use all that space. Now I need more, since the last part of it has been added. As more things went in it to more complicated it became. I needed more shielded cable to get rid of the a-c hum that was feeding into my amplifiers. The high side of a transformer was arching across a switch and the seeming simple job of installing the waffer switch turned out to be more complicated that I ever imagined. All this was my own idea. I bought no wiring diagrams or kits. I built what I wanted and I built it the way I wanted it built. The most aggravating thing I had to contend with was the fact that I live in a small town and could not get the parts that I wanted. Most of my parts came from an army surplus dealer in my town. I would rather be working with improper equipment that not working at all. So many of the things I am using are not really what I wanted but they work and that is what counts in my case at least. I plan to keep adding to this entry even after the Science Fair is over. I plan to be able to control every electric thing in our house just about without wires. I have some of the tubes that I need now but don't have the money to build the switch relay receivers just yet. I intend, as I have built the first part, to work out each step by myself my own way.

The only book that I have used to any extent is a tube manual. I have made use of some of my own ideas to save money. When I did not have the money to buy a crystal mike I just used 3 V.D-C in series with the carbon mike and the primary of an old speaker transformer. The secondary had the small A-C current when I talked that the expensive crystal mike would have had. I have the panel fused and equipped with a master switch. Each different circuit or unit has a pilot light to show that it is either on or off. I am making use of three amplifiers, having each of them in potential use of more than one thing at one time.

CONSTRUCTION OF A TELESCOPE

CHARLES J. SCHWARTZ
West End High School, Nashville, Tennessee

My entry in the National Science Fair was a 3¼ inch equatorial telescope which I constructed over a period of about twenty months in my spare time. In order to keep the financial end of this project moderate, I employed such items as curtain rods, spent bullets, and towel tubes in the design. Although half of the fun in a telescope is the construction, upon completion, this instrument has afforded me with numerous pleasant evenings of spectacular celestial entertainment.

To begin with, the most important part of a telescope is the tripod. This I made from one inch pipe. It will fold up for

easy transportation, yet it is quite heavy and sturdy. I have equipped this with feet, to keep the legs from sinking in the ground, a small tray which will hold charts and eyepieces, bubble levels, which aid in determining the proper angle of the polar axis, and a red lighting system which is used to read star charts without enlarging the iris in the eye. The feet and tray were made from ¼ inch plywood, the levels from laboratory glass with a solution of phenolphthalein, and the lighting system from flashlight batteries and bulbs with a two hole triple position switch. I painted the whole tripod with flat black paint which takes the weather well. This was completely constructed for slightly less than three dollars.

Next, was the choice of an equatorial mount or an altazimuth. For obvious reasons, I chose an equatorial. I made this from two inch plumbing fittings which I filed smooth and painted white for appearance. This was attached to the tripod by means of a large flange bolted to a piece of ¾ inch plywood at a 9° angle with the base of the tripod. This reduced the 45° bend in the plumbing to 36° which is Nashville's latitude.

The telescope is a refractor, that is, it uses a lens. This I purchased along with an aluminum tube to house it. I painted the inside of the tube with flat black to reduce glare. I glued two pieces of two by six pine together and turned them on the lathe at school for the rack and pinion. Then I drilled a 1⅜ inch hole lengthwise through this to accommodate the star diagonal which holds the eyepiece. I then drilled a hole across the first hole in which I put a radio control shaft covered with friction tape for a fine adjustment focusing device. This shaft is turned with large radio knobs. This rack and pinion is quite effective and again saved extra expenditures. For viewing objects at the zenith, I made a star diagonal from bronze tubing and a small right angle prism. To find a star easily, a finder scope is a necessity. This I made from a small lens and Towel tubing covered with tape. I fastened it to the telescope with small strips of aluminum. In order to view the sun, a sun projector is required to protect the eyes. This I made from a small mirror, curtain rods and sheet aluminum. I designed this so that it would always be connected to the telescope and needs but to be revolved to be used. The lens cap was the last part of the main telescope and was made from sheet aluminum and packing steel.

When I had completed the main tube, I had to make the counterbalance to equalize the weight for the mount. I joined the school's rifle team so that I could collect spent bullets for this weight. These I melted in an old beaker and poured the molten lead into water to purify it. Then I again melted the lead in the beaker and allowed it to harden. I now have a nicely shaped counterbalance which works very well.

Aside from the technical value of my instrument, it is valuable to me in that I gained much practical knowledge in optics and workmanship in its construction. Also it was my ticket to the National Fair in Cleveland where I met many new friends and scientists.

THE IMPORTANCE OF NATIONAL SCIENCE FAIRS TO THE STUDENT

ANNA WEIGEL, INSTRUCTOR
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One of the most challenging and encouraging experiences which can come to a high school boy or girl is the opportunity to present a scientific project in competition with other students from over the nation. This fact was indeed demonstrated at the National Science Fair which was held in Cleveland, Ohio, May 12-14 of this year. At that time one hundred and thirty students, each a winner in one of the seventy-one regional science fairs from coast to coast, displayed their own scientific exhibits in competition for national honors. This type of competition is good for the student.

From the enthusiasm, earnestness and assurance with which the students discussed and explained the principles involved in their exhibits to the many outstanding scientists, eminent industrialists, and other visitors, it was evident that each one had not only an understanding of his project but also much pride and joy in a piece of work well done.

From the speakers, scientists and from each other, the students received encouragement to continue their studies in science, a stimulus for research and creative work in science, a realization of the need for skilled personnel in the various fields, and above all, a desire to fill those needs.

It would be amiss not to mention the genuine enthusiasm, good fellowship and true sportsmanship which prevailed throughout the entire three days. New friendships were made, participants rejoiced with and congratulated the national winners, and in parting shouted to each other, "I'll meet you at the Fair in Oklahoma City next year."

THE IMPORTANCE OF THE SCIENCE FAIR FROM A TEACHER'S POINT OF VIEW

LULA MAE SHIPE, INSTRUCTOR
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The growing demand for trained scientists is brought to the attention of the high school science teacher almost daily by one or another of the many media of communication. When in-