SECTION II

DARK

ATTRACTION

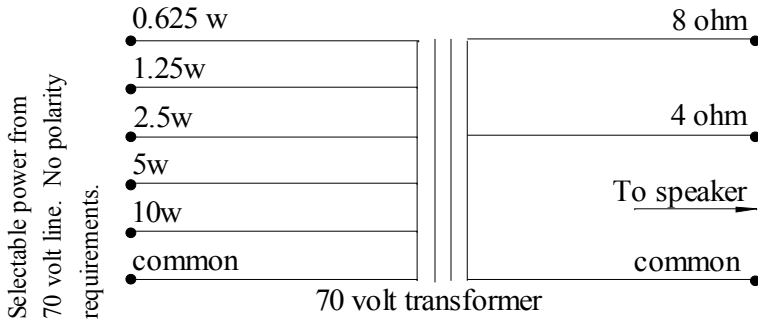
SYSTEMS

SOUND SYSTEM

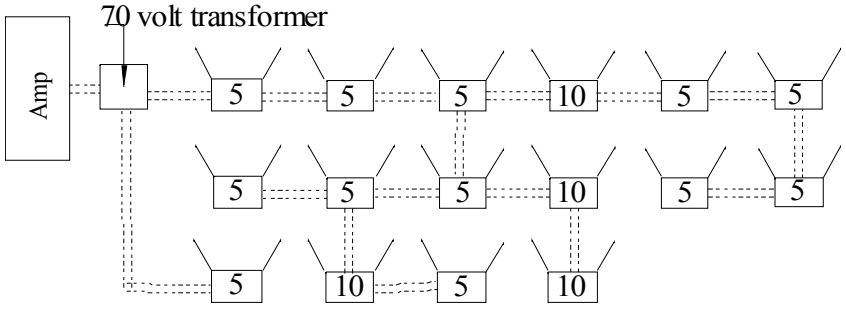
Most designers pay little attention to sound systems. I use six or more. A stereo amplifier and cassette player provides two separate sound systems, the left and right channel.

For house sound, i.e.: the general sound track heard by the customer throughout the house, I use a 70 volt speaker system and a mono sound track. This eliminates the need for impedance matching of speakers and reduces the line loss to the speakers. I don't have to turn a few speakers up to a deafening roar and the sound throughout my house is evenly distributed. The placement of these speakers is important for the sound masking effect. Sounds from other rooms/events will not be heard easily or bleed into other areas, tipping off the customers to things to come.

A regular amplifier can be used as a 70 volt sound distribution unit by purchasing an 8 ohm to 70 volt transformer rated at the same or higher wattage as the amplifier. Mount a muffin fan in each amp to reduce heat. Purchase 8" 4 to 8 ohm speakers with a rating of 10 to 20 watts and a matching 70 volt to 8 or 4 ohm transformer (some transformers have both 4 & 8 ohm outputs) for each. The transformer will have a selection of wattage inputs on the 70 volt side. One wire is black (common) and there is a selection of other wires organized by wattage rating (1/4, 1/2, 1, 2.5, 5, and 10 watt). The ratings will vary by brand. See diagram.



Using a 100 watt amplifier and 10 speakers at 10 watts each, the system is automatically balanced (10 x 10 = 100). The sound system is not limited to this set-up. The total wattage of all the speakers should not exceed the wattage rating of the house sound amplifier but can be less (5- 10 watt speakers and 10-5 watt speakers add up to 100 watts). I operate a combination of 5 & 10 watt speakers for house sound. Use 10 watt speakers before an event sound system so the customer cannot hear the special event sound track or the actors prior to entering.



Event sound tracks operate with 4 & 8 ohm speakers. Most event rooms have stereo sound with music, sound effects and occasionally, voice. Mix music to both left and right, put a sound effect on the right channel and a voice on the left channel, or other combinations.

For all sound sources, use endless loop answering machine message tapes and stereo cassette players. Keep the cassette machines clean and do not use damaged message cassettes. Have a spare message cassette for each sound track and keep the masters at a safe location.

All sound equipment should be located in the central equipment room. The house sound wiring should be 14 to 16 gauge zip cord and the event sound wiring, 16 to 18 gauge zip cord. Zip cord has one

smooth conductor shielding and one rough conductor shielding. Use this difference to maintain polarity throughout the sound systems (70 volt polarity is recommended, not required). Maintain polarity for trouble shooting purposes. Note in the drawing that a 70 volt system may be hooked up in a random fashion

SPEAKER CABINETS

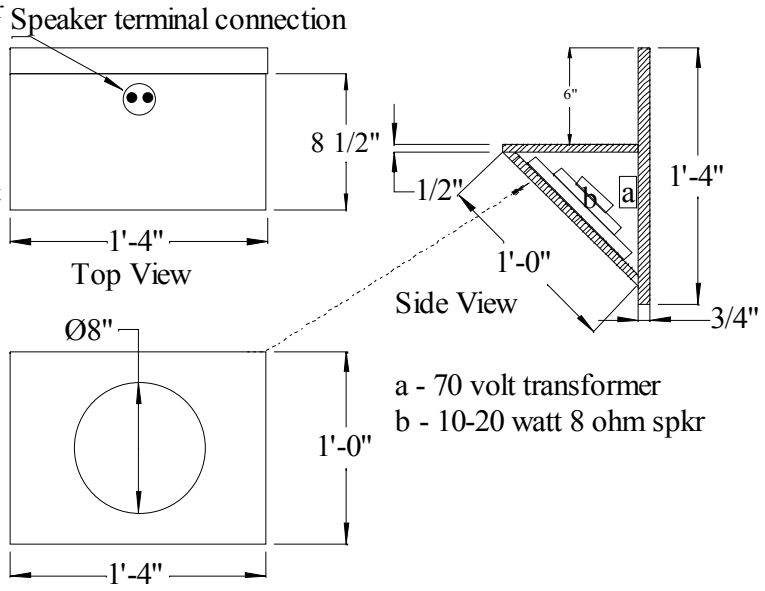
Sound is very important. A portable dark attraction is not the safest place for good sound equipment. This is a very good dark attraction speaker cabinet. Note that it does not look very good, but how many people will want to break in the house and take it home?

It is made from 3/4" and 1/2" BC plywood and designed to fit high against the ceiling with the sound directed down at a 45 degree angle. Note the 6" the cabinet extends above the level portion of the speaker. This provides three separate functions:

1) A fixed distance for the speaker from the ceiling creating uniform sound from speaker to speaker,

2) Enough room to insert a screw gun and drive two wood screws into the wall and the 2x4 to mount the speaker box and

3) Contains the speaker terminals.



Pre drill all holes with a 1/8" drill bit so the screws don't split the wood. Use black latex caulk to seal all the edges and cracks. Mount the line matching transformer to the speaker or the inside of the box. Do not trim away the extra wires on the transformer, but make sure that all of them are insulated from each other and the metal portion of the speaker. Save these wires for future redesign of the sound system.

The 4 & 8 ohm dedicated event speakers will not have a transformer inside. Mark these speakers on the outside as to wattage and ohm designation. Mount the 8" speaker to a metal grill cover and attach this to the wood speaker cabinet.

MICROPHONE/CAMERA USE

An unusual special effect is that of placing a microphone in the house at a location that usually evokes screams and placing the speaker some place in the house or in the waiting area for customers to hear.

A better way is to capture both sound and picture, using video camera in a better illuminated area. This will be a preview of things to come for the customers and entertainment for the long wait in the line. The camera should only show customers being scared and not what is scaring them. This camera could be used with one of the mirror effects, shooting through the mirror at eye level into the customers faces. The mystery would then be, where is the camera.

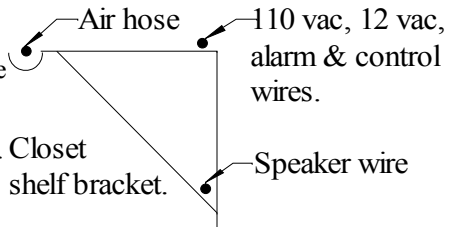
EQUIPMENT RACK/MOUNTING

Remove the protective covers from all the amplifiers and fix mount them to their respective shelves. Place a small 110vac equipment style muffin fan at one end of each shelf to blow air across each amplifier. Install two or three such fans at the top of the equipment rack to suck air out of the equipment room and blow it through drilled holes or a slot in the top of the equipment room wall. Make sure there is a slot or holes near the bottom of the wall for air intake.

A dark attraction has poor ventilation. There is a good chance the speakers in the sound system will be overdriven and/or blown. This protective ventilation arrangement will keep the amps cooler and may prevent amp destruction.

WIRING NOTES

Check the wire wattage rating before connecting the lights. Different wires have different wattage limits. Add up the wattage for a circuit and don't let it exceed 80% of the total wattage rating of the wire. Consult an electrician for proper installation, connection and ratings.



All wire connections must be made with wire nuts. Major junctions should be in plastic electrical boxes with clamp connectors to hold them in place and protect them. Do not allow any stress/strain on the wires.

I use "L" brackets (closet shelf/hanger) to create my wire channels and place them every 4'. All my wiring is placed in these "L" brackets. The bracket design I selected is for closets and has another feature: I use it to wire tie the fog boxes air hose into. Once all the wiring is in place, gather the wires into two bundles, one for speaker wire and one for all other wires, then wire tie into two tight bundles. Speaker wire runs inside the "L" and other wire on top of the "L".

POWER DISTRIBUTION SYSTEM WITH EMERGENCY BACK-UP POWER

Distribution of 110 vac power must be according to code. Most of the power in my attraction is 12vac. Items using 110 vac are kept in the trailer, equipment room or main lobby. Note the regular "Exit" lights are wired directly to the emergency power system. This way, you can tell if the emergency power system is working from any exit door in your attraction. If the EXIT lights are illuminated, the emergency power is operational, no EXIT lights...

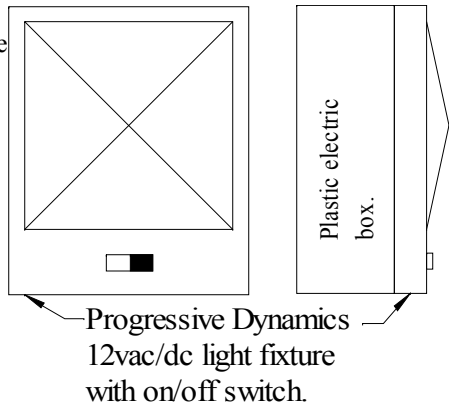
For back up dc power, use a large deep cycle 12 vdc marine style battery. Attach an automatic deep cycle battery charger that will cycle off/on according to the charge level of the battery.

To get 12vac, purchase a step down transformer with the wattage rating needed and a voltage rating of 110vac to 12vac. See low voltage lighting.

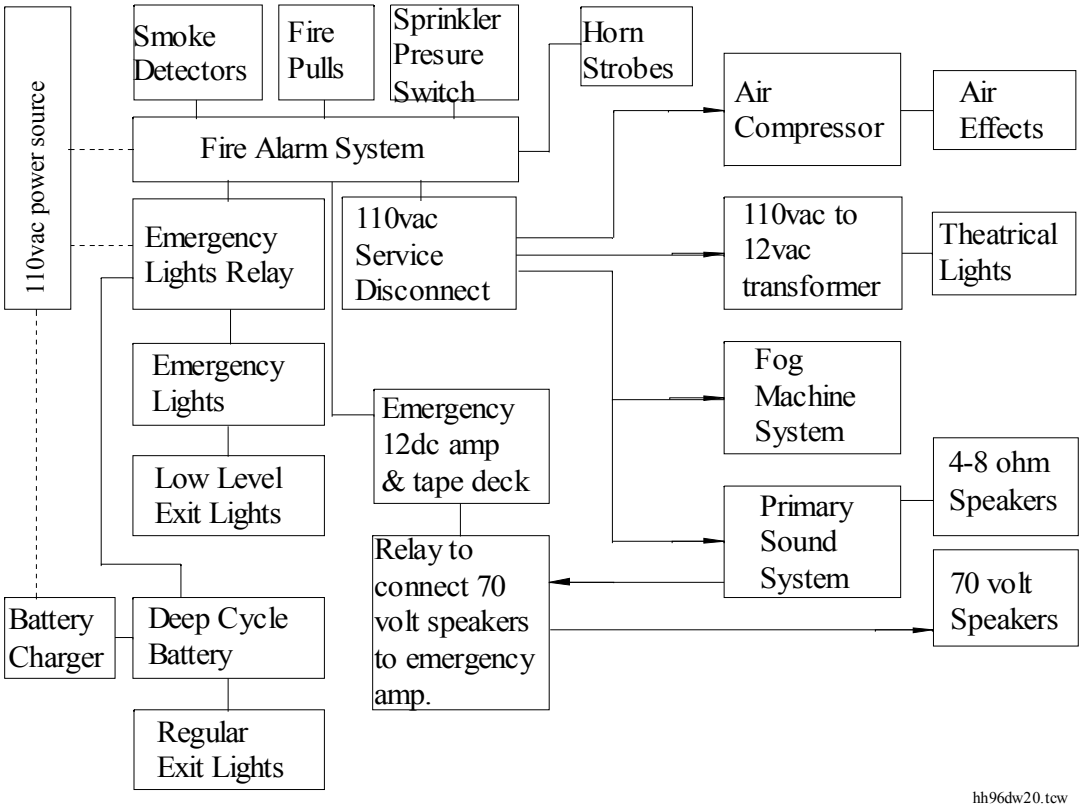
To determine the wattage rating required of the 12vac transformer, add up all the wattage of the theatrical lighting in the house. The #1141 12 volt bulb is 18 watts, #93 bulb is 13 watts and low voltage wedge base landscape bulbs are 4 to 11 watts each. Call a lamp supplier to obtain wattage ratings for bulbs not properly marked.

For a load wattage of 1,500 watts, add 20% for resistance in the wires and the connections, a total of 1,800 watts.

Use 18 watt bulbs for the exit light and low level emergency exit light. These exit fixtures are available from Progressive
Dynamics packed 40 to a case. These fixtures can also be used for emergency lighting.



TYPICAL BLOCK DIAGRAM



LOW VOLTAGE LIGHTING

A dark attraction does not need bright lights. Strobe lights are more effective and blinding on customers whose eyes have adjusted to low lighting levels. Purchase low voltage lighting fixtures from Home Depot or your local hardware store one at a time or in quantity from an electrical supplier. These small 4 to 7 watt 12vac (or dc) spotlight units are perfect for this use. Also available from Tanner electronics is a 12vac/dc light fixture ready to mount. Do not purchase colored plastic covers. Purchase colored gel material from a theatrical staging supply house or colored floral wrap from a craft store instead and cut the pieces to fit. Use rubber bands or clothes pins to secure. This will save big bucks.

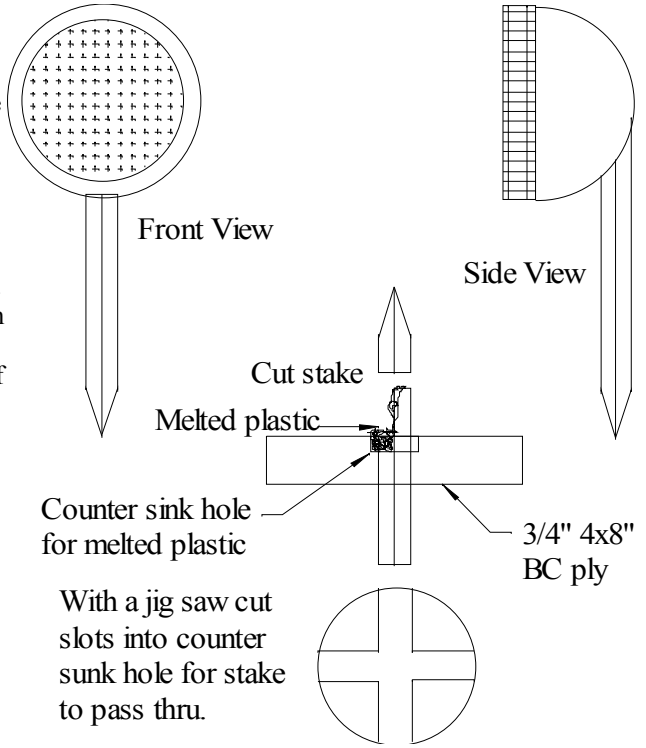
The main drawbacks to the decorative lighting system are the transformers available for the low voltage lighting and manufacturers constantly redesigning the light fixtures. A large 110vac to 12vac 20 amp circuit transformer will deliver about 2,000 watts and is the best choice. Look in the yellow pages under transformers. One or two of these will be enough.

One reason for using low voltage lighting is that either no electrical permit will be needed, or the electrician may need one to install the low voltage transformers. The rest of the connections may be made by trained employees. Do consult with a licensed electrician. Low voltage ac is not as dangerous as high voltage ac. It is; however, still dangerous.

The low voltage light drawn is a Toro model #52201 style floodlight. Malibu has a similar spot light, model #ml90401. Both have probably been redesigned by now, so use this as a guide only.

Mounting a light with a stake for a base is a problem. My solution was to prepare a piece of plywood as noted. Cut the stake and melt the stake end into the counter sunk portion of the plywood with a propane torch . This takes some practice, so practice with the cut off portion. Once the plastic has cooled down, the stake is firmly mounted to the plywood. Paint the whole base black, don't leave the torch marks un- painted, you might give a fire inspector a fit.

The low voltage wiring slips into the back and is clamped down by the mounting bracket connection to the spot light on the Toro. The Malibu has a wire with a clamp on clip. Run the wire through and on to the next light. Complete instructions come with each light.

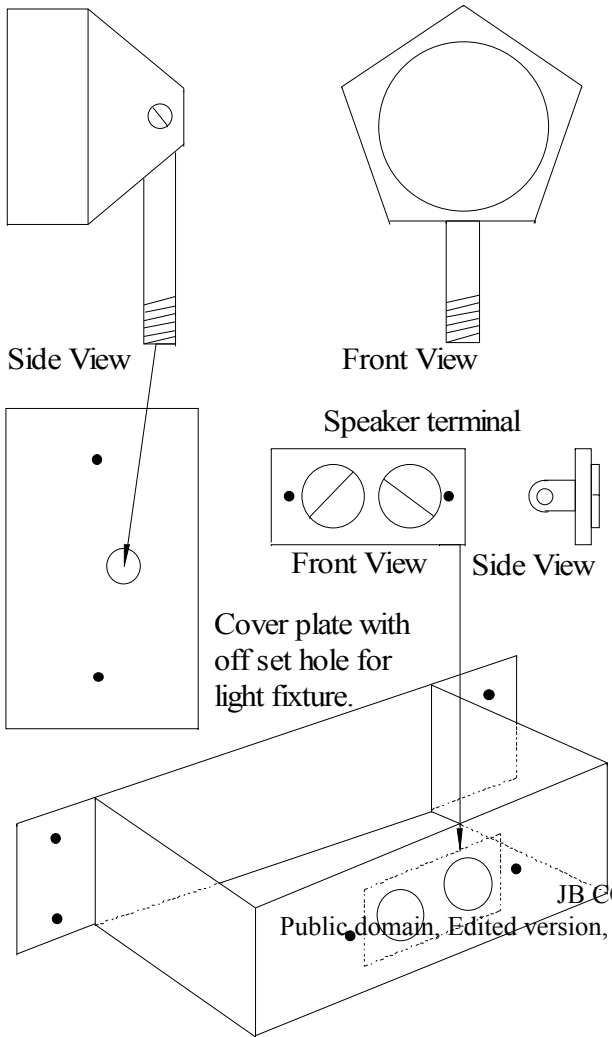


Do not exceed the number of lights per wire as indicated on the packaging. When you reach the limit of the wire, start another wire back at the transformer. Larger wire may be used from the transformer to a 12vac distribution point from which low voltage wire may be connected.

The 12vac/dc light from Tanner may also be available from a local electrical supply house. It is used on emergency lighting fixtures.

Purchase single gang metal electrical plates with a conduit hole or blank plates and drill your own hole, mount the fixture to the plate and the plate to a plastic electrical box with mounting tabs..

Attach a two or four position screw terminal (four terminal used as a loop through, one set in and one set out) to the box and wire the light to it. These may be used for theatrical lighting as well as emergency lighting.



JB CORN

STROBE LIGHT

The strobe light offers a good lighting effect that really can disorient the customer. Use the strobe to illuminate a creature or to blind customers. Strobes are a high cost item and one that some people will want to steal. Make your own strobes. Purchase strobe kits to assemble yourself or get them assembled. Mount the strobe in a little plastic box and have it powered by the 12vac power line. Electronic kit suppliers have schematics for strobes and for 5/12 vdc power supplies from 110vac and 12vac.

With this packaging the value of the strobe is less for a thief and just as effective in a dark attraction. Add a colored gel like red for a hot effect or blue for a cool effect. With this inexpensive approach, more strobes can be used.

The cave, described on page 25, is painted white in my house and illuminated with 12 strobe lights flashing at a slow rate. Customers leaving this room are very glad to do so. They are totally disoriented (some even say nauseous) and ready to be scared out of the house.

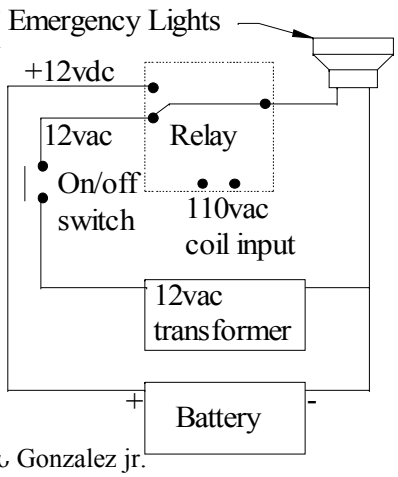
A warning sign must be placed at the entrance of the house: "strobe lights in use". A strobe light will cause some people to have seizures. For the most part, these people know who they are, but any room with a strobe should have an attendant that is on the lookout for any customer who may be having difficulty or on the verge of collapse.

EMERGENCY LIGHTING SYSTEM

The Toro spots could be used, but more light and a different lighting look is needed. The Progressive Dynamics lighting fixture model # pd-751 page 44, comes packaged 40 to a box complete with # 1141 18 watt bulbs. These units mount easily anywhere with just two screws and the plastic cover pops in place. Use wire nuts and 12 gauge zip cord or use the 14 gauge zip cord and place fewer units on the circuit. Consult a licensed electrician for proper installation. I also use the lights from Tanner described on page 47.

Install these lights near the top of the 8' wall to illuminate all hallways and rooms. If the ceiling height is greater than 8', place emergency lights higher along walls that are higher. Example: the attraction is in a warehouse. Place emergency lights about 8' oc along the walls of the warehouse and 10' high. If you have a central corridor configuration like on page 59, place emergency lights along the top of the braces on either side of the central corridor 8' oc facing into the customer area . The ticket booth and entry area must also be illuminated.

These lighting units can also be used for the illumination source behind the exit lights and as the low level exit light. A sign shop can make a sign label according to the building/fire code to apply to the plastic cover. See appendix sample plans.



The emergency lighting system is triggered by a loss of power. The relay in the diagram is engaged as long as the attraction has 110vac. It is powered directly from the 110vac distribution system, page 45. When the relay loses power the emergency lights come on, powered by 12 vdc.

An option is to add 12vac power to the other side of the relay. Place a switch in the circuit. Now you check to see if all your emergency lights are working without going into alarm mode.

Note that the battery ground is tied to one side of the transformer and together they make electrical ground for the emergency lights. This circuit will have to installed by a licensed electrician.

SPRINKLER SYSTEM

The new fire code requires that all attractions of this nature be fully sprinklered. If you are in a building that is already sprinklered then you are OK. If you are a portable operation, like mine, then you have your work cut out for you.

Some fire departments will let you install a residential style system with quick response heads. This type system is cheaper, can be easily removed, stored and reinstalled the following year. The key to making this system affordable is having a 12' high ceiling. The alternative is about 60 sprinkler heads in a typical 40x80 attraction and orange plastic pipe everywhere. Although it is not required, I also recommend two 50' to 75' fire hoses, one in the front and one in the back. If you go for the fire hoses ask your local fire department for some training assistance in their use.

Your attraction should be within several hundred feet of a fire hydrant, this will make hooking up your sprinkler system easier. It is possible to have an approved water tank trailer with pump and stand-by generator. The details would have to be worked out with your local fire department.

Even with a sprinkler system, excessive use of foam and untreated fabric can lead to a major low heat fire that creates a cloud of poisonous gas before it ever gets hot enough to set off the sprinkler system. A good fire alarm system with more smoke detectors than are required is necessary.

FIRE ALARM SYSTEM

One fire alarm pull is in the ticket booth and one or more in the employee central corridor. Do not place any fire alarm pulls in any customer area. The fire alarm system must also monitor the sprinkler system. A sprinkler bell is nice; however, when our attraction was up and running, we tested our sprinkler bell and could not hear it until we where within 10'. The Fire Alarm Control Panel (FACP) must be in a central easily monitored area of the attraction. The warning lights must be clearly labeled as to distinguish between fire pull, smoke detector or sprinkler detector. When the system is triggered, staff will be able to tell the source of the alarm. The best system would include individual lights for each smoke detector and fire pull with a diagram indicating their location. Part of the fire alarm system is a telephone. That may sound strange, but remember this attraction is designed to be in a parking lot. A cell phone or direct line is a must. Having a good detection system is good for the customers, but in the event of a fire it would be nice for the fire department to know about it and even come and put it out. After all, it is your investment. When the fire alarm system is activated it is important for the following things to happen automatically:

1) Loud sirens in and out of the house.
2) All sound, ac, and/or ventilation systems stop.
3) Emergency battery powered lighting illuminates all areas.
4) All 110vac to the house is disconnected.
5) All exit lights stay illuminated and all low level exit lights become illuminated.
6) A 12 vdc standby amplifier which will automatically connect to the house sound 70 volt speakers and a automatic cassette player to instruct the customers to make an orderly and quick exit. This amplifier also has a microphone to make emergency instructions.

The fire alarm system must be installed by a professional alarm company. Some cities require it for a dark attraction. Cover all the areas with sirens and fire strobe sirens. Select the style smoke detector for your event. Each room should have its own smoke detector. There may not be enough money the first year to install all the smoke detectors that I recommend, but add detectors each year. The central corridor must have 2 or 3 smoke detectors. The fire alarm company will design the plan for the house and submit it to the fire department for approval. Do not place any of the oil based fog boxes close to a smoke detector. Take time to adjust the fog level by compensating with the air pressure gauge on the air compressor. Do not use other smoke creation devices inside the house.

Do not use any device in the house that heats up to operate, I don't care if it is approved by the underwriters laboratory or the fire marshal, because no matter where it is placed, someone will get burned. This type of device can be poorly maintained or become damaged and cause a fire.

MINERAL OIL BASED FOG MACHINE SYSTEM

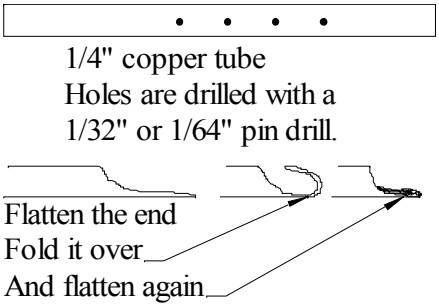
DARK ATTRACTION SYSTEMS

A dark attraction really comes alive (dead?) with a mist hanging in the air. Fog creates great lighting effects and looks awesome seeping from the cracks of the house at night. However, there is the problem of expense. Fog machines and fog juice is very expensive. To completely fog an entire house for a month would cost nearly $1,000 in fog juice alone, not to mention the purchase or lease of several fog machines. The cheap way out is to fog one or two rooms with one fog machine.

A fog machine called "cracked oil" has been around for a very long time. This machine is very expensive, but the fog juice is low cost. There is a cheap way to build a cracked oil type fog system.

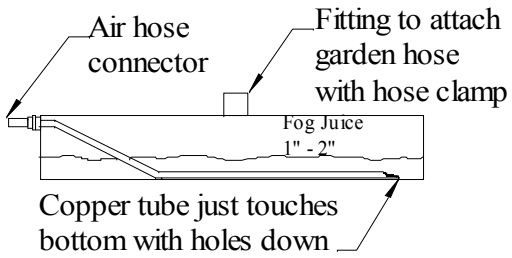
An entire system of ten machines will cost less than one commercial fog machine. Mist fog juice is as low as $15.00 per gallon. All the components are off the shelf and easy to assemble: One 3 1/2 to 5 hp air compressor with moisture removal unit (operates 10 to 12 fog boxes), air hose, fog juice containers, copper tube and hose to direct the fog.

Cut a piece of 1/4" copper tubing about 12" long, pinch one end closed, fold it over and pound it shut with a hammer drill 3 to 5 tiny holes (1/32" to 1/64") with a pin drill and place a 1/4" copper pipe fitting on the open end.



Purchase small plastic containers with an opening large enough to get your hand into to tighten the fittings. Drill a hole in the side for the fitting, use both a rubber washer and a metal one on the inside (rubber against container wall). Bend the copper tube unit so that it just touches the bottom of the container with the pin holes facing down. Screw a male air hose coupling to the copper tube fitting.

Purchase 50' lengths of air hose, female connectors for the ends, hose clamps, "T" plumbing connectors and any other necessary parts to complete the custom system.



I had a sheet metal shop make metal boxes for my system detailed here. They made metal shelf units for each fog box as well. I screw the shelf up high on the wall, place the fog box in it and run a garden hose out of the top to where I want the fog.

After about 30 minutes the entire house will have fog and, depending on the direction of the wind, fog may pour out the front door of the house.

This is not a thick fog; it is a mist fog. For the thick effect, I place a fog box in a coffin and crack the coffin just a bit. The fog builds up and pours out over the edge. Put a red light in the coffin for an eerie effect.

Be careful with the fog juice. It is slippery when spilled. Use dirt or saw dust to sprinkle over it and sweep it up quickly. The special mist fog juice is 100% mineral oil, food grade.

JBCORN

The best features of this fog are that it does not smell, is hypo-allergenic and oil based food flavors can be added to create various frightening aromas.