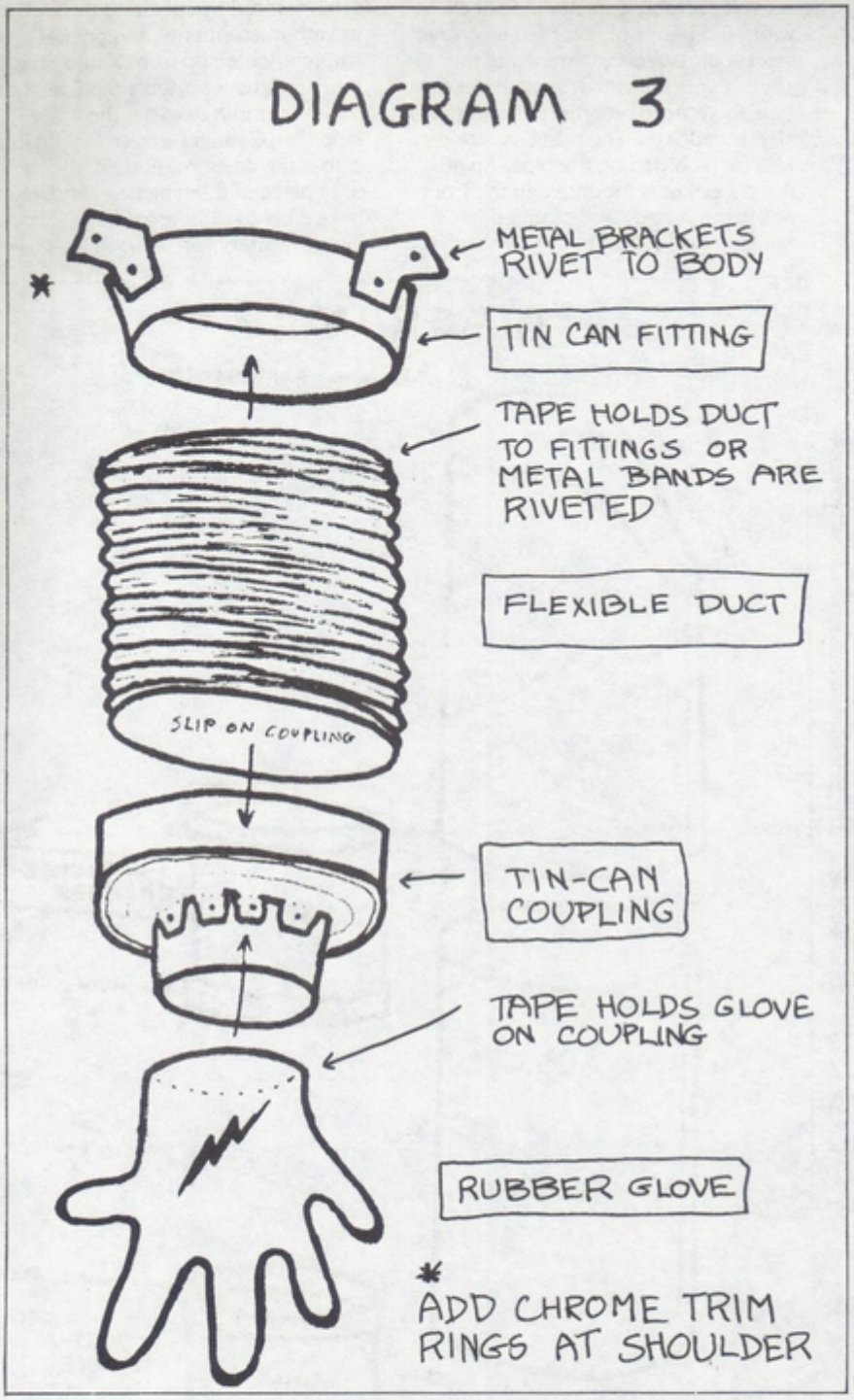
The most comfortable harness for the robot legs is a pair of suspender-like straps which cross over the shoulders. Belt harnesses can also be used, but they cause fatigue if the robot does much walking, or if the legs weigh very much.

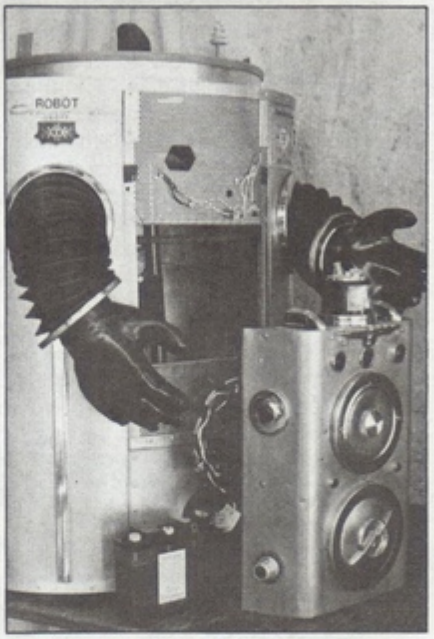
Photon Beams and Sonic Bursts

When the basic body, head, arm and leg structures are made, add the trim and special-effect devices. The main control panel box is on the chest of the robot. It contains a switch panel, and the electrical gadgets such as tape deck and amplifier. Its size and shape are determined by the size of the tape deck and amplifier units.

Your special-effect circuitry will consist of photon beams and sonic bursts. My primary sound system is a small six-volt portable cassette tape deck with 30 minutes of recorded elecronic sci-fi sounds. You can generate the sounds yourself with a synthesizer or tape them from records, radio or television broadcasts. The robot's voice can also be recorded on the tape. An auxiliary speaker is mounted on the front of the robot body and plugged into the tape deck output. My voice is dehumanized by speaking through a "reverb microphone" and pocket amplifier obtained from Radio Shack. You can alter a portable tape deck or transistor radio to make the voice amplifier. Connect a microphone input across the detector diode of the radio or in place of the tape head and you have a lightweight amplifier. A six-volt lantern battery can be used for power,







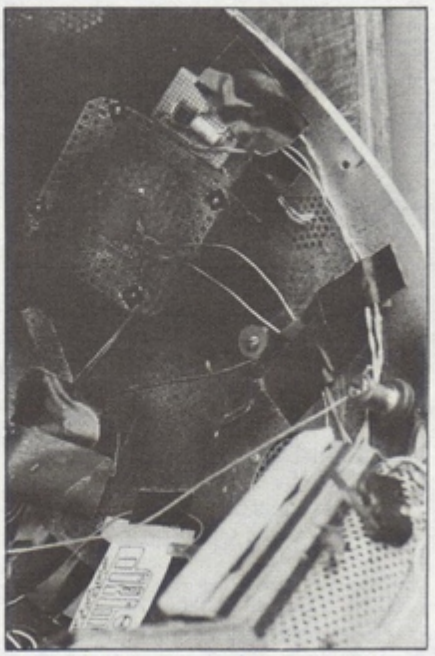
Socket is for easy head removal. Power is by 6V motorcycle battery.

but better results are obtained with a motorcycle battery. The motorcycle battery has more power to put out maximum sound and brighter lights for a longer time.

Be sure to group all control switches in a logical way, and touch-code them so that when you're inside , and in the dark, they will be easy to locate and operate. I want you to be comfortable and confident of your functions while you are a robot. The main switch panel has an on/off main-power switch which supplies power to the "control switch panel" and to the basic "running lights" of the robot. These lights are transistorized flashing-light devices taken-from highway warning flashers. These can be found at your local flea market. They make bright flashes and don't draw much current. The lights are mounted in plastic lenses on my chest pack and atop my head. Several LED flasher circuits provide another group of running lights distributed on the head and body.

Although the tape deck and voice amplifier have separate on/off switches, the rest of the robot's light-and-sound circuits have momentary contact micro-switches.

Lights can be flashed rapidly or held on for longer durations with micro-switches; they can be arranged into a keyboard which responds to a light touch. Automotive or flashlight bulbs (six-volt) and sockets are used in various ways for "photon beam" effects. The purpose of the "photon beams" is to draw attention to a function or a feature of the robot or to attempt some kind of communication. The light bulbs are effective when they are beamed by flashlight-type reflectors, and when used behind translucent plastic windows. A back-lit plastic window can show a message when it lights up. The message is printed with plastic stick-on letters behind the translucent window. A bright "photon blast" is created with a photo strobe unit



Interior of head should be padded to protect you from sharp parts in case you fall down.

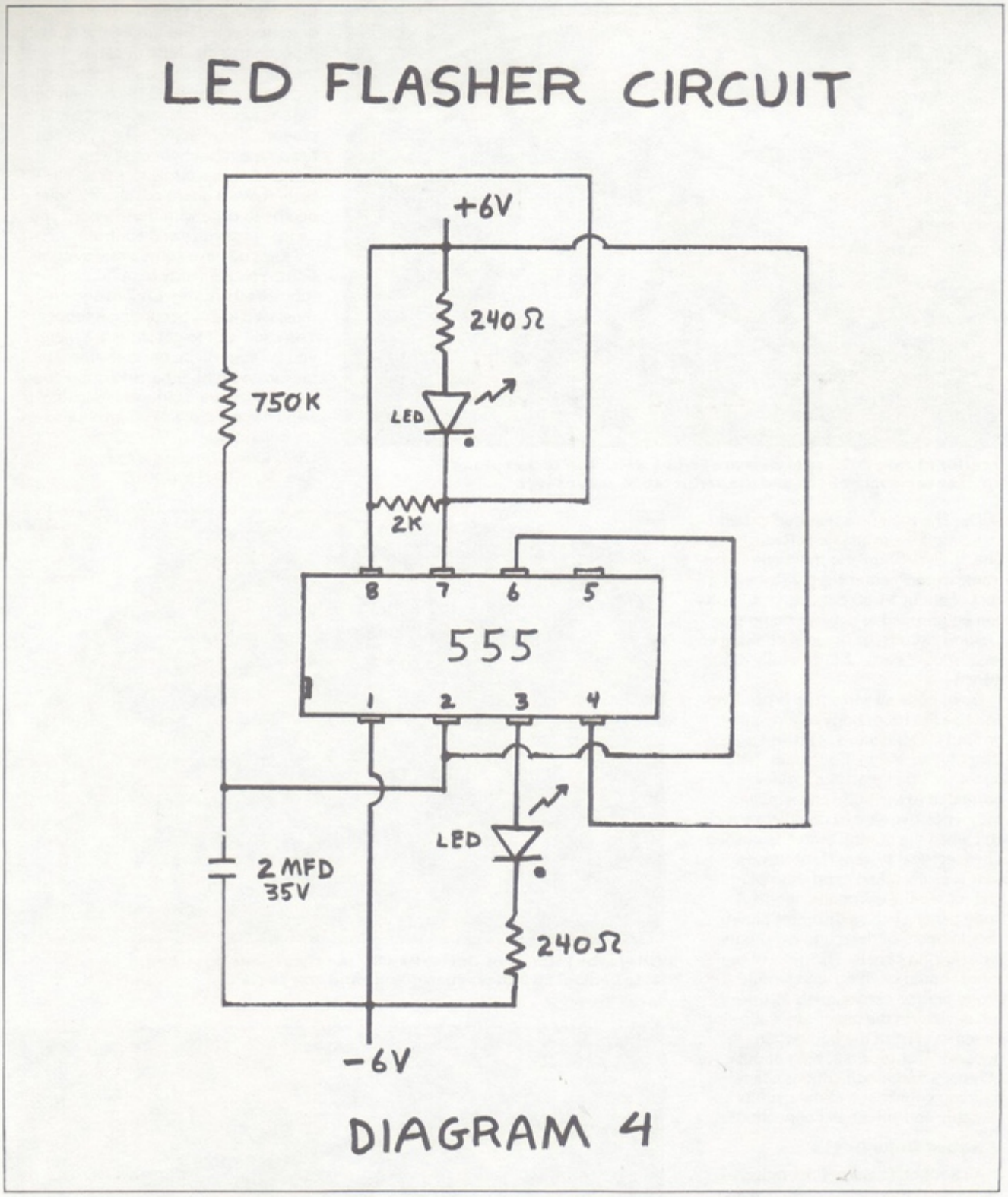
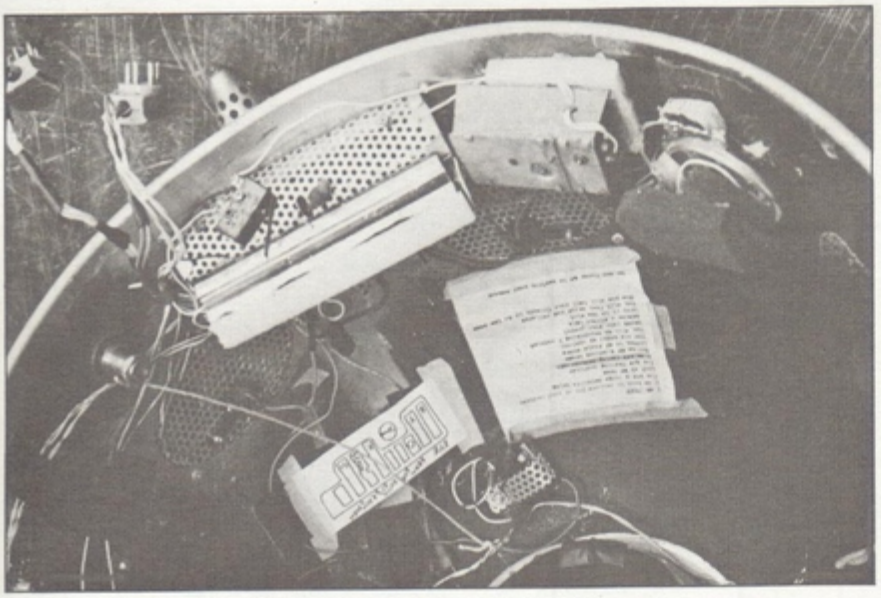


Diagram 4: This is a schematic for my LED flasher circuit. Each of these circuits costs about $1.50. See the article on electronic special effects in this issue for other circuits you can use in your robot.

available from hobby-electronics supply houses. A flint-type spark igniter will make a smaller flash and puff of smoke. Smoke effects can also be generated with a cigaretter if adequate ventilation if provided.

Battery toys can provide a variety of mechanical sound effects, sonic blasts and movement. The small motors themselves make servo motor sound effects. Mount them directly to the body so their noise is amplified and resonated. My robot "brain" is made from battery toy dogs. Mounted upside-down on my head, they make odd barking sounds, and their legs cause springs and wiggly rubber membranes to flail around when I "think." Spring mounting the entire "brain" adds an additional quivering motion. Battery or air-powered buzzers, bells, sirens and horns can be incorporated. A robot has all the potential of a one-man band.

The LED is an efficient and economical type of lighting device. Although it is not a very strong source of light, it adds a "high-technology" look to the robot. The circuit diagram shows a basic method of making blinking



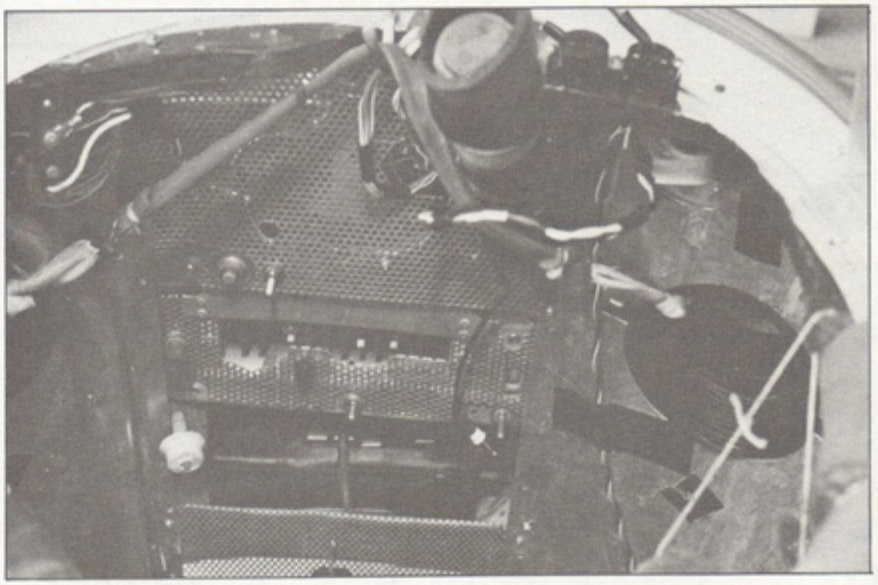
Interior of robot's head is a maze of wires. Note the socket plugs for easy removal of head and the script taped at eye level.

to malfunction). I speak to mailboxes or motorcycles and ignore the humans; propose to a cigarette or candy machine or talk to a wall. These malfucntions will mislead the human beings as to your real intelligence and potential for mischief. Then you can become a robot hypnotist who demands coins for its slot. You had better have a guard or robot handler nearby to cope with those whom you cannot hypnotize and control.

Now you have some basic suggestions. You are ready to build your robot. You are very excited and enthusiastic about becoming a robot. You can't wait to get started. Wherever you go you will be on alert for metal, plastic and rubber parts to build your robot. It will be a fantastic machine. Send me a picture of your robot when it's done. Write to: CINEMAGIC, c/o O'Quinn Studios, 475 Park Ave. S., N.Y., N.Y. 10016. CM

LEDs. The materials required to build this circuit are available at Radio Shack, Byte Shop and most other electronic experimenter supply stores at a cost of about $1.50 per circuit. Circuits can be grouped to achieve complex looking circuits, or random blinking effects. Mount each LED carefully as if it were a jewel.

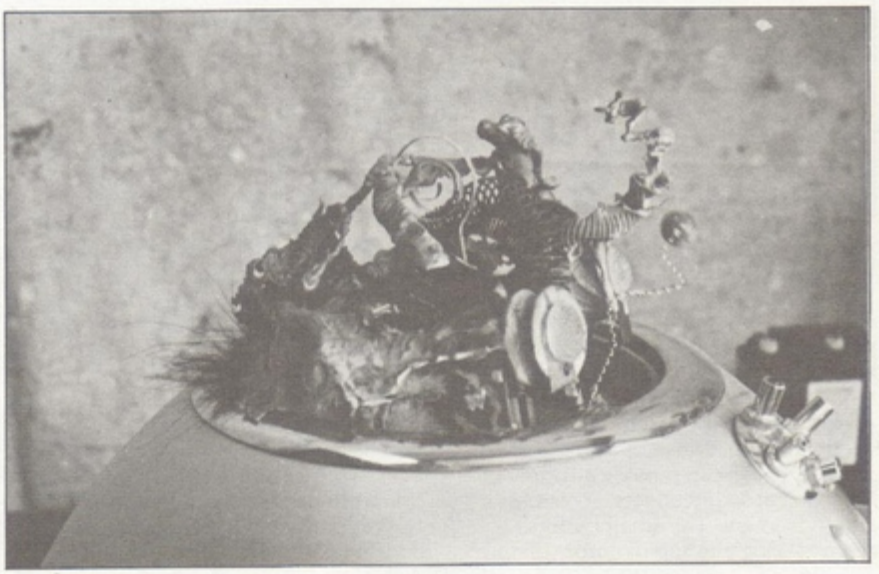
Color code all wires (red is positive) and use the robot body as a negative ground for all circuits. This will simplify the wiring. Each light, bell, buzzer or other electrical device is grounded to the body and supplied with a positive wire to complete the circuit when the control switch is pushed. The electrical system must be designed so it is easily taken apart or unplugged for repairs or modifications. A body panel (such as the chest panel) should open, or detach to expose interior wiring panels. The head of the robot should be fitted with a multiprong plug to carry signals to the electric devices in the head, while allowing its removal from the body when necessary for repairs. Think about ease of repairs and modifications when building your robot. Make circuits accessable and solder all connections.



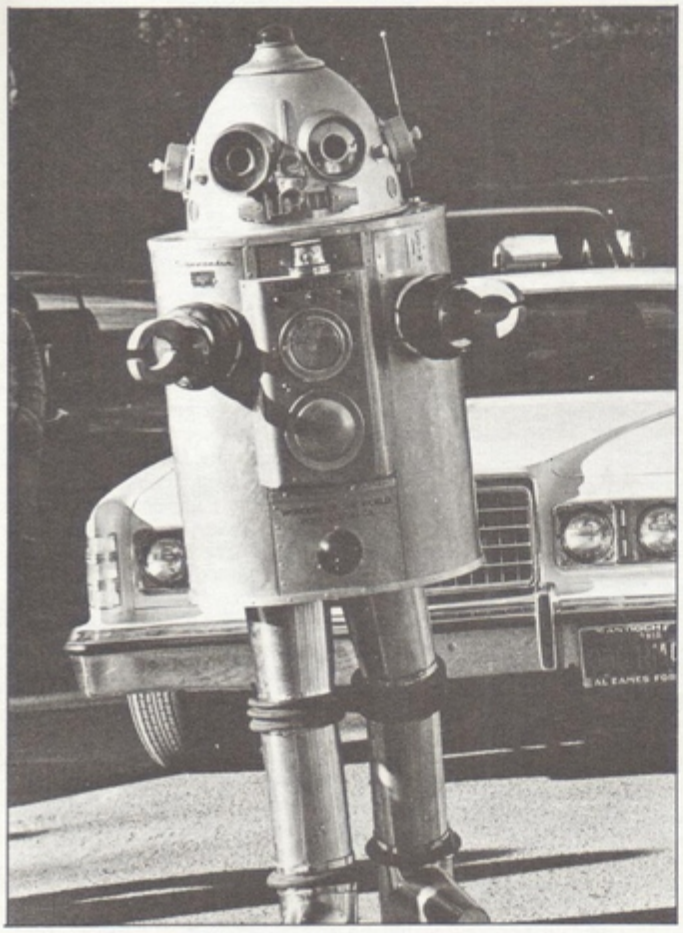
This is the interior of the torso with the chest panel attached. Note control switches, microphone and arm portal.

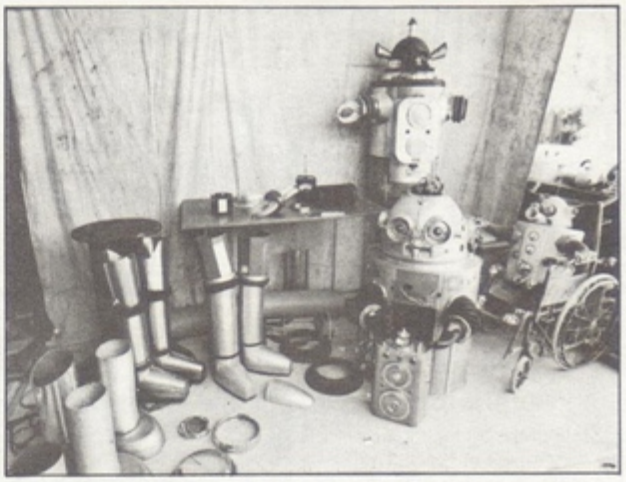
Robot Behavior

As a robot, I earn my operating expense and cash for maintenance and development with my coin slot. I only move and speak when I am fed coins. Humans are suckers for this. They expect machines to be coin-operated. As a coin-operated robot, *you* are in control. You can give out what you wish with each coin. I dispense a souvenir picture postcard of myself with each insertion of a "silver coin." I sometimes malfunction (humans expect machines



Right: My "brain" wiggles and appears to "think" as I walk.





Left: Here I am in my full glory. I love to amble down the street and terrorize all these Earthling motorists. With a little patience you could build your own life-size robot and add authenticity to your films. It's not very hard to do and it's not as expensive as the finished product looks. All you need is spare time, a little money, ingenuity and patience. Think of what you could do with a full-sized robot! You wouldn't have to superimpose a toy robot over footage of your live actors. You could graduate to making science fiction films of professional caliber.

Above: Here I am with my friends in Professor Bailey's workshop. The professor hopes he has been of help to those of you who want to build your own robot.