The Bell System's new coin telephone is easier to install, use, and maintain and harder to break into than any other past Bell System coin collector. It incorporates many unusual features, such as a single coin slot and a new coin-sampling mechanism.

R. R. Stokes

A Single-Slot Coin Telephone

THE NUMBER of Bell System coin telephones has increased steadily over the years to a present high of 1,130,000—about one public telephone for every 250 Americans. This growth is expected to continue, for people today are using public phones more and more.

Because of the increasing importance of public telephone service, Bell Laboratories was asked some years ago to design a coin telephone more suited to the needs of the modern user than existing coin collectors. The result was a new coin telephone called the 1A1, which is easier to install, use and maintain and harder to break into than its predecessors.

Almost every component of the new telephone has been changed. For example, the coin slot, the mechanisms for testing and adding coins, and the housing itself have been completely redesigned.

The most obvious innovation is a single, edge-on coin slot that replaces the three circular openings on previous collectors. The slot saves people the bother of finding the right opening for every coin by allowing them to deposit nickels, dimes and quarters all in the same place. It simplifies the operator's job of counting deposits because people can no longer put two coins in the phone at once. It also makes it difficult for burglars to insert probes into the phone.

Deposited coins are tested in a new chute for their ferromagnetic properties, maximum and minimum diameter, maximum thickness, weight, density and resistivity. The last two properties are tested simultaneously by eddy current means —a valuable technique that has become the basis of most sophisticated coin sampling mechanisms. The chute accepts both the silver and the new laminated U.S. coins and rejects practically any other kind of deposit.

Good coins progressively move through the chute while slugs stop wherever they fail a test. To get rejected slugs back, the caller must operate a coin return lever, which is near the slot. The one exception occurs when slugs are rejected by the eddy current detector. When that happens, the slugs fall automatically into the coin return chute.

Coins are counted differently than in other sets. Once a coin passes all of its tests, it drops onto an electromechanical device called a totalizer, which is about the size of three kingsize cigarette

packs. The kinetic energy of the falling coins is used to start the totalizer because neither commercial nor central office power is available before the initial toll has been deposited. The totalizer is such a precision instrument that it is able to operate even with severely worn dimes.

This new device adds coins and also stores the subtotal mechanically until the initial toll is deposited. By positioning a single cam, installers can adjust the initial rate—also stored in the totalizer—from 5 to 45 cents in 5 cent increments. This new feature enables telephone companies to set one rate for public phones in, say, large cities and another for phones at outlying airports.

After the initial amount has been deposited, the totalizer goes into action. The central office applies power to the line, and the totalizer then transmits the coin deposit information in the form of electronic signals. The signals are equalized for the central office loop and thus can be detected either by machines or operators.

After all the signals have been transmitted, the totalizer disables the initial rate storage circuit for the duration of the call. This allows callers to make toll and overtime deposits. The totalizer controls the generation of signals for nickels, dimes and quarters. Field trials have shown that operators recognize these signals more easily than the traditional bongs and gongs. The caller, however, does not hear the new signals.

If, for some unusual reason, the totalizer stops operating, the coins are not counted but instead fall to the side and then down to the bottom of the chute. This bypassing feature eliminates the possibility of coin jams.

After coins leave the totalizer part of the chute, they are held in escrow until collected or refunded. This is done by activating a "single-coil" relay from the central office. The first piece of apparatus designed for this telephone, the new relay was such a major improvement over the "two-coil" type that it was initially adapted for use in existing coin telephones.

Collected coins, released from the coin hopper trap, fall into a cash receptacle. This telephone accommodates either the standard cash box or a new one with 50 per cent greater capacity. When the larger is used, a false bottom in the vault is removed. Greater coin storage adds flexibility in coin plant administration for high collection stations or locations with increased initial rate.

Refunded coins fall into the coin return chute. The mechanism is changed from those used in existing phones. To get at the returned coins, the caller pushes back a door that swings inward.

In addition to these coin handling mechanisms,

The Bell System's new public telephone includes many new features, such as a single coin slot, a coin release lever, a new coin return, and a switchhook located on the set's front.

the telephone contains a removable chassis for mounting the ringer, network, coin signal oscillator and start circuit. The totalizer, and the telephone cover, dial and switchhook assembly are plugged into two jacks on this chassis allowing

C. D. Hays works with a laboratory model of the 1A1 Coin Telephone. Movie camera gives a high speed series of pictures showing various points in a coin's traverse down the telephone chute.

installers to connect the major subassemblies quickly. They also can test the set electrically by removing the cover and using a patch cord. On-the-spot electrical testing with the mechanisms and circuits exposed is not possible with existing coin collectors.

All of the subassemblies are mounted in a high-strength housing, reducing the possibility of gaining access to the set. Two new locks on the cover and lower housing are superior to those on other coin telephones.

Such an emphasis on security not only will minimize losses for the Bell System but will in the long run improve the reliability of the coin telephone. When telephones are broken into or tampered with they usually have to be taken out of service.

A new type of switchhook also protects against fraudulent use of the phone. If this switchhook is moved up and down slowly to attract the operator's attention, a mercury switch makes contact with the central office line. However, if the switchhook is flashed at high speeds to simulate dial pulsing, the mercury splashes into droplets and contact is irregular.

The switchhook rests on the front of the set so that an inoperable condition can be more readily detected by customers. If, however, it is blocked, the circuit automatically refunds deposited coins. The front switchhook can be used with equal ease by right-or left-handed people.

Other new features of the coin telephone include a high-strength fingerwheel with an enclosed number card. A metalized back surface highlights the dial and also masks collected dirt. Plastic information cards, conveniently located on the faceplate, resist the effects of rain and condensation. The set uses the new standard armored cord and handset, which has a specially guarded transmitter and receiver.

To develop the new coin telephone from an exploratory set to a fully reliable production design took many years. During this time, not only did requirements change as a result of several field trials, but new and sometimes unexpected needs arose that had to be met. Among these were the introduction of TOUCH-TONE® dialing and the new laminated U.S. coins.

For the last several years, the Oklahoma City Works of Western Electric Company has set up production facilities and cooperated with Bell Laboratories in the construction of sets for testing, evaluations, and correction. Thus, the design has been optimized and tooling errors have been eliminated. Many field trials and laboratory and security tests have been run on these sets. Everything has been tested from the coin mechanisms to the set's absorption of tobacco tar. The result is a highly reliable coin telephone that can take extremes in use, abuse and weather and is free of major production problems. It will become the Bell System's new standard for public telephone service.