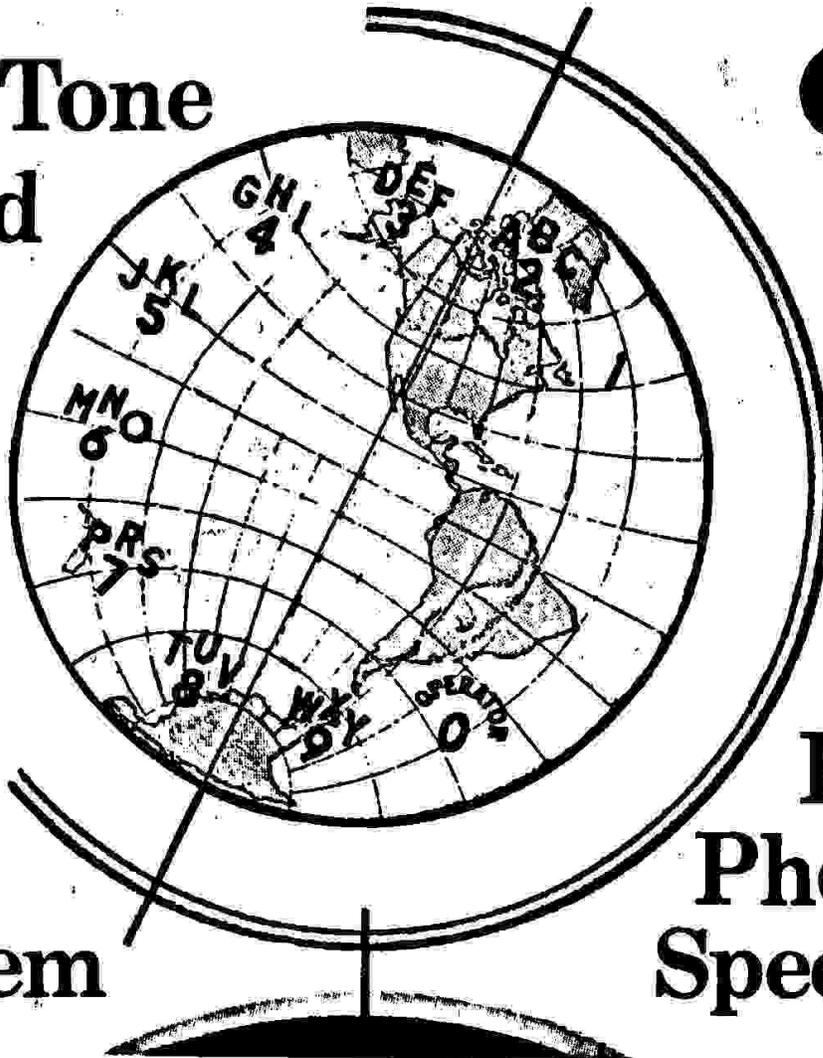


NEW FORMAT, NEW STYLE — THIS ISSUE!



How The Telephone Works

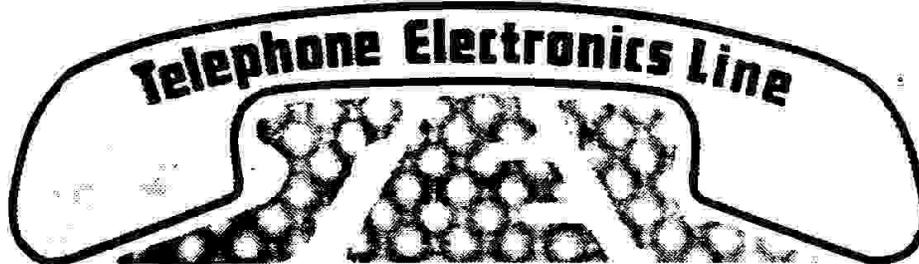
**Dial Tone
Speed**



**IRS
System**

**Pay
Phone
Special**

OVERSEAS DIALING TECHNIQUES



MARCH 1975 **Published Monthly** VOL 2, NO 3

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If it's TEL, it's swell!

TEL CONTINUES TO GROW:

With almost 7,500 subscribers we are now a "force" to be reckoned with. If you are not yet a member of the TEL family now is the time to join us.

As a note of special thanks, TEL now offers free subscriptions to those unfortunate ones among us who, due to a bit of bad luck, are now behind bars for "exploring the greater depths of their telephone".

To: Telephone Electronics Line, 22035 Burbank Blvd., Woodland Hills CA 91364

Please send me: a one year **FIRST CLASS** subscription to TEL @ \$12.00
a one year **REGULAR** subscription to TEL @ \$ 6.00

Name _____

Address _____

house number street

city state zip code

Enclosed is my check for: \$12.00 \$ 6.00

Editorial

By
Jack Kranyak

As TEL enters it's fourth month of publication we can only be absolutly amazed at the reception you have given us. When we first started publication in November of last year we thought TEL would appeal to a small group of people to whom the telephone and the telephone company held a special fascination. Well, frankly we were wrong!

The question of course is, how does this affect you? Well for one thing the unexpected response, almost 10,000 subscribers to date, caught us unprepared to handle the basic task of getting that many magazines labled with your names, sorted by Zip-Code and into the mail. That alone was an obstacle, but not the only one. The very task of printing the magazine required a whole new aproach.

At this point we were forced to take a good look at ourselves, and what we wanted to provide to you through TEL. Our old equipment, mostly one Selectric typewriter and an outdated label maker were simply not up to the task.

It was (and still is) our goal to bring you something which is just not available anywhere else on the "open market". And we hope we have been meeting that goal. Each issue we try to give a good mix between highly technical discussions (see C.O. Operations this issue) and articles of more basic interest. These include pieces on the operation of the basic telephone instrument and interesting information on access numbers and codes.

But, more than just provide you with information we wanted to do it proffessionally. We are not the first in this field but we are the only ones. Others have tried to "ditto" or mimeograph but these efforts inevetiably fell apart.

In order to provide you with the kind of publication we think you wanted when you first subscribed, we made the decision to "do it right". Starting in January we began a program of replacing our equipment and doing work ourselves that previously had to be sent out.

To date we have spent more than ten thousand dollars to improve our magazine. This has not yet been visable to you, in fact for the last two months our service has been paradoxically worse. For this we extend our apologies, we just grew faster than we could handle at the time. Now we are ready!

The only sad note is that we have been forced to raise our subscription rates. This change took place starting with the January issue. However those who are already subscribers will not be charged for the difference.

We thank you for your help in keeping TEL afloat.

BACK ISSUES

We are pleased to announce that back issues of TEL are now available. Due to the large number of requests for back issues we have started a new press run to meet the demand.

The issues available are: Nov. 74, TSPS; Dec. 74, Toll Free Dialing; Jan. 75, Area Code 900, Detection and Hold Button; and Feb. 75, Phone Bill and Answering Devices.

These issues are unrevised original copy sent by first class mail in a manila envelope and cost \$1 each. Please specify the issues desired and enclose payment with your order.

TEL SOLICITS ARTICLES

In order to make TEL more open to it's readers we are adopting a new plan whereby TEL will pay for readers articles used in TEL. Additionally, we welcome schematics and circuits for our line of plans.

We will pay between 10 and 15 dollars for material used in TEL and up to \$50 for scematics used in our plans.

Material submitted should be typed with all illustrations in ink. We can assume no responsibility for any item sent and all contributions become property of TEL. □

Overseas Dialing Techniques

By JOHN REYNOLDS

Until recently it was impossible to dial a call to a point outside North America (with the exception of Hawaii). However, a new Phone Company service will change all that. Direct Overseas Dialing is now becoming available to home subscribers. In a program called *International Direct Distance Dialing* (IDDD) currently being introduced, you will be able to dial directly to most European points as well as Israel, S. Africa, Venezuela, Australia, Japan and Hong Kong. A Bell spokesperson, contacted for information about the service, told TEL that a pamphlet titled "International Direct Distance Dialing" will be available from local business offices in areas where the service exists.

The technique is quite simple, the caller dials "011" followed by the two or three digit code for the desired country plus a one to six digit code for the city and finally the desired number. If the caller has TOUCH-TONE service he may "dial" a "*" after the last digit, this will speed up the call, but is not necessary.

The IDDD system, while new to the home subscriber, is very similar to the method used by operators since the introduction of *Multi-frequency* (MF) switching. In this procedure the operator keys: KP + 011 + XXX + ST, and waits for an *international dial tone* then KP + XXX + City Code + the desired number. The XXX is derived from the country code plus a "1" or a "0" and will be explained in detail later. It is important for the call to be completed as soon as possible after receiving the *international dial tone* — at most 7 seconds — because there are a limited number of these international dialing channels (TASI).

The IDDD system simply codes the TOUCH-TONE tones into MF tones and adds KP and ST at the proper places.

That is the basic system for "normal" overseas dialing. There are, however, some refinements which can be used for better

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THE U.S.A., CANADA, MEXICO AND CENTRAL AMERICA ARE ALL 1

DONT FORGET! LIKE AREA CODES YOU DO NOT USE A COUNTRY CODE TO CALL INSIDE YOUR OWN AREA.

FRESNO—Way station for tax returns

By HARRY ANDERSON

MILLIONS OF DOLLARS PROCESSED EACH DAY THROUGH IRS CENTER

Fresno—This is where they bring your federal income tax return after you mail it. They sort it here, staple it, computerize it, microfilm it, store it and ship its key information—on tape—to higher headquarters to approve your refund and decide if you should be audited.

It all amounts to one of the world's greatest paper shuffles, and Fresno is just one of 10 Internal Revenue Service regional processing centers. It handles roughly 10-million individual tax returns per year from California and Hawaii.

How tax returns are processed and selected for audit used to be more of a secret than it is now. Taxpayer lawsuits, congressional criticism and the Freedom of Information Act have opened up the process to public scrutiny.

In theory, at least, the operation is a tribute to bureaucratic problem solving.

Three times a day, mail trucks loaded with bags and carts full of tax returns pull up to the mammoth, 12-acre IRS building in southeast Fresno. The center handles 10,000 individual returns on an average day this time of year.

Old hands say the mail is heaviest on Mondays, after taxpayers spend the weekend wrestling with returns. It also comes in spurts during the season—late January after W-2 forms come out, late February (those expecting a refund), and again in the week before the April 15 deadline (those who have to pay up).

Envelopes zip through an opening machine at the rate of seven per second. The machine also sorts them according to type of return inside and the location from which they were mailed.

How, you may wonder, does the machine know what to do? It "reads" those curious black squares on the outside of the envelope IRS supplied with the tax forms it mailed you. (If you don't use the IRS envelope, the system slows down.)

From there, they go to employees who remove the returns from the envelopes, sort out the documents inside and send any money attached to the accounting department.

What happens if somebody mails cash? The sorter stands up, raises his hands in the air and yells, 'CASH!' and waits for the supervisor," an IRS official said.

Bank of America stations a number of its employees at the Fresno IRS center to record and deposit the tax monies as they come in. Last year, B of A received average deposits of more than \$33 million every day at the Fresno center during tax season.

More than 450 IRS examiners check the returns manually to make sure taxpayers signed them, that W-2s are attached and the names of dependents are listed.

It's a repetitive chore—examiners usually check about 65 individual returns per hour. If the examiner is checking the so-called "short-forms" return, he usually gets through about 120 per hour.

Once the examiners finish their simple checks, the computer takes over. IRS decided long ago the avalanche of paper it receives had to be reduced to computer form or else the agency would slip into bureaucratic chaos.

So, at Fresno, more than 400 employees enter information from your tax returns into the computer system. Not everything you write on the returns gets into the computer.

Basically, what's entered is on the first page of the return—adjusted gross income, taxes paid, exemptions and refunds due. Information about total deductions, if you itemized them, and about the dividends and other income you reported on separate schedules also is entered.

The computer does the addition, subtraction and tax calculation, then checks it

(Continued on Page 13)

Pay Phone Special

By ROBERT KLEIN

In the course of the average day, many people will encounter a pay phone that is out of order (OD) for one reason or another. These people will usually place an out-of-order sign on the telephone, and go to another location to notify the repair service. His duty having been completed, the subscriber goes on his merry way, assuming that the problem will be taken care of in a short time. But what is not known is that the simple action of reporting an OD on a pay phone (PT) initiates a very complex maintenance and service routine performed by the coin maintenance craftsman. These complex routines are the subject of this article. We will now give a description of the chain of events incurred by the trouble report, beginning with the customer dialing repair service.

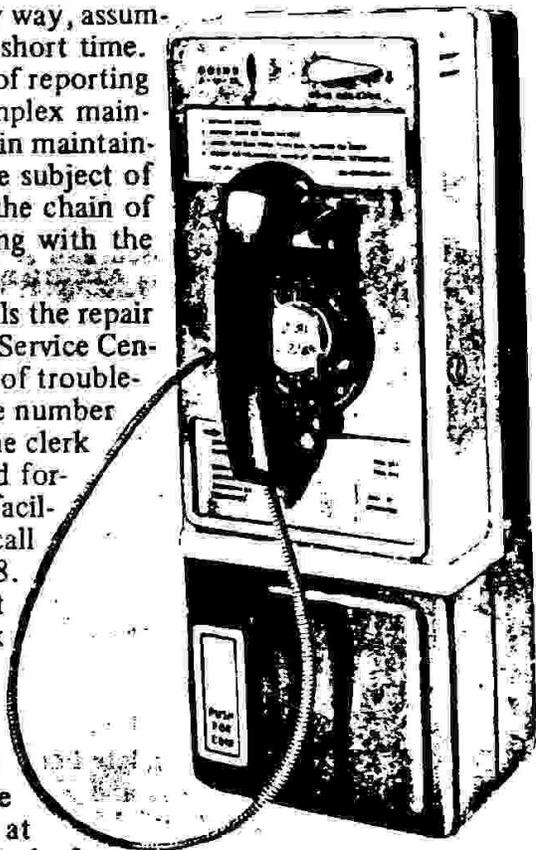
When the customer wishing to report an OD calls the repair service, it rings into what is known as the Plant Service Center (PSC). This office is usually manned by a staff of trouble-reporting clerks. The customer gives the clerk the number of the OD PT and the nature of the problem. The clerk then writes up an inter-office trouble ticket and forwards the report to the appropriate test board facility, usually located in the PSC where the repair call was taken. Suppose the OD number is 555-2368.

The test man will then take the ticket to his test position and proceed to get up on a no-test trunk (verification) in the 555 office, after which he will dial the 2368. He will then be abruptly connected into the OD circuit. Then by using his test equipment he can determine more closely the actual nature of the problem and whether the problem is located in the central office itself or at the PT. If the problem is located in the central of-

ice, he will ring down to the frameman, who will walk over to the switching apparatus in use by the OD PT and attempt to knock the trouble out. This might mean the un-sticking of a line relay, etc. Should this occur, the frameman notifies the testman, who will file the trouble ticket with the records department, and continue on with other reports. However, should he determine that the nature of the problem is outside the office, he will make such a notation on the trouble ticket, along with the actual nature of the problem, and forward it to the dispatch section of the PSC responsible for dispatching the coin craftsman out to the trouble location. The office responsible for dispatching and co-ordinating the coin craftsman is called "Relay". The craftsmen are periodically required to call into relay to report their progress, receive additional trouble reports, announce lunch breaks and also to announce when they are heading for the "Barn" (the PSC) at the end of the day. A fact worth mentioning is that the relay number is non-supervising (free); as most

of the men would resent paying a dime just to report required information. These men also carry a small pouch in their tool belts that are filled with a pre-determined amount of coins, in different denominations, all of which are colored with a permanent ink. This is done to insure that, should the craftsman loose money in a PT he is attempting to fix, the accounting office can take these colored coins out of the regular collection. By way of a color code these coins are returned to the proper man. It is, by the way, a myth that a coin craftsman has access to the coin box. His key opens only the upper part of the machine. About all he can do is poke a thin wire

(Continued on Page 9)



THE TELEPHONE : a basic introduction

COMPILED BY TEL STAFF WRITERS

Like any electrical circuit the telephone requires four basic elements: A power source to set the electrons in motion—such as a battery or generator; An electrical apparatus—like a motor, lamp, TV set or a telephone—to be operated by the electrons; A conductor which provides a continuous “pipe” through which the electrons can flow from the power source; and a switch to complete the circuit and to turn the electron flow on and off.

DIAL TONE SPEED MEASUREMENT (part two)

By JACK KRANYAK

This article is the second in a series of articles dealing with telephone company plant engineering and maintenance. It is primarily intended for knowledgeable enthusiasts and plant employees who have a background in this field.

Each month a topic will be investigated as we progress into the field of telephony.

SELECTION OF LINE EQUIPMENT TO BE TESTED

Measurement Error

The Dial Tone Speed measurement is intended to accurately show the DTS that is average for all of the customers in the entity or loading divisions for each hour studied. As these tests are not made by a random selection of lines it is necessary to select lines in a particular manner if the objective is to be achieved. When properly done, the measurement error inherent in the selection of sample items is minimized.

Selecting The Lines

In making the selection of lines the following will want to be considered. One objective is to achieve a measure that reflects the variations in DTS that exists between Horizontal Groups, Line Groups, Vertical Groups and Line Load Control Groups. Recognize that this is to be done even within Loading Divisions where they exist.

(Continued on page 10)

The Telephone Circuit

Like a light bulb, the telephone operates as part of an electrical circuit. The power source is in the telephone company office building. The conductor is the wire and cable that lead from your telephone to the telephone building. The apparatus is the telephone itself. The switch is built into the telephone.

The switch that opens and closes the telephone circuit is operated by the two “buttons” beneath the telephone handset. With the handset resting in it’s cradle, the buttons are pressed down—the circuit is broken. Lifting the handset releases the buttons and a spring releases the switch. The circuit is now complete. It brings you the dial tone to tell you that the telephone equipment is ready to handle your call.

The telephone also contains two other important units. The *bell* is operated by electric current to call someone to the telephone. The *dial*, when operated, sends a kind of “electrical code” to search out and find the other telephone you are trying to reach.

In the TOUCH-TONE phone, push buttons replace the dial. When a button is pushed music-like tones are transmitted to the central office where they operate equipment sensitive to the tones which in turn find the party you are dialing.

Electricity and Sound

Basically, the telephone is an instrument which permits you to talk with someone at a distance—almost instantly—through an electrical conductor (such as wire). Voice signals will not travel along a wire, but

(Continued on Page 11)

Coming Next Month

ANATOMY OF A PHONE BUST
CENTRAL OFFICE OPERATIONS
Part 1: Step-by-Step Switching
TOUCH-TONE®: What it is, What it Does
CONSTRUCTION PROJECT:
add four new numbers to your
touch tone phone

NOTICE

TEL welcomes letters from readers on all topics of interest, however we regret that due to the huge volume of mail we receive we can not answer each letter individually. Letters of general interest will be printed as space allows but we simply do not have the time to reply to the myriad of requests for technical information that arrive each day.

We do, of course appreciate your comments, and try to slant our articles to your interests.



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JACK KRANYAK
Executive Publishing Director

JOHN REYNOLDS DONALD SIMMONES
BILL HOMUTH ROBERT KLEIN
TEL Staff Writers

Editorial and main offices at:
22035 Burbank Blvd., Woodland Hills CA 91364
(213) 884-1129

RED BOXES BLUE BOXES & DMT
Due to unforeseen legal difficulties the article on Tone Boxes originally scheduled for the Feb. issue has been indefinitely postponed. It was felt that it would be more prudent to delete the article than risk what has befallen RAMPARTS and ESQUIRE in the past. It is, however, hoped that the article will appear sometime this summer.

In related matters, the article on DMT and DET synthesis scheduled for this issue will not appear. In an editorial decision it was felt that TEL was not the proper forum for an article of this nature. However, type has already been set so that those who are interested may order "reprints" from TEL at 50¢ each including postage.

Gentlemen:

I am a current subscriber to TEL, and find the information very interesting. However, I do have several questions.

First, I am considering running an advertisement in your publication as a distributor of 'hard-to-get' telephone equipment for experimenters. I am currently in a position to acquire some apparatus that is not available through the usual electronic outlets. Would you consider such an advertisement and what would be the rates?

Secondly, How many subscribers do you currently have?

Third, As with the Ramparts magazine it was learned that A.T. & T.'s lawyers and security requested lists of all subscribers after publication of certain articles dealing with toll defrauding and other equipment. Has TEL had any requests and if it has did they comply with the Telco?

Fourth and last, Has your magazine been published on time?

C.A.
Ohio

Dear C.A.

I think you will find two of your questions answered in this issue. For the other two—First, we do not give out the names of our subscribers to anyone for any reason. Secondly, our subscribers number about 7,500 at the moment and increase by about 1,500 each month. re: our advertising—the rate card is now being published and yours will soon be in the mail.

Dear TEL,

Although it has never been universally established, there are numerous cases in which calls have had to be removed from a subscriber's bill, wherein a "conversation" never took place. Such as when a small child answers the phone and cannot carry on a conversation. Or in another instance, a workman—say a plumber, working in your house answers only to say there is nobody at home. Or perhaps a person answers who only speaks a foreign language and is unable to converse. All of these are unchargeable calls. In fact, in some cases if you get a recorder, but do not leave a message, it may be a non-chargeable call. In other words, you pay for a conversation with a real person.

R. G. T.
Moraga, CA

Dear Sirs,

I have just received my first copy of "Telephone Electronics Line". Your "statement" indicates that your publication in no way constitutes a conspiracy to intentionally defraud any common carrier nor do you support any illegal implements or actions on or drawn from your publication or it's contents.

In the January issue you describe the techniques of "blue boxing" under the article "Modern Phone Phreaking" and then the "Detection, How To Avoid It".

I am sorry but I cannot continue to subscribe to a magazine which lifts up and even encourages illegal telephone activity and even describes how to avoid apprehension.

I am sorry that your talents and efforts are directed in such a perverse direction. Would you please be so kind as to cancel the balance of my subscription.

R.E.P.
Tuscon, AZ

TEL does not encourage illegal activity and is sorry for any misunderstanding.

Dear John,

I was very interested in your Multi-frequency Encoder Network construction plans, and would greatly appreciate a description of what it can do. In the letters section of the Feb issue S.H. told how to Blue Box over the WATS system, only he had the frequencies wrong. Will the above unit produce the proper tones? Being new to "phone freaking" I have a question, Is the Blue Box simply a unit which generates the proper 697Hz-1477Hz pairs? If so how do you do it? I have plans for a unit which generates Touch Tone frequencies, can I use it? I would like to see several articles for newcomers which would cover some of the equipment, (Blue and Red Box) and more construction features.

S.T.
Nashville, Tenn.

The Multi-frequency Encoder produces the same tones as those used by an operator (see "Little Lexicon" this issue). Touch-Tones are produced by a totally different system, a matrix of 7 tones are used to produce the 12 pairs, and will not perform so called "blue box" functions.

P.S. Milo Ponbil (or is it Phone Bill) we have mail for you!

Pay Phone (Continued from Page 6)

down a 1/8th inch hole to test the level of the coins. This is usually done only when the coin receptical is so full that the coins may back up into the coin relay.

Should the craftsman find any money, no matter how little, in the upper section, he must call the test board and deposit the found money in the PT, this is then totaled by the test board. The craftsman next writes up a collection ticket showing that the money was deposited. In the event of the coin box being full to the point of overflowing, the craftsman will call a special collection man, who will come out and empty the phone at once.

Occasionally there are certain craftsmen who do not follow the above procedure and pocket the cash instead. These men do not last long, as telco security is constantly springing traps on unsuspecting craftsmen to test their honesty.

Craftsmen are also required to sign for the keys they possess, which open the upper housings of all PTs. This is to insure against a craftsman giving in to his vices and selling the keys; besides, the upper housing key is stamped and die-cut on a special blank manufactured only by and for the telephone company.

So that explains the craftsman; now we will look into what he does in terms of actual repair and maintenance procedures he performs while on the job. For illustrative purposes, we will assume that the craftsman has been called out to inspect 555-9368 for a possible OD condition, the nature of which is as yet undetermined.

Upon his arrival, the craftsman will open the upper-housing of the PT with his 29a upper-housing key. He will then swing the housing out to a position perpendicular to the wall mounted portion. Then, he will attempt to determine the physical location of the OD condition in the PT. Having done so, he will fix and/or replace the faulty part, and write his ticket up as repaired. He will then move on to the next assigned repair location, initiated by the same repair call procedure; which continues this repair cycle. □

DTS (Continued from Page 7)

A second objective is to make separate measurements for groups of customers who have distinctively different Dial Tone Speeds because of equipment configurations. Thus, TOUCH-TONE and Dial Pulse service are measured separately. And, in No. 1, Panel or SXS, MR, FR, and COIN are measured separately.

A third objective is to make the study in the hour appropriate for the service. For Indexing, Traffic Engineering and similar purposes the practice clearly states how the hour is to be chosen.

The general procedure is as follows:

1. Establishing loading divisions and their busy hours.
2. Provide one or test lines per line group or line link frame for panel or crossbar offices depending on office size, and one test line per line finder group for SXS offices. There are some additional recommendations concerning the number of lines for

A LITTLE LEXICON

(In each issue many terms are used which may be foreign to some of our readers. A new feature which will appear at regular intervals will be A LITTLE TELEPHONE LEXICON.)

This LITTLE TELEPHONE LEXICON will discuss:

Multi-frequency Tones

Multi-frequency Tones (MF) are the basis of modern telephone switching. The MF system uses 6 different tones combined in pairs to form 15 sets of paired tones. These 15 tones represent the numbers 1 through 10, two special tones, *Key Pulse* (KP) and *Start* (ST), plus 3 others used for special purposes.

The operator has a dialing pad, much like a standard TOUCH-TONE "dial". When dialing a call the operator keys KP then the desired telephone number and finally ST. This is normally written as KP + 7D + ST. "+" simply means —followed by — and is called plus.

The KP tone signals the automatic dialing equipment that a call is about to be placed. The ST tone signals that all of the numbers (called a *signal train*) have been keyed and that the equipment may complete the call.

coin groups and SXS primary line switch groups.

This assures that the DTS measurement reflects all of the line groups. This does not allow for weighting groups within a loading division, but it does not allow the variations in service resulting from imbalance or other reasons to be reflected in the measurement.

3. Within each line group select particular terminals so that the sample represents average hunting time and the results are representative under all degrees of loading. For example, when preference is normally given to certain lines such as Vertical group 02 in No. 5 crossbar offices; or the lower numbered terminals (panel) or first rotary positions (SXS) the test lines are to be proportionately distributed to all levels of lower preference terminals to obtain average results.
4. To achieve results during overloads further steps are taken by assigning a proportionate number of test lines in each Line Load control category. For example, in an office with the % of lines in categories A, B, and C of 10%, 45%, 45% respectively, the test lines would likewise be proportioned.

No. 5 Crossbar With Local Overload Announcement Facilities

In No. 5 Crossbar offices equipped with the Local Overload Announcement, special measures for assigning lines and computing DTS results are required. When the announcement feature is actuated, the DTS test lines will not register any delays except under very heavy overloads. No delays would be recorded because to the DTS Register Circuit, the seizure of an announcement line would appear as an immediate return of dial tone.

By arranging the office for Dial Tone Speed measurement as recommended, the lines that are denied access to the announcement circuit are made to wait for dial tone. The measure of their DTS is then used as an indicator of an "equivalent office average speed". □

HOW PHONE WORKS

(Continued from Page 7)

electricity can travel along a wire conductor and be "boosted" (amplified) whenever required. The telephone changes voice sounds into a stream of electrons capable of traveling in an electrical circuit.

Sound to Electricity—and Back Again

The way the telephone sends a voice along a wire is to convert the sound pattern into a matching electrical pattern. At the other end of the line, the telephone reverses the process. It changes the electrical back to a matching sound pattern.

The telephone performs this "magic" by means of *transducers*. Transducers are devices which convert one form of energy, such as sound waves, into another form, such as electrical waves.

There are two transducers in the telephone. The *transmitter* converts sound waves into electrical waves. It is located just where you would expect it—inside the mouthpiece.

The *receiver* converts electrical waves into sound waves. It is, of course, located inside the earpiece.

Placing A Call

Of course it takes more than a transmitter and receiver to make a telephone call. First, you need an electrical circuit between your telephone and the telephone you want to reach. But there are over 100 million telephones in the United States. How is just one of them found and connected? This is the job of the telephone *central office*. All telephones are joined to special equipment in central offices throughout the country.

At one time all connections were made by telephone operators. To connect one telephone to another, the operator used a flexible wire cord on the switchboard. At each end of the cord there was a slender, blunt rod called a *plug*. One plug was placed into the socket (called a *jack*) connected to the line of the telephone making the call. To make a connection, the operator pushed the plug at the other end into a jack connected to the line of the phone being called. The plugs and jacks acted as switches, completing the electrical circuit.

Today most local and many long distance

calls are dialed directly by the telephone user. But operators are still needed to assist on such calls as person-to-person, collect and credit card calls. Others handle special services such as information and calls to mobile telephones. When you make a telephone call, thousands of "off-and-on" switches called *relays* go into action. It is the telephone you use that sets these relays into operation.

Dialing and Switching

When you pick up a telephone handset, a switch inside the telephone closes, and the current flows through the telephone from the office. There, a relay closes, putting your telephone in the circuit with the equipment that will put your call through. The dial tone tells you that the circuit is now closed and the equipment is ready for your call.

Suppose you want to dial 555-2368. The first three digits identify the central office of the telephone you wish. The last four digits specify the phone you want in that central office. For long-distance calls you dial at least ten digits. The first three digits, in such a call, indicate the area you wish. For example, 212 is the area code number for New York City.

But back to your local call, 555-2368. You begin, of course, by dialing 5. When you release the dial it interrupts the circuit five times. Each interruption causes a capacitor to build up a small charge. When the circuit is closed again after each interruption the capacitor discharges its charge and causes a pulse on the line. For the number 5 this occurs five times. Each pulse causes a relay in the central office to repeat the pulse, 5 times when you dialed the five etc. Where touch tone is used the relay is sensitive to the tones of each number.

When later pulses, or tones reach the central office, they set many more relays into operation. Each relay that closes is another connection, another link, in extending the electrical circuit. Each closed relay brings the circuit another step closer to the person you wish to talk with.

The first three groups of pulses (or the first three tones)—from the first three digits you dial—close relays to connect you with the particular central office you are calling. (If the number you are calling is in your own central office, the first three digits tell the

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HOW PHONE WORKS

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central office equipment to handle the call itself.)

After you reach your friend's central office, the last four digits you dial close more relays there to extend the circuit to his telephone. Each digit you dial opens another "doorway" to his telephone; a final group of relays sends a signal to his phone, connecting and ringing it.

When your friend answers, he lifts his handset and the buttons below it spring up and close a switch in the base of his telephone. This is the final link in the circuit from your telephone to his. When you answer your phone you cause two things to happen. First the ringing is stopped and second the equipment starts to bill the calling party if it is a toll call. When you finish talking and hang up, all of the operated relays and switches release to free the equipment for another call.

If there were only a few telephones in the world, connecting them would be quite simple. But, as the number of telephones increases, the number of possible connections grows faster. There is a simple formula for figuring this: $X(X-1) \div 2$ with X representing the number of phones in a system.

OVERSEAS DIALING

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service. As explained before, the "XXX" dialed by the operator represents the country code. It is derived in the following manner (this applies to MF tones only and not IDDD): If the country code has three digits they are the "XXX". If the country has a two digit code, a "0" or a "1" is placed before it, the "0" is for satellite and "1" is for cable. Sometimes one route may be busy, or the country only accessible through cable. For a one digit country code, the code is preceded by the "0" or the "1" and followed by a "1". For example, Germany by satellite would be "149", while Russia by cable is "071".

The already mentioned code "011" automatically "finds" the proper route. It is possible, however, to force a particular routing by demanding a certain *overseas calling center*. There is one alteration when using this method, The key seq-

uence is changed to the following—

KP + 182, 183 etc. + ST wait for tone, then

KP + XXX + City Code + number + ST.

Seven of these exist in the U.S. as follows:

182	White Plains
183	New York
184	Jacksonville
185	Oakland
186	Denver
188	Montreal

Jacksonville is the center for S. America while Oakland serves the Pacific area. Where a call is to be "forced" through a specific *overseas calling center* the code for that center is dialed in place of the regular overseas access code "011".

In cases where a city code is unknown the *Rate & Route* operator may be consulted, she is reached by dialing (MF tones only)

KP + 141 + ST. Then ask for the IOTC route for the desired city and country. Foreign *Rate and Route* may also be reached by dialing the 141 code after the desired country code. Inward operator (121) and Directory Assistance (131) may be reached in a similar manner. There is no language problem since all international operators speak english — it's the international telephone language.

If you can't "afford" to call overseas you can still hear what foreign ring and busy signals sound like. Try the following, all in the 212 area code:

363-8888	Norway/Sweden
363-8849	Switzerland/Denmark
363-8889	Italy/Luxemburg
797-8029	Greece/Spain
797-8079	Australia/Japan
797-8729	U.K./France
797-8798	Belgium/Germany

If you have the "stuff" to be able to spend a lot of time on European calls some of the following numbers might be of interest:

In Hannover, Germany, city code .0511;

119, 11531, 1161

11511 & 1164.

In London, England, city code 1;

246-8099, 246-8021

& 246-8000.

As a note of closing there is a companion tone to our 2600Hz clear tone in Europe, it's 2400Hz, and may have a myriad of uses, such as calls routed through Paris on their way to L.A. □

IRS (Continued from Page 5)

against the totals you entered. If the numbers don't match, the computer kicks out your return and sends it to the "input perfection" department where a human being decides what the problem is.

The computer doesn't have a data bank against which to check your return. It doesn't, for instance, have copies of all your W-2s to make sure you listed all income. That check would come later, if at all.

If you used the long-form tax return—usually known as the 1040—all the information IRS needs to decide about your refund and whether you should be considered for audit is contained on about half an inch of magnetic tape.

If you used the short form, it takes a quarter inch or less.

The Fresno center sends about 10 reels of tape a day to the IRS national data center in Martinsburg, Va. Each reel has information on more than 120,000 individual tax returns.

If your return was rejected by Fresno's computer, you normally will hear from the center's "correspondence audit" division, which handles simple corrections and disputes.

"It's not a formal audit in the eyeball-to-eyeball sense," an IRS spokesman said. "We serve notice that we consider something incorrect and 92% of the taxpayers accept the adjustment."

Into this category fall people who made obvious mistakes—claiming their dog in an exemption, for example, or incorrectly calculating the standard deduction.

Few other audit decisions are made at the Fresno center. IRS top officials make most of them, and the computers at the Martinsburg facility pick out most of the returns for review.

Basically, IRS says, returns are selected for audit in two ways—through random selection and a complicated process known as the discriminant function test, or DIF scores.

IRS sets up various tax return categories including wages, deductions, exemptions, and other income. Using averages on past returns and other, more confidential methods, IRS establishes a "DIF" score against which your return is matched.

Simply exceeding an average in one category—medical expense deductions, for instance—won't necessarily set off the bells on the computer, but it will figure into the

DIF score. If enough categories on your return exceed DIF limits, you will be considered for audit, IRS says.

DIF scores are constantly changing, based on IRS intelligence and problems identified in past auditing experience.

The "random selection" IRS uses to find other returns for audit really isn't so random. Tax officials say that, to study special areas, they will ask regional centers to select a number of returns with specific features.

"We might be asked to select 600 returns with dividend income over \$1,000," one tax official said. "It's random selection, but within certain limits."

If you are chosen by the computer or through the random process, the IRS sends your return to a preaudit stage, where officials determine whether a full-blown audit would be worthwhile.

Of the more than 80 million individual income tax returns filed last year, 2% or 1.6 million were given a full audit. IRS hopes to boost the percentage this year, but odds are still good you won't be called.

Of course, if you have been audited in the recent past or if your income is in a top bracket the chances you will be audited this year are much higher.

Only the IRS computers at the national center in Martinsburg are programmed for the DIF score test. If you're among those selected, a tape with your return's information is sent back to Fresno which then forwards your return to the local IRS district in which you live.

Full audits are conducted at the local office.

The Martinsburg facility also makes the decision on refunds. Its computer prints a tape with names, addresses and amounts which, in the Southern California region, is sent to the San Francisco Treasury disbursing office which in turn mails out the refunds.

It takes about a week for the average return to make it through the Fresno center. But by the time the information gets through the national computers and makes it back to your regional office, the average refund takes about six weeks to reach your mailbox.

The Watergate scandal and revelations of alleged misuse of the IRS for political

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IRS (continued from page 13)

purposes raised some questions about the agency's storage and safeguarding of tax information.

At the Fresno center, security is tight and highly visible. About 30 private guards watch every entrance, and everybody wears a badge. Visitors are never allowed to get near employees while they sort and examine tax returns.

(Information on tax forms is, by law, confidential.)

They also microfilm tax returns at Fresno, and the film is kept on file for three years. The actual papers themselves are stored at Fresno for a year, then shipped to the Federal government's massive document storage facility at San Bruno, Ca., which normally keeps them for seven years.

And the Fresno facility's officials point out that not a single tax document is ever destroyed there, except for the 22 million envelopes they arrive in.

They are obliterated in a pulping machine, and the city of Fresno uses the residue as landfill.

classified advertising

Starting with this issue TEL will accept display and classified advertising. Classified ads cost \$1 per line. A line contains 40 characters, including spaces and punctuation. A box service is also available for those who prefer not to receive replies at their home address. The charge for a box is \$2.50 per ad and includes forwarding of all replies by first class mail. Your address will be kept confidential.

Payment for classified advertising must accompany your order.

Also beginning with this issue, TEL is accepting display advertising. The minimum display ad size is 1/8 page. Please apply for rates.

The address for all advertising is: TEL, Dep't. DA, 22035 Burbank Blvd., Woodland Hills, CA 91364.

EUROPEAN- phone phreaks, I will be in Germany this summer and need info on how to DO IT in Europe. T.G. Box 47 TEL.

TELEPHONE- equipment, dials, relays, plugs, line cards, cords, switches, networks, key units, interrupters and much more. Write for list and prices. Some quantities limited. Write today to: Phone Stuff, P.O. Box 131, Cotati, CA 94928

PRESENTLY- have speakerphone, w/on-off buttons on mic, for key phone. Need wiring diagram as unit will not work on Centrex but will work in my next building, which is equipped with PBX and dial 9 for outside, system. R.W. Box 29 TEL.

USED- Pitney Bowes model 75-R Metal address plate embossing machine. Cost over \$5,000 new, only \$1,500. FOB Woodland Hills, CA. Very good condition. Circulation Dep't. TEL

TEL FOR THE BLIND

TEL is now available on cassette tapes for our blind readers. The current price of \$24 per year includes a copy of the regular TEL along with each tape. Single tapes are \$2.50 each, with a copy of TEL.

TEL cassettes are complete spoken versions of the regular issue, nothing is left out. In fact, the tape is "illustrated" with appropriate sounds and tones.

To order, write: TEL for the Blind, 22035 Burbank Blvd., Woodland Hills, Ca 91364. Please enclose payment with order.



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Stop those long-distance calls made by your friends! Device disconnects all long-distance calls from your telephone line.

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Now you can call the other end of your house on your private telephone system. Great for the office without a PBX system.

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Now you have the capability of recording telephone conversations automatically every time the phone is in use.

Schematics

The basic schematics and parts lists for commonly used telephones. Includes a description of the telephone network.

Telelink Burglar Alarm

Use the telephone line as a link to notify you when intrusion occurs. Great for babysitting purposes and remote applications.

Automatic Dialer

Automatically dials a stored number in its magnetic memory. Takes Touch-Tone or Dial and stores hundreds of numbers.

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Answers the ringing line automatically and dials a pre-recorded number to divert the original call to a remote location.

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Automatically puts your friends on a giant conference as they call in. Have three or four way calls from your home phone.

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Add harmony to your phone. This device eliminates conventional ringing and produces a melody with each ring cycle.

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Before you leave work, call your home and utilize this device to turn on the stove and heat your dinner. Avoids burglars too!

Speakerphone

Enjoy hands-free conversation on the Speakerphone. Similar to Bell System type, but uses two-way transmission instead.

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Talk and listen to your friends in the normal manner, but good luck if someone else tries to monitor the conversation.

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Monitor the fluctuations that your brain produces and learn to put yourself in any mood desired. Completely harmless.

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The complete reference book on the legal rights of the telephone customer. \$29.95, postpaid.

Due to unexpected developments in the legal arena, the book has been pulled back from the printers. We felt that to publish at this time would be to print a book that was obsolete from the outset. TEL has engaged a well known Telco fighter from New York to revise the book prior to an early June printing. The book will contain excerpts from relevant chapters of the tariffs. This

book is drawn from extensive research by our staff, and experts in the field. We will let you know exactly where you stand in the area of interconnection. This book could save you many times its cost. To keep you informed on what is happening in this area we will send an abridged copy of our original edition to all those who order before June 1st. Don't let this one go by!

ALL OF THE CONSTRUCTION PLANS ABOVE ARE AVAILABLE FOR \$24.95 WITH "LEGAL ASPECTS" BOOK \$49.95 AIRMAILED

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