How to Earn $20 in an Hour or Less *see page 104*

SCIENCE and MECHANICS

35c MAY

Dodge Darts Compared:
Stock vs. Ram Induction

Bonus Insert
Full-Size Nail Chart for Your Workshop

Science Fair Projects:
Van de Graaff Generator
Chemalloy - a new alloy for researchers
Bernoulli's floating ball experiment

•

Make Your Own Blueprint Machine

•

Electronic Watchdogs Check Your Income Tax

•

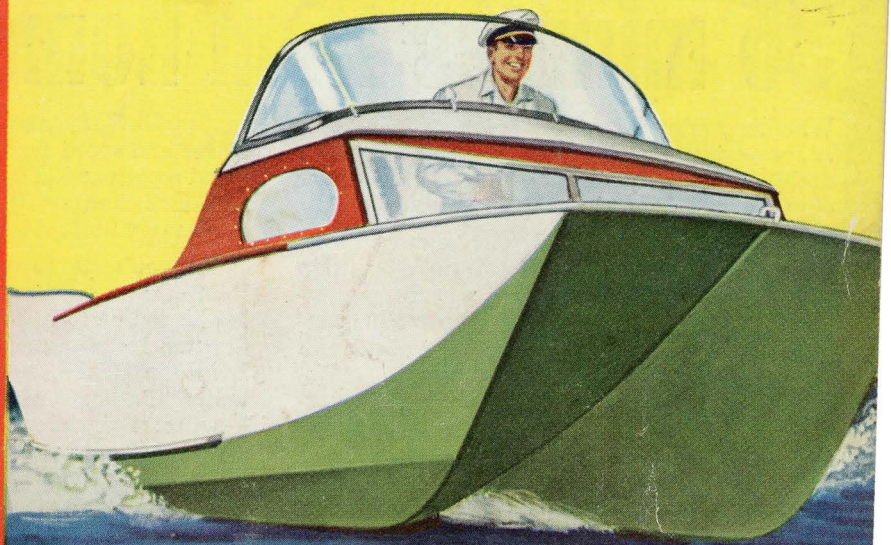
Beginner Special 5-Way Radio

•

Servicing Kitchen Ventilating Fans

The Look of Phones to Come

SAVE $1000 Building Your Own 18-ft. Family-Size Catamaran Cruiser



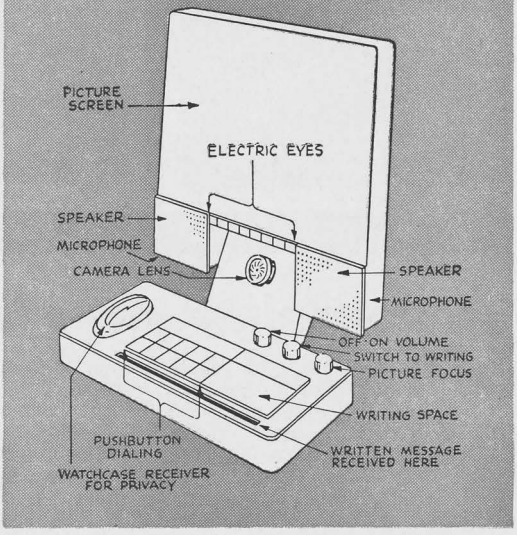
SCIENCE and MECHANICS MAY · 1961

Turn on this phone and you could see who's calling. Two knobs give you control over volume and picture focus, and a third lets you pencil a note in the transmission space. This set gives you stereo sound, but if you want to talk privately, just lift the *Watchcase* handset. Camera eye sends your picture while a row of small electric eyes adjust for the right light. You can also get a return written message. Automatic Electric Co. built this futuristic mock-up. (See line drawing of the set below for location of various components.)

The Look of Phones to Come

One of these days you won't even recognize your telephone. You'll see some new designs this year and next, but other "blue-sky" models are farther off

By ROBERT A. KELLY



ONE of the most common articles we encounter every day is undergoing some radical changes. These changes, in both the look and operation of today's telephone, will—in the not too distant future—make it possible for you to:

- See, and be seen by, in 3-D color, the person to whom you're talking.
- Make and receive a call anywhere—from your car or even walking down the street.
- "Turn on" your phone by merely speaking a key word to it.
- Transmit business information automatically and at high speed over telephone lines.

These are just some of the modifications and improvements you will be seeing and using in the coming years. Some of these are already in use on a limited, test basis. In fact, it's largely a problem now of putting in the complex installations that the phone designs require and miniaturizing existing hardware.

Seeing Your Caller is still a long way off—conservatively estimated at 10 years—but nevertheless, we have all the individual com-

Bell Laboratories engineers envision one use for this television-telephone, the *Picture Phone*, in an executive's office. Here a secretary uses one of the knobs to decrease volume. Lens at the top of the set transmits her picture.

If you hear a telephone signal on the street, chances are someone is being paged on the *Bellboy*. This little instrument will let you know if someone is trying to get in touch with you.

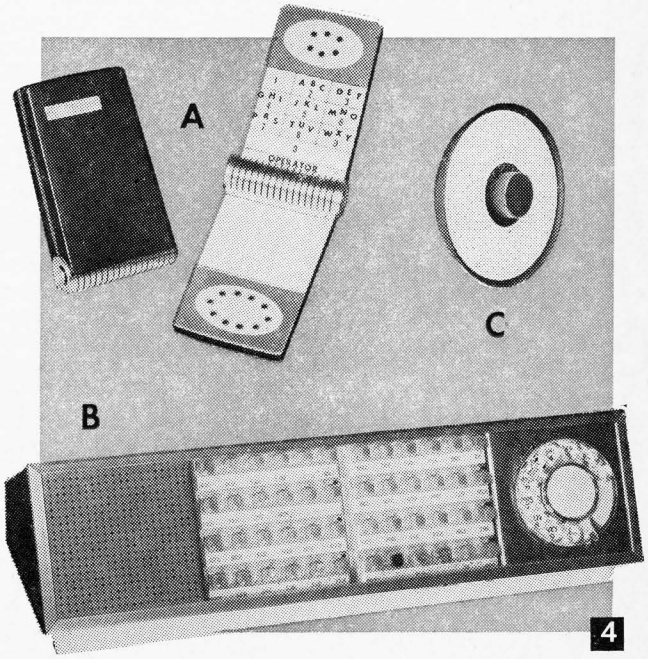
ponents for such a system right now.

The problem lies in putting these together and, more difficult still, making it possible to transmit a television image over telephone lines.

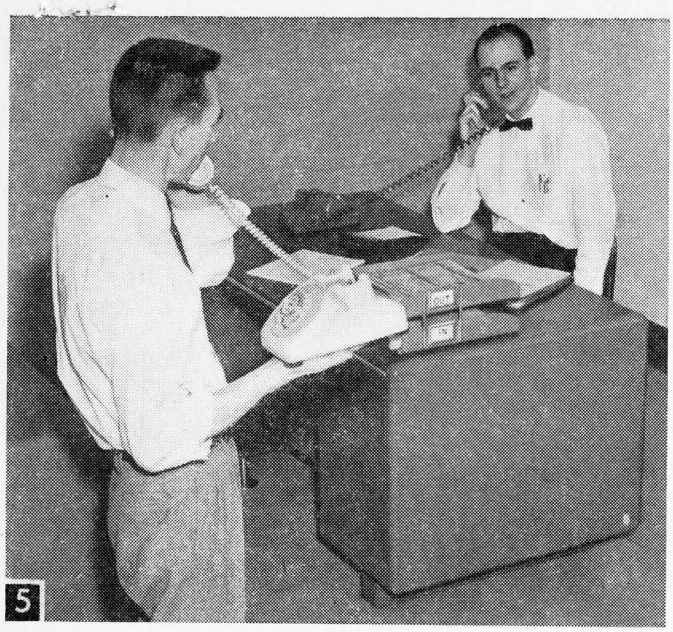
The *Picture Phone* (Fig. 2), developed by Bell Laboratories is a model of what they believe the see-your-caller phone will look like.

A small desktop unit, it contains a miniature TV-type camera lens for transmitting your picture plus a small viewing screen that shows the person at the other end. Included in the unit is a "repertory" of 66 frequently-called numbers, all of which can be reached by simply setting an indicator and pressing a bar. The push-button dial is used to reach other numbers. In one model, they've provided both a microphone-speaker unit for hands-free operation and a conventional handset.

Engineers at Automatic Electric Co., Northlake, Ill., have made some giant steps with their *Telesight* (Fig. 1). This design calls for a 3-D color picture and



Here's a round-up of three phones that engineers promise we'll see sometime in the '60s. A handy Personal Telephone (A) would let you make a call wherever you were. The executive Direct-Line Loudspeaker (B) combines ordinary intercom principles with a phone you never have to pick up. The Phonetic Phone (C) may remind you of the Arabian Nights—say the right word and you're automatically connected with your party.



This may be the beginning of completely wireless phone conversation. The phone held by the man at the left resembles an ordinary desk phone, but it isn't. It transmits incoming and outgoing calls (via radio) from a base station control unit connected to the main line. Still too large, and efficient only for in-plant or office use, the unit nevertheless represents a good example of phones to come.

transmission, and no less than stereophonic sound in sending and receiving. In addition, they also plan to make it possible to transmit drawings or written messages, using a system similar to two on the market now (see p. 110, Feb. '61 S&M).

Curbside Communications? The *Bellboy* (Fig. 3), now being offered by the Bell System in 14 key cities throughout the U. S., will certainly provide a revolution in phone calling.

In operation, the instrument is quite simple. If an important call comes in for, say, a doctor while he's making his rounds, his receptionist phones the telephone company's Bellboy operator. She, in turn, immediately puts the doctor's personal signal on the air. This is picked up by his Bellboy receiver—and his alone—and he knows that he is to telephone his office as soon as possible.

This personal receiving set weighs only 7½ oz. and you can carry it easily in your pocket or clip it to your belt. Three small mercury-cell batteries with a life of about 750 hours power the receiver.

An on-off switch controls the power. Another switch permits you to turn off the tone signal after it's received. Subscribers pay a small monthly fee, covering a basic number of calls.

The ultimate in this type of phone is the *Personal Telephone* (Fig. 4A). This instrument would allow you to call someone directly—no matter where you were. Engineers at Automatic Electric have proved the feasibility of this with their *Wireless* telephone (Fig. 5). However, they still face the problem of increasing its range of operation and reducing the size of the unit. Right now, it's limited to an inplant type of use.

Machines that "Talk." Business and industry also benefit from current innovations in telephone progress. In addition to a variety of intricately-designed executive phone instruments that allow various kinds of conference call combinations and loudspeaker uses, there is the brand new *Data-Phone* (Fig. 6).

This instrument converts the signals from electronic computers into a form that can be sent over the telephone network. Connections are put through as simple telephone calls and link locations together between which the machines "talk" to each other.

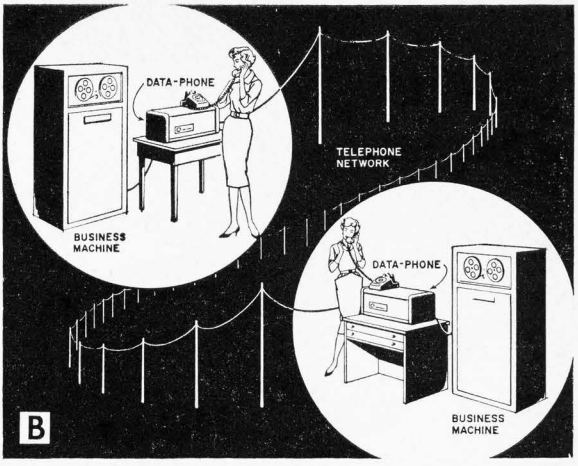
Any type of data in any machine language—including handwriting and diagrams—can be transmitted at high or low speeds from any place to another telephone location. For example, using a fairly low-speed Data-Phone set, a big supermarket's entire inventory of some 7,000 items can be sent in about eight minutes. This same list single-spaced on a printed tabular form would be about 100 ft. long and could take you hours to read over the phone.

In a typical system, compact Bell System Data-Phone sets are placed at the sending and receiving locations. These locations could be as close as next door or as far apart as opposite ends of the country. Items are transmitted from one machine to another with a flip of a switch after you place a regular telephone call to the receiving station.

This flexible system can now transmit approximately 1,600 words per minute. It can handle information from punched cards and paper or magnetic tape as well as the handwritten messages and diagrams.

Data-Phone sets get their information in the form of electrical pulses (technically described as "bits") and convert these pulses to audible tones suitable for telephone circuit transmission. At the receiving end, Data-Phone sets convert these tones back to electrical pulses that feed into computers, teletypewriters, or other equipment.

Just around the corner are further devel-



In the photo, a company official shows the compact innards of a Data-Phone unit. Easily hooked up to an ordinary phone, it can transmit information fed into it by several kinds of business machines. Diagram (B) shows how an office worker puts the unit into action over a standard telephone network.

opments in the Data-Phone field that will allow business machines to turn themselves on in the dead of night, place their own call to another machine, transmit all the data stored during the preceding day, then turn themselves off again.

Versatile Home Phone. Just as new, but already here is the *Home Interphone.* This system (you can have it installed in your home this spring) gives you the hands-free kind of phone use you may long have wanted to have.

In the base of each phone is a small microphone and in the wall near it, a small speaker. These are the two major items that make it possible for you to use each phone as an intercommunicator. Your controls consist of two buttons: The hold button permits outside phone calls to be held while using the intercom part of the system. The line button lets you select either an outside line, a voice-paging circuit, or you can answer the door or call the kids in from outdoors through a combination speaker-microphone located just outside the front door.

Now let's look forward to that day when we can go to a dish-shaped receptacle called the *Phonetic Phone* (Fig. 4C) on the wall, give it the key word, and be immediately connected with the corner grocer.

Offer Demo Fuel Cell

YOU can demonstrate the actual operation of a fuel cell—converting chemical energy directly to electricity—with a working model kit, the *Fuelectric,* designed to operate on easily-obtainable chemicals.

The cell drives a small 1½-volt electric motor which is part of the kit. The necessary chemicals—an alcohol fuel, potassium or sodium hydroxide electrolyte and hydrogen peroxide oxidant—are commonly available from chemical supply houses.

Including a propeller that attaches to the motor shaft, the entire assembly is 5½ in. high. The base measures 7 x 3½-in. Allis-Chalmers Manufacturing Co., Milwaukee, Wis., offers the kit for $9.75.