

# Telegraphy

WIRELESS -- WIRE



FOR WIRELESS



FOR WIRE

CONTINENTAL MORSE  
AMERICAN MORSE  
INSTRUCTION

*Published by*

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by  
O. B. KIRKPATRICK

## FOREWORD

**T**HIS little volume has been prepared with two distinct purposes in view. First, to convey an intimate knowledge of the care and operation of the Instructograph, and to furnish adequate directions for building and installing an oscillator unit, particularly adapted to that machine. And, second, to assist the beginner in the telegraph field to a quick but thorough knowledge of the wireless and wire codes.

The information pertaining to the care and operation of the Instructograph has been compiled after several years of experience in manufacturing, selling and operating this machine. The information pertaining to the art of acquiring the codes is the result of many years of experience as an operator, both International Morse and American Morse, and from teaching the codes in residence schools, and by the extension method, with the use of the automatic machine.

The material has been checked by experts in the art of teaching the codes, and it is the common expression of experienced operators that "if one cannot learn to become a skilled operator with the consistent use of your machine and instruction, they had as well give up the idea." Therefore, this little volume is presented to the public with every confidence that it represents the very best obtainable.

O. B. KIRKPATRICK.

## UNPACKING INSTRUCTOGRAPH

**T**HE standard "Instructograph" consists of the machine proper and ten rolls of double perforated tapes.

Each machine is carefully wrapped and packed to prevent damage in transit and should reach its destination in perfect condition, regardless of how or where shipped. Should the machine be damaged in any respect, upon receipt, such damage should be called to the attention of the transportation company immediately with a view to filing a claim.

The extra spool, winding crank and book of instructions will be found in the top of the case, on the instrument panel, carefully wrapped and protected. The ten tapes will be found inside of the case proper, carefully packed in paper. The tapes should be removed through the small panel in the back of the case, and not by taking out the instrument panel. Every particle of packing should be carefully removed so that nothing interferes with the free operation of the motor. The corrugated paper block under the motor should be replaced in the position it is found, after the tapes are taken out, as the paper block acts as an extra support for the weight of the motor.

The batteries should be connected up and the buzzer or telegraph instrument attached, just as illustrated in Figure No. 1, and the machine is all ready for operation.



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# THE INSTRUCTOGRAPH

## ITS CONSTRUCTION, CARE AND OPERATION

It is the intention to make the instructions regarding the care and operation of the Instructograph so plain and complete that one with no knowledge whatever of telegraph instruments, electrical devices or mechanical operation, will be able to adjust and operate the machine, as well as make minor repairs, if necessary, without any trouble.

Figure No. 1, page 7, shows the top panel of the machine, the various parts being numbered 1 to 10 inclusive. This Figure also shows the wiring of the device, and illustrates the proper connection between the machine and a "buzzer" or telegraph instrument and the battery connections. An explanation of some of the more important features will, doubtless, be helpful.

**CONTACT BREAKER:** Parts numbered, 1, 2 and 3 constitute this unit, which operates as follows: Post No. 1 supports a spring which has an iron lug near the center and a silver contact point near the end. The lug rests in the shallow groove of Post No. 2, with the contact point resting against another contact point in an adjustable setscrew at Post No. 3. This contact is what serves as a key and transmits the characters which are perforated in the tape.

The contact points meeting at Post 3, as just described, closes the circuit, and if connected with a buzzer, as illustrated in Figure 1 a constant "buzz" or note will be heard. The paper tape, however, which passes around Post No. 2, as illustrated, raises the lug of the spring sufficient to separate the contact points at Post No. 3. Therefore, when the unperforated part of the tape is between the lug of the spring and Post No. 2, the contact points at Post No. 3 will be separated about one-thirty-second ( $1/32$ ) of an inch, and no sound would be heard, as the circuit would be open.

From this it is easily observed that the contact points at Post No. 3 operates as the key when the spring lug drops into the perforations of the tape, making the contact points open and close as directed by the dots and dashes perforated in the tape.

The contact points at Post No. 3 occasionally collect small particles of dust between them, which interferes with the usual firm contact. A small piece of soft paper drawn between the points, with a slight pressure on the back of the spring at Post No. 3 will remove all dust and dirt. If the machine is not used for a time, the contact points may have a tendency to corrode, particularly in damp climates. A small piece of fine sand paper or emery cloth drawn between the points will remedy the trouble, should it occur.

**ADJUSTMENT:** The proper adjustment of the spring and contact points is the most essential factor of the perfect operation of the Instructograph. This adjustment is very simple and easily made when the mechanism is clearly understood and this is quickly accomplished by a careful study of the illustrations and instructions.

The spring should not be too stiff, nor yet too loose. Just the proper tension will have to be determined by experimenting with it. The lug should rest firmly in the slot of Post No. 2, but not so tight that it will cause a "grating" noise, unnecessarily wear the tapes and not produce the best results. The spring may be adjusted by loosening the screw at Post No. 1, taking the spring out and slightly bending it with the fingers; or Post No. 1 may be turned slightly to the left or right with a small wrench or pair of pliers. It is best to try the spring at Post No. 2 with the finger to see that it is firm but not pressing too hard. Just firm enough so that the lug dropping into the perforations of the tape opens and closes the contact points firmly at Post No. 3 uniformly. The

spring is always properly adjusted and the set-screw set tightly when the machine is shipped, and usually requires little attention for some time, unless bent or jarred out of adjustment.

The most common cause of trouble in spring adjustment is caused by accidentally bending the spring when wiping off the panel of the machine with a cloth, or some similar mishap. If the spring should be bent out of shape in this manner, simply take off the spring, as heretofore directed, straighten it out with the fingers and replace it. Adjustment may then be made. Careful study of the spring connections will enable one to make all adjustments quickly and easily.

**CONNECTIONS:** Posts numbered 4, 5 and 6 are the posts to which the instrument to be operated by the Instructograph is to be connected. The wire leading from the binding post of the buzzer or telegraph instrument nearest the key should connect with Post No. 4. The wire from the center post of the buzzer or telegraph key to Post No. 5, and the other to Post No. 6. These connections must be made just as described as the wiring of the Instructograph is such as to provide a separate and distinct circuit for the Instructograph, and the key of the instrument, each independent of the other. This is a special patented feature of the Instructograph, and not permitted in any other mechanical code transmitter.

This double circuit just mentioned enables one to operate the buzzer or instrument with the key while the circuit of the Instructograph is open, or to operate the buzzer or instrument with the contact points of the Instructograph with the key circuit open. One of the principal advantages of this double or independent circuit is that the student may repeat characters on the key and buzzer or instrument while the blank tape holds the circuit of the Instructograph open, after the machine has made such characters.

**WIRING:** It is seldom indeed that the wiring gives any trouble, and it is quite probable that the machine may be used for years without having to pay any attention to this feature. But, Figure No. 1 will clearly show that the wiring is from Post No. 1 to Post No. 4, to battery. From Post No. 3 to Post No. 5, and from Post No. 6 to the battery. It is simple indeed to check these connections in case of any trouble from that source.

**BATTERIES:** Three to four and one-half volts of battery operates the ordinary buzzer or telegraph instrument most successfully. Either a  $4\frac{1}{2}$  V. "C" battery may be used, or  $2-1\frac{1}{2}$  V. No. 6 dry cells. If the two dry cells are used they should, of course, be connected positive of one to negative of the other, and connection made to the other two terminals. The dry cells will probably cost a little more, but they will last much longer. Either will go inside the case under the motor, and should be protected from rolling around when the machine is carried about.

When the Instructograph is shipped, the wires leading from Post No. 4 and 6 are left hanging loose inside the case. One of these wires attaches to the positive and the other to the negative terminals of the battery. Which wire to the two terminals makes no difference. Batteries should be installed or replaced through the removable panel in the back of the case, and not by removing the instrument panel.

**MOTOR:** The Instructograph is equipped with a high grade phonograph motor, and should operate for years without attention or oiling.

To the shaft at Part No. 8 is attached the mechanism which engages the spool and pulls the tape from the spool on Post No. 7 around Post No. 2. This mechanism is fastened to the shaft by a set-screw. Once in a great while this set-screw may work loose and allow the shaft to turn inside of the mechanism. If this should occur the set-screw may be refastened with a screw driver by removing the four screws at the corners of the instrument panel, and

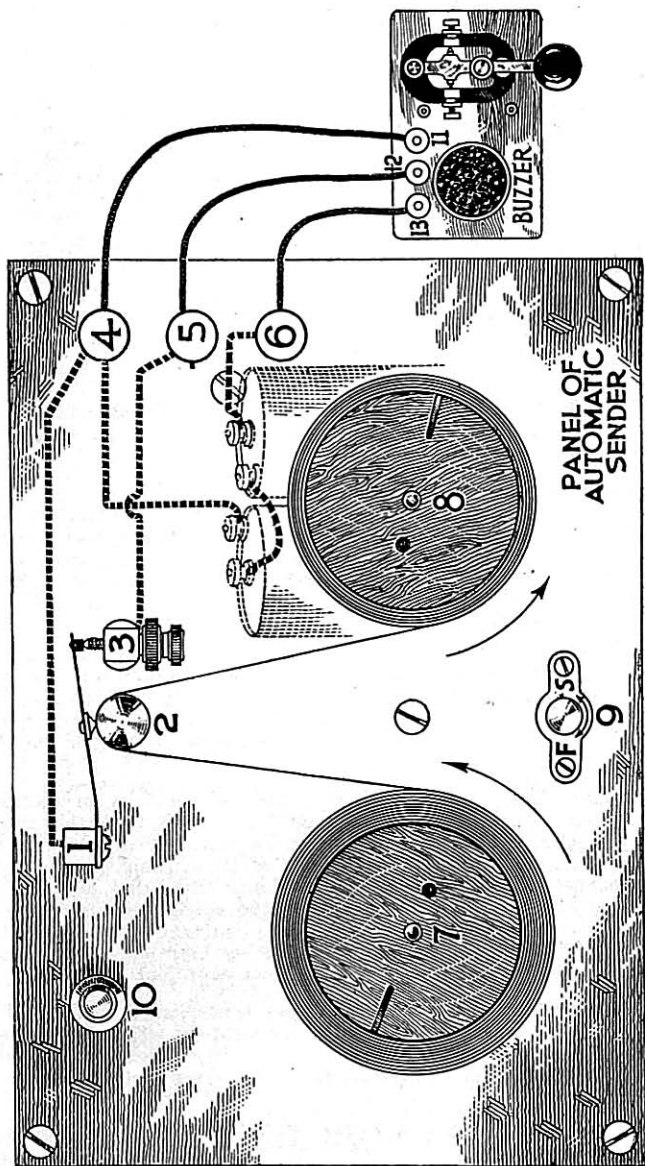


Figure 1. Diagram showing buzzer and battery connection with the Instructograph. Be careful to see that the tape always runs exactly as illustrated above, otherwise it will reproduce the characters backward, and wind the tape incorrectly. Further reference to this illustration will be found on page 5.

loosening the three motor screws just enough to enable one to pass the screw driver to the screw head. Occasionally a new motor—until used enough to smooth the bearings—may not always start, even when the speed regulator is set for normal speed. Should this occur simply turn the spool on Post No. 8 to the left slightly with the fingers.

**SPEED REGULATOR:** Each Instructograph is equipped with a speed regulator, and it is illustrated in Figure No. 1 as part No. 9. The small arrow at the bottom or top of the plate pointing to "F" (Fast) or "S" (Slow) indicates the direction which the screw should be turned to increase or decrease the speed at which the motor moves the tape. Regulating the speed of the tape movement will be taken up further under the code lesson instructions.

**BATTERY SWITCH:** Each Instructograph is equipped with a battery switch, usually located on the back left hand portion of the instrument panel. It is illustrated in Figure No. 1 as part No. 10. This switch may be a "Toggle" or "Push" switch. If the former, to connect the battery will be indicated by the word "On," and to disconnect the battery will be indicated by the word "Off." If the latter switch is used, to connect the battery the button should be pushed down, and to disconnect, it should be pulled up.

The switch is used only when an oscillator unit is installed. When the machine is used to operate a buzzer or telegraph instrument, the switch is not connected up nor used.

**MOTOR SUPPORT:** Naturally the instrument panel of the machine should be, and is, exactly level, in order for the tapes to wind perfectly. In certain damp or very warm climates, the weight of the motor has a tendency to sag the panel slightly. Probably not enough to be noticeable to the naked eye, but enough to make the tapes wind a trifle high on the spool. This does not affect the operation of the machine and the perfect reproduction of the characters, but may as well be remedied.

Each machine shipped has a piece of corrugated paper block between the motor and the bottom of the case. This is to prevent damage by a severe jar in transit. In unpacking the machine the piece of block will have to be removed, but should be replaced, as it acts as an extra support for the weight of the motor, and eliminates the possibility of the panel sagging as mentioned above.

**SLACK TAPES:** New tapes, which are made of specially prepared oiled paper, have a tendency to be a little stiff until used quite a little, and as a consequence may slacken a little between Post No. 7 and Post No. 2. This in no way interferes with the perfect reproduction of the signals, but is unnecessary and easy to correct. Each machine shipped has a small disk of black paper pasted on the panel at Post 7 which lays under the spool containing the tape. This paper is slightly rougher than the polished surface of the panel, and causes just enough friction to eliminate the slacking mentioned. Any kind of paper or cloth with a slightly rough surface will answer just as well.

**TAPE CONTAINERS:** The oil in the paper tapes has a tendency to discolor the white paper boxes in which they are contained. This begins almost immediately after the tapes are inclosed, but in no way damages the tapes or boxes. In fact, it has a tendency to strengthen the boxes considerably.

## OSCILLATOR UNIT

The standard equipment of the Instructograph consists of the mechanical code transmitting device and ten rolls of double perforated tapes. It is shipped ready to operate a buzzer or telegraph instrument by attaching same and connecting the battery.





The advantage of using an "Oscillator" to produce the radio signals instead of a buzzer is so well recognized that directions for building and installing an efficient and satisfactory tube unit in the Instructograph is given herewith. The oscillating tube unit illustrated by Figure No. 2, Page 9, consists of the following materials:

- 1 Audio Transformer.
- 1 Tube Socket.
- 1 Oscillating Tube.
- 1 Telegraph Key.
- 1 Pair Head Phones.
- 1 Battery—(3 to 4½ V.)

The battery switch might be included in the above list, but as the switch is standard equipment of all machines put out, it is unnecessary to mention it here.

**INSTALLATION:** The transformer and socket are fastened with small screws to a board three inches wide and seven inches long, and not over one-half inch thick. Such a board will fit in the left hand side of the case (facing the case) opposite the motor. A brief description of the tube unit material follows:

**AUDIO TRANSFORMER:** While almost any kind of an audio transformer will answer the purpose, Figure No. 2 illustrates a small 3½ to 1 ratio audio transformer procurable at almost any radio shop. The wiring as shown by the diagram is easily followed, and there is but one factor which might confuse those not familiar with transformers.

The terminals or connections of all transformers are not marked the same. If they were, no explanation of the hook-up illustrated would be necessary. In the transformer shown in Figure No. 2, the primary side is lettered "B" and "P" and the secondary side is lettered "F" and "G." The following diagram shows how these markings may vary in different transformers:

Primary	}	B, B+	Positive Battery
		P	Plate
Secondary	}	G	Grid
		F, F—, A—, C	Negative Battery

From this it will be seen that these markings will be found practically uniform except with the negative battery terminal of the secondary side. This explanation should enable one to connect up an audio transformer without trouble, recognizing that the various markings shown may represent the terminals illustrated in Figure 2.

Once in a great while it occurs that one of the coils of the transformer is reversed. So, if the oscillator should not work when connected up, and all the connections checked carefully, reverse the leads going to the two binding posts at either secondary or primary. Reversing both sets of leads will have no effect.

**TUBE SOCKET:** The tube socket illustrated in Figure 2 is an ordinary socket for an U. X. (long) four-prong tube. Any reliable make of similar socket will answer as well. The lettering at the terminals of the sockets is practically uniform, except that in some cases the "F" "F" terminals may be designated as "+" and "-".

The wiring from the tube socket shown by the illustration is so plain that any further explanation is useless.

**RADIO TUBE:** Either a "99" "201-A" or "230" type U. X. radio tube will produce a good clear tone and prove quite satisfactory. The 201-A type

is usually the cheaper and will stand more hard usage, but draws more battery than either of the other tubes. Either of the other types is recommended for general use and satisfactory operation.

**TELEGRAPH KEY:** The telegraph key illustrated in Figure 2 is a "Signal" standard learner's key and answers every purpose satisfactorily. Any good key with dependable contact points will do as well. The key of a combination set, key and buzzer or sounder on the same base, may be used by connecting the two terminals next to the key provided the set has three terminals.

The key is connected to the Instructograph by two wires or a 2-wire cord, just as illustrated by Figure 2, and cannot be reversed.

**HEAD PHONES:** Any set of good head phones, single or double, preferably 2,000 ohm., will prove quite satisfactory. Phones should be connected as shown in Figure 2.

**BATTERIES:** Three to four and one-half volts of battery are required to operate the oscillator unit satisfactorily. Either a  $4\frac{1}{2}$  V. "C" or  $2-1\frac{1}{2}$  V. No. 6 dry cells may be used. The former is lighter and more compact but is shorter lived when used constantly. The dry cells are more economical in the long run and answer just as well. Either will go inside of the case.

It might be mentioned here that both oscillators, buzzers and telegraph instruments, even of the same variety, may require different battery voltage to operate them properly and produce the exact tone desired. A little experimenting with the voltage will soon determine just what voltage produces the result wanted.

**WIRING AND CONNECTIONS:** Figure No. 2 clearly illustrates the wiring of the transformer, tube socket, switch, batteries and machine proper. It also shows the connection of the key and head phones to the machine. Therefore, further explanation would only tend to confuse rather than assist.

**TONE OF SIGNAL NOTE:** An oscillator constructed of reasonably good material and set up as illustrated should produce exceptionally satisfactory results. One should produce a good clear sharp note, and very similar indeed to that heard over the air through a regular wireless set.

Transformers, tubes and even head phones have a bearing on the quality of note produced. One may have to experiment occasionally to produce just the note or tone desired, but little trouble should be encountered. The unit illustrated produces a clear and flute-like note, just as assembled, nine times out of ten.

In case the note should be too high-pitched it may be modified by connecting a small .002 MF condenser from the plate to grid terminals of the tube socket.

Occasionally a tube, that lights up and tests in other respects, will not oscillate, but one will seldom meet with this trouble if a reliable tube is procured. It is simply mentioned with a view to assisting the student to meet any emergency with a minimum of experimentation.

## ACQUIRING THE CODE

It is a well recognized and indisputable fact that telegraphy may be learned only by acquiring the art of reading the code characters as sent by an operator on an instrument reproducing them the same, or very similar to, those that have to be read in actual telegraph work.

One may read books and study lessons until they die of old age, and not even begin to be an operator. One may practice with a key and buzzer or sounder for an indefinite period and never be a fair "ham." One may practice with another student and fare little better, as it is simply another case of "the blind leading the blind."

The only possible way to learn telegraphy is to have some one, or a machine directed by an operator (the perforated tapes) send to one, someone with a knowledge of the code, its fundamentals, its spacing and its technique. Slowly at first and very gradually faster and faster until one's ability to read the characters develops to the required degree to understand the fastest sending just as one understands his native language when it is spoken.

That is just what the Instructograph does. It will send to one as slowly or as rapidly as desired. It will work with one when one feels like work. It will teach the student for a few minutes or an entire twenty-four hours, as one elects. Therefore, with the Instructograph, tapes and these instructions one has all the equipment necessary to make him an expert operator. The rest is up to you.

**PRACTICAL APPLICATION:** Learning either the Continental or American Morse codes is exactly the same process, the only difference being that the codes differ somewhat in their make up. It would be similar indeed to learning either of two foreign languages. The process of learning would be identical, and one would simply learn to make use of the proper vocabulary.

Therefore, everything in this booklet up to the division of the lessons for the respective codes is equally applicable to either, and should be made use of accordingly. That is, the student of either code should diligently study everything contained herein up to the chapter captioned "Continental Morse Code Instructions," on page 22, and if that code is to be taken up, continue without interruption. But, if the American Morse Code is to be studied, the Continental Morse Code Instructions should be omitted, and the student begin with the chapter captioned "American Morse Code Instructions," page 36, and continue to the end.

This provides clear and concise instruction in both codes, which the student will find greatly to his advantage to know.

Acquiring the art of transmitting and reading telegraphic characters by sound as analyzed by many successful teachers is divided as follows:

Natural Ability	5 Per Cent.
Psychology	10 Per Cent.
Study and Practice,	85 Per Cent.

If one possesses a natural ability to learn easily, it is, of course, some advantage, but if not, it is no material handicap. It is not the rule that the one who learns most easily, necessarily learns the best. It is sometimes like the case of money, "easy come—easy go."

The author of this pamphlet is of the opinion that the psychological attitude of the student is slightly underrated in the above analysis, and in many cases might absorb the five per cent attributed to natural ability. In any event, the psychological element in acquiring the code is unmistakably pronounced, and the mental attitude of the student is a vital factor in the work. This factor will be given further consideration later.

As before stated, learning the code is very similar indeed to learning another language, except that the hand is trained to speak the language by re-

producing symbols which represent letters, words, etc., and the ear is trained to read such mechanical symbols instead of a human voice. Therefore, it requires practice, and lots of it. If you expect to learn radio or wire telegraphy in a day, week, or month, you will be disappointed. It simply is not done. But, if your desire to learn is strong enough for you to determine to practice faithfully, and carefully follow these instructions, it will, in the course of a few months, lead you to your goal.

A music instructor, for instance, gives his pupils finger exercises and outlines a regular and exhaustive course of practice, and forbids the student to attempt playing even the simplest pieces until a certain advancement has been made. The same is true with acquiring the code. Certain fundamentals must be learned; specific practices followed and tiresome repetition indulged in, if one is to obtain the best results. If there were any short cuts, instructors who have taught hundreds, would surely know of them. The only short cuts attempted are by those with no knowledge of teaching by the most improved and advanced methods.

Therefore, if you desire to acquire the code with the least possible resistance, and become an efficient operator within the shortest possible time, follow these instructions carefully.

**SOUND METHOD:** It is desirable, so far as possible, to avoid learning the code characters by the so-called "visual" method. That is, memorizing that each one is composed of so many dots and dashes. Instead, it is greatly to the student's advantage to employ at the beginning the "Sound" method, i.e., learn to recognize the characters by their sound, as made by the buzzer or telegraph instrument, rather than by the number of dots and dashes.

When you hear some one pronounce the letter "A" you intuitively know instantly that it is the first letter of the alphabet and you do not have to stop to figure out that it is constructed of certain curves or angles. If you did, each letter or word spoken to you, in order for you to understand them, would have to be pronounced separately and with sufficient space between each for you to visualize their construction and interpret them.

The same is true with the code alphabet and symbols. If you had to stop and translate the characters from dots and dashes to the letters which have to be employed in transcribing them, you would be completely lost, and never be able to keep within hailing distance of the fast sending necessary in actual work. Therefore, you simply have to learn to recognize them instantly by sound or you will never become an operator. Since this is a fact, why not learn correctly in the first place?

**HOW TO LEARN THE CHARACTER SOUND:** About the most satisfactory way to become familiar with the sound of the characters, other than to listen to the Instructograph make them, which will be taken up in connection with the code lessons, is to repeat them over and over again by the "Dit," "Dah" method, described below, and to repeatedly make them on the key, paying particular attention to their sound as made.

**THE "DIT"—"DAH" METHOD:** Many students find it helpful in learning the code by the sound method, and it will doubtless assist in avoiding the so-called "visual" method, to apply a voice sound to the dots and dashes, commonly called "Dits" and "Dahs." The "dit" representing the dot, and the "dah" the dash. As an illustration the first few letters of the alphabet would be pronounced as follows:

A—Ditdah	E—Dit
B—Dahditditdit	F—Ditdahdit (American Code)
C—Dahditdahdit (Continental Code)	F—Ditditdahdit (Continental Code)
C—Ditdit Dit (American Code)	G—Dahdahdit
D—Dahditdit	H—Ditditditdit

Repeating these sounds over a few times in connection with the dots and dashes will clearly indicate the practical application of these sounds to the parts of letters. The "Dit" is a quick, sharp sound, well representing the dot. The "Dah" is a prolonged sound quickly associated with the longer dash.

The student may use this sound method to good advantage in practicing letters and words he happens to see—words read in books, magazines or newspaper articles, or the lettering of signs seen while out of doors. Such practice may be indulged in at any time and under almost any circumstances. It should materially assist in impressing the "sound" of the characters on the mind.

**EXPECTED PROGRESS:** There is a tendency on the part of students to think that they should progress more rapidly than they are doing. That is, they are inclined to want to skip from one tape to another and try some of the faster ones. This is a great mistake, and much greater progress will be made by working with each tape until it is thoroughly mastered. The tapes are properly spaced, and gradually progressed to advance the student in the work just as he should be.

**PRACTICE PERIODS:** If the student is employed, or only devoting spare time to the work, it is considered splendid progress if one averages completing one tape per month. If full time is employed one tape every two weeks is as much as may be expected usually. There will of course be exceptions to this rule, and one tape may be mastered in less time than stated, and another take much longer.

**IMPORTANCE OF SENDING PRACTICE:** Many students, and some instructors, for that matter, seem to think that the "sending" part of the work will just naturally take care of itself, and that little attention to that part of the training is necessary. Nothing is further from the actual facts. There are more good receiving operators than there are good sending operators. Indeed, a good clear and accurate sender is a rarity. To be one is a mark of distinction, and a recognized indication of a real efficient operator. Therefore, practice sending faithfully, and as instructed in connection with the ten lesson assignments and tape interpretation.

**RETARDED PROGRESS:** It is doubtful if any operator ever learned telegraphy without the feeling that at some stage of the work, they were at a standstill and making but little or no progress. It usually develops, however, that it is just a last heavy pull before pitching over the top to some real gain. There seems to be no accounting for this feeling, and its remedy is somewhat similar to that of treating a "boil." Just continue to apply poultices, hard work and practice, and it will soon "break."

## PRACTICE AND STUDY

In the practice and study of telegraphy there are a few vital factors which have a distinctive influence on the ultimate success or failure of the student. Indeed this may be said of almost any endeavor, but at present we are dealing with the art of learning telegraphy. These factors may be enumerated as follows:

1. Psychological Attitude.
2. Regularity of Practice.
3. Timing of Characters.
4. Persistency.

Others, of course, might be mentioned, but all come under the broad conception of the four referred to above.



1. **PSYCHOLOGICAL ATTITUDE:** Practically everything one does, other than the things that are instinctive, such as self preservation, getting hungry, thirsty or sleepy, for instance, is the result of developing instinct by education. Broadly speaking, education is learning certain things usually by the simple process of repeating them over and over again. When one learned the multiplication tables, there were no short cuts nor "simple methods." It was a case of saying and thinking them over and over until they were indelibly impressed upon the mind.

The same is true with physical accomplishments. Anything done with the hands or feet is a form of physical education and is accomplished in exactly the same manner, doing it over and over again.

The art of learning telegraphy is both an intellectual and physical development, and it is a matter of education by repeating and doing specific things over and over again.

Beginning the practice and study of telegraphy one's efforts are naturally directed by the conscious mind, and as a result are slow and laborious. Every thought and movement must be directed specifically and controlled by a mental effort. But, when the processes have been repeated a sufficient number of times, the efforts are then directed by the sub conscious mind, and without the aid of the conscious direction. When that state of perfection is reached it is commonly called "SKILL."

As telegraphy involves both mental and physical processes, and at the same time, it naturally follows that absolute coordination between the mind and hand is necessary. When the mind sends forth an impulse to perform a certain movement with the hand, and the nerves and muscles of the hand fail to obey such impulses instantly, proper coordination is lacking. But when the nerves and muscles of the hand respond instantly and without conscious direction, coordination is manifest, and efficiency results.

Certain letters and characters of the telegraph code will give students more trouble than others, just as some words are hard to learn to spell correctly for some. What is easy for one may be hard for another. Probably every letter and numeral in the code has been the special concern of someone. There is no apparent accounting for this fact, nor should it cause any worry. It is incidental to learning, and so far as known, the trouble never extends beyond the student stage.

There is but one way to remedy this fault, and that is to give such letters and characters special and continual attention until they are as easy as the others.

2. **REGULARITY OF PRACTICE:** It is a well recognized fact that the regularity of habit in any endeavor is far better than the "hit and miss" method. In the practice of telegraphy better results will be obtained by setting aside certain periods of the day for practice. Just what time will be available for the work may be determined, and it is recommended that the schedule arranged be followed as closely as consistent.

Never attempt to practice continually long enough to become exhausted. Fifteen minutes of concentration and intensive practice is enough for one sitting. That is, at the end of that time it is best to get up, move around and do something else for a few minutes, and when thoroughly relaxed, try another fifteen minute period.

If one is employed, and practicing during spare time, six to eight hours per week is considered quite sufficient. This time may be divided to suit the student's convenience. If all the student's time is devoted to the work, as many fifteen minute periods may be employed as desired, so long as one feels that progress is being made. With too constant application the mind seems to become confused and ceases to function properly, and before that stage is reached some rest should be indulged in.

**TIMING OF CHARACTERS:** In the telegraph characters a dash is equal to three dots; the space between the parts of the same letter is equal to one dot; the space between two letters is equal to three dots and the space between two words is equal to five dots. With these specific intervals between the characters and parts of characters, it is quite evident that timing is an important factor.

In telegraphy the dots and dashes, which make up the various characters, are of uniform length, regardless of the speed of the sending. That is, there is but one way to make the letter "A" for instance, — (Ditdah) correctly, and that is according to the specifications mentioned above. It cannot be strung out for slow sending like . — (D i t d a h). Therefore, it will be seen that speed in sending is gained by reducing the spacing between the letters and words, and not by making the characters faster or different. It is exactly the same as when teaching the alphabet to a child. The letters are pronounced as they should be. An "A" being called an A, and not distorted to an unrecognizable sound by dragging it out.

It is obvious, therefore, that in order to reproduce telegraphic characters with a specific and varied amount of space between parts of letters and words, that proper timing in making them is indispensable. Proper timing (spacing) is just as important in telegraphy as in music. A student of the piano, for instance, will work on an exercise for hours and hours counting, 1-2-3, 1-2-3, 1-2-3, in order to get the proper "rythm" to the music. The same is just as necessary in telegraphy. In telegraphy, however, one does not ordinarily count, 1-2-3, 1-2-3, as in music (although there is no reason why it could not be done) but instead, starts to spacing sufficiently by sending very slowly, and gradually decreasing the spacing with the increased speed in sending, to a perfect "rythm" of time, and incidentally excellent sending.

Improper timing or spacing accounts for ninety per cent. of all poor sending of telegraph operators. And, incidentally, real good senders are seldom encountered. As an illustration to show what havoc improper spacing may cause, a sentence is reproduced below, once improperly spaced and again properly spaced:

The reare thousands ofrad ioamateur soperati ngall thet ime  
There are thousands of radio amateurs operating all the time

It is almost impossible to read the first line, while the second is read at a glance. Yet, they are exactly the same, except the first is incorrectly spaced. This is a slightly exaggerated illustration, of course, but in fast sending there is but a small fraction of a second's space, even between the words, and with this in mind the importance of proper spacing may be more clearly appreciated.

**4. PERSISTENCY:** Anything worth having is always hard to get, otherwise there would be no particular incentive to possess it. Some things, such as digging a ditch, for instance, are quite easily learned, while acquiring the art of telegraphy is more difficult.

One's persistency, therefore, is a material factor in determining whether one is to become an operator or a ditch digger. Only about one in ten carries out what he undertakes, regardless of whether it is conducting a business, studying a course of instructions or some similar endeavor. Except, of course, digging a ditch, in which occupation practically all may succeed.

If you have made up your mind to become an operator, BE ONE. Let nothing stop you. Get the "I WILL" spirit and succeed. Pass up some of the passing frivolous entertainment for a while, in order to more fully enjoy things really worth while, after you are established.

The Instructograph and these instructions supply you with everything needed to make you an expert operator, except the WILL. You will have to furnish that.

## SENDING

Figure 3, page 17, shows the correct position of the forearm and fingers in relation to the telegraph key. It is recommended that the key be fastened far enough back on the table to allow the elbow to rest on the table. One should sit erect with both feet on the floor. In other words, assume the most comfortable working position possible.

The movement of the arm should be free and unhampered, and the energy required to manipulate the key should be from the forearm and wrist and not from the hand and fingers. The wrist should go downward when each dot or dash is made. The fingers should rest easily upon the key with no trace of rigidity.

**KEY AND ADJUSTMENT:** In actual radio telegraph work a heavy key is used, and one that has heavy contact points. In practice work, however, any ordinary key will answer just as well.

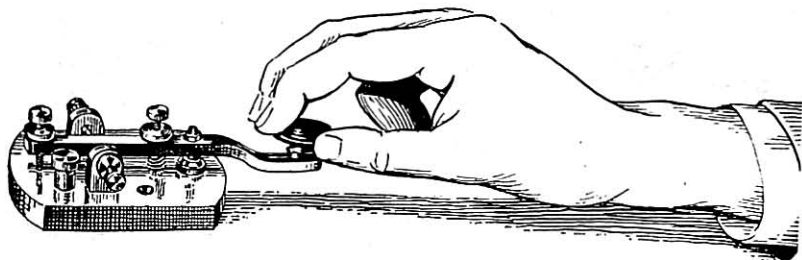


Figure 3. Showing correct position of fingers, hand and wrist in sending with an ordinary telegraph key. The key should be set far enough back on the table to allow the elbow to rest comfortably on the table in an easy and natural position. Detailed information in connection with "Sending" will be found on page 17.

Adjustment of the key is largely a matter of individual preference. One will apparently do better and easier sending with a rather tight spring tension, and another prefers it light. The same is true of the space between the contact points. Some prefer very little space between the points and others wish plenty of room. The best way to begin is to adopt a "happy medium." Leave about one thirty-second ( $\frac{1}{32}$ ) of an inch between the points with a moderate spring tension, just enough to raise the key lever quickly when the pressure is removed. Then, as you progress in the work, and feel the necessity, adjust the key to the point where you get a maximum of result with a minimum of effort.

The hold on the key is similar to holding a pen holder in writing. The old copy-book rule was, "hold the fingers in a certain position and point the holder over the right shoulder." Not one in a thousand holds a pen in exactly that way, but most of us have adopted a somewhat similar style. Therefore, hold the key as near like the illustration as you can, but have it natural and easy.

**SENDING SPEED:** It is a good rule to never try to send faster than you can receive. Make all dots and dashes clear and distinct and very slowly to begin. The dot, of course, is made by a quick contact, but the dash should be prolonged, even more than is really correct, particularly at the start. There is a tendency among beginners to make the dashes too short, particularly those preceding dots. Speed in sending will come with practice and should be very gradual.

Additional information regarding making the letters properly will be given in connection with practicing with the Instructograph.

**"BUG" SENDING:** Quite a number of mechanical sending devices are manufactured and are excellent for easy and fast sending. They are used largely by experienced operators and are considered by many as quite indispensable. The student, however, has no call or need to procure or use such devices until he has quite thoroughly mastered sending with the regulation telegraph key. In fact, the introduction of an automatic sending device would likely prove a handicap to learning key sending as it should be mastered.

"Bug" sending is easily picked up in a few days of practice, after one has become an efficient operator, and it is absolutely necessary that one learn to send correctly with the standard telegraph key. There is not the slightest occasion to use a mechanical sending device while learning the code.

## OPERATION OF INSTRUCTOGRAPH

The "Instructograph" as its name implies, is an instructor in every sense of the word. It will render service that cannot be duplicated by any other instructor.

Before attempting to operate the Instructograph, carefully study Figure 1, on page 7, and see that the TAPE ALWAYS RUNS IN THE DIRECTION AND EXACTLY AS INDICATED BY THE ILLUSTRATION. If it is not so run the machine will produce the characters backward and wind the tape incorrectly.

**CONNECTING UP INSTRUCTOGRAPH:** The standard instructograph consists of the machine and ten rolls of graduated double perforated tapes. The machine is designed to operate a "buzzer" practice set or oscillator unit for wireless, or a telegraph sounder for wire telegraphy.

**PRACTICE SETS:** If a "buzzer" or telegraph instrument is to be used, refer to Figure 1, page 7 and make the connection of the buzzer or telegraph instrument just as illustrated. Two loose wires will be found inside the case, leading down from the under connection of Posts 4 and 6. They attach to the positive and negative terminals of the battery. Either wire to either terminal will be correct.

**OSCILLATOR UNIT:** If an oscillator unit is installed it should be connected up as illustrated by Figure 2, page 9. The illustration is so plain that further directions are unnecessary.

**INSERTING TAPE:** Place the full spool of tape on post No. 7 and the empty spool on post No. 8. Pass the tape around post No. 2, between the spring and the post, bringing it around to the empty spool, and insert the end of the tape in the slot to prevent it from slipping, just as illustrated. Before proceeding further, STOP and check your work to see that the top panel of your machine looks exactly like the illustration.

**REGULATING SPEED:** Turn the speed regulator to "Slow" until the motor stops. Then wind the motor fully (about 65 turns of the winding crank), placing the left hand on the right hand front corner of the case and instrument panel to steady it. The one winding will reproduce the matter on one side of the tape. Next release the speed regulator to the speed desired, by turning the small knob to "F" or "S" as necessary.

**REVERSING TAPES:** When the tape is all run onto the spool on post No. 8, exchange positions of the spools, placing the empty spool on post No. 8, and the full spool on post No. 7. In exchanging the spools, the spool containing the tape must be TURNED OVER in order to produce the characters on the other margin of the tape. Again check the running of the tape to see that it is exactly like that shown in Figure No. 1.

**GENERAL:** While it may do no particular damage to stop the motor by use of the speed regulator, and this will often be found convenient, it is recommended that when the work is finished for the time being, and the machine is to be idle for some hours, the motor be allowed to run down, rather than leave it stopped by the regulator. The motor wound up and throttled down by the regulator leaves some strain on the motor which may as well be avoided.

Should it become necessary to remove the instrument panel of the machine for any reason, remove the winding crank and take out the four screws at the corners of the panel. Before lifting the panel, disconnect the batteries and see that the wires leading down from Posts 4 and 6 are free.

Keep the machine as free from dust and dirt as possible. In order to close the lid of the case tightly, it is necessary to disconnect the wires or cord leading from Posts 4, 5 and 6.

Handle this machine as you would any other delicate piece of machinery and it will serve you well, and last an ordinary life time. There is nothing to get out of order, and seldom indeed is it necessary to replace any part.

## SELECTION OF CODE

Everything contained in these instructions up to this point pertains equally to either code—Continental Morse (wireless) or American Morse (wire) telegraphy.

At this point it should be determined which code the student desires to take up first, and the one selected should receive his undivided attention to the exclusion of the other for the time being.

**ONE CODE ONLY:** A great deal of time would be wasted if both codes were attempted at the same time. But, when one is an operator in either code, and that code is thoroughly established in the mind, the other code may be easily learned in a short time. One knows how to telegraph, and the mind is trained to read the characters by sound. To acquire the other code is, therefore, simply a case of learning the other code characters which are different, and applying them to the work.

Acquiring either code is a very similar process for the beginner. Each calls for approximately the same amount of practice and training. The American Morse is a little shorter, and possibly a little more difficult.

**EXPLANATION OF DIFFERENCE:** The Continental Morse (wireless) code is composed of dots and dashes only. There are no space characters. See the chart on page 23. The reception in actual work is by means of an amplified flute-like note produced by an oscillating radio tube, and heard through headphones or a loud speaker. In learning the code, however, a "buzzer" is sometimes used which produces a sound, which in some instances, resembles the note produced by the oscillator. When the key is depressed, or the circuit closed, a continual note is heard. Therefore, the dot is made by a quick momentary closing of the key and the dash is made by a continued depression of the key just three times as long as used to produce the dot.

Listening to the Instructograph make the Continental Morse characters either on a buzzer or an oscillator unit, will quickly teach one to make them correctly and accurately.

The American Morse (wire) Code is composed of dots, dashes and spaces. See chart on page 37. The reception is by means of a metallic sound produced by a telegraph sounder. The dots are made by a quick metallic click of the sounder produced by momentarily closing the circuit with the key. The dash is produced in exactly the same way except that the metallic click is prolonged three times as long as in making the dot, by the simple process of closing the circuit with the key just three times as long. The space is simply a momentary pause between the dots. All space letters are composed of dots only. C-R-O-Y-Z-& (short and) are the space letters. The letter C, for instance, would be just like four dots (....) with the third omitted (. . .) The letter R the same with the second dot omitted (. ..) and so on through the list.

Listening to the sound of the American Morse characters as made by the Instructograph will clearly indicate how all letters, figures and symbols are made. It is a beautiful and rapid code and well worth the while of every radio operator to learn.

Of the 36 letters and numerals, 16 are the same in both codes; ten are the reverse of others, and ten are entirely different. Therefore, it is manifest that in learning the second code it is only necessary to learn a limited number of new characters.

The Continental Morse Code is now in more demand than the American Morse, and if one has no special preference, it may be well to take up the former first, and the latter at some future time. Both are necessary, however, in order for one to procure an operator's Commercial Extra First Class License.



To apply the "Dit-dah" method to the American Morse characters simply separate the dits by a slight pause in connection with the "space" letters. As an illustration, the letter "C" would be as follows: ditdit dit (.. .)—a slight pause between the first two and third dit.

It is hardly necessary to mention that in learning the Continental Morse code a buzzer or oscillator should be used, and for the American Morse, a key and sounder. It might be stated in this connection, however, that when one learns both codes it will materially assist in avoiding confusion of the codes by always using the proper equipment for practice. That is, never use an American Morse tape on the Instructograph to work the buzzer or oscillator, and never use a Continental Morse code tape for the telegraph instrument. In this way one learns to always associate the proper code with the sounds produced in the respective codes in actual work.

**CODE SELECTED:** The lesson material and machine practice instructions in connection with the Continental Morse and American Morse codes follow in the order named, under the captions "Continental Morse Code Instruction" and "American Morse Code Instruction." The instructions pertaining to the code not being studied should be completely disregarded, until that code is taken up and the proper tapes secured.

# CONTINENTAL MORSE CODE INSTRUCTION

These instructions include the use of ten double perforated tapes. That is, each tape contains two rows of perforated characters, reading from opposite ends, which permits both sides being run by turning the spool over after it has passed through the machine, and running it again in the same direction, without having to rewind it as is necessary with an automatic piano roll, for instance.

The tapes are graduated from a very slow sending tape to exceptionally fast ones. Besides the tapes being made from very slow to very fast, by reducing the space between the letters and words, the speed of their passing through the machine may be regulated by use of the speed regulator.

It should be remembered, however, that it is best to practice with the slower tapes until the faster ones may be run normally, as running a fast tape too slow, (or any tape for that matter) distorts the sound to the extent that the characters are not made properly.

A list of the Continental Morse code and conventional signals is shown on page 23, which may be used in connection with these lessons.

Also to facilitate learning the code characters, they have been arranged in eight groups, as illustrated on page 24. The first group being all dot letters, the second all dash letters, and so on. It is recommended that each group be practiced separately, beginning with the first group and practice on it until the sound of it is perfectly familiar. Then pass to the next.

In practicing dot letters it is a good plan to begin as follows: Before beginning to form the characters themselves just make the dots. Start with making one each second until you have made about 20, being careful that each is clear-cut and quick, and made by a distinct motion of the wrist. Stop and rest a moment, and then try two each second, then three and so on until you have attained a speed of about 250 per minute. The dash letters may then be taken up.

The dash letters should be practiced just as carefully. Remember that a dash is presumed to be three times as long as a dot, and naturally the dashes may be made just one third as fast.

Listening to the Instructograph make the letters will soon teach the student just how all letters should be made, and little trouble will be experienced if the student takes pains to make the letters just as they are made by the machine.

## Lesson and Tape No. 1

**TAPE NO. 1:** This tape is what is commonly called the "Sending" tape. That is, it is intended for use by those with no knowledge of how the letters and characters should be made. The letters, numerals and conventional signals are made with sufficient space between each for the student to make them on the key after the machine makes them correctly. The characters reproduced by tape No. 1 are as follows:

A B C D E F G H I J K L M N O P Q R S T U  
V W X Y Z 1 2 3 4 5 6 7 8 9 0 Period — Semi-  
colon — Comma — Colon — Interrogation — Exclamation point —  
Apostrophe — Hyphen — Bar indicating fractions — Parenthesis —  
Inverted commas — Underline — Double dash — Distress call — Attention  
call, to precede every transmission — General inquiry call — From  
(de) — Invitation to transmit (go ahead) — Warning, high power —  
Question (please repeat after ———), interrupting lone message —  
Wait — Break (Bk) (double dash) — Understand — Error — Received  
(O. K.) — Position report (To precede all position messages — End of  
each message (cross) — Transmission finished (end of work) (con-  
clusion of correspondence).

CONTINENTAL MORSE CODE AND CONVENTIONAL SIGNALS

A	• —
B	— • • •
C	— • • — •
D	— • •
E	•
F	• • — •
G	— • — •
H	• • • •
I	• •
J	— • — —
K	— • — •
L	— • • •
M	— —
N	— •
O	— — —
P	— • — •
Q	— • — —
R	• — • •
S	• • •
T	—
U	• • —
V	• • • —
W	• • — •
X	— • • —
Y	— • — —
Z	— — • •

---

Ä (German)	• • • •
Á or Å (Spanish-Scand.)	• — • —
CH (German-Spanish)	— — — —
É (French)	• • — • •
Ñ (Spanish)	— — — —
Ö (German)	— — — •
Ü (German)	• • — —

---

1	• — — — —
2	— • — — —
3	• • — — —
4	• • • — —
5	• • • • —
6	— • • • •
7	— • — • •
8	— • — • •
9	— • — • •
0	— — — — •

Period	• • • • •
Semicolon	— • — — — •
Comma	• — • — • —
Colon	— — — • • •
Interrogation	• • — — • •
Exclamation point	— — • • — —
Apostrophe	• — — — — •
Hyphen	— • • • —
Bar indicating fraction	— • • — •
Parenthesis	— • — — • —
Inverted commas	• — • • — •
Underline	• • — — • —
Double dash	— • • • —
Distress Call	• • • — — — • • •
Attention call to precede every transmission	— • — • —
General inquiry call	— • • • — — — • —
From (de)	— • • •
Invitation to transmit (go ahead)	— • —
Warning—high power	— — — • • — —
Question (please repeat after -----) — interrupting long messages	• • — — • •
Wait	• — • • •
Break (Bk.) (double dash)	— • • • —
Understand	• • • — •
Error	• • • • • •
Received (O. K.)	• — •
Position report (to precede all position messages)	— • — •
End of each message (cross)	• — • — •
Transmission finished (end of work) (conclusion of correspondenc)	• • • — • —

Beginning again with the letter "A" the same letters, figures and conventional signals are repeated over and over again to the end of the tape, and in the same order. The alphabet and numerals are repeated four times while the conventional signals are repeated but three times. Both sides of the tape are exactly alike. It will be noted that the foreign characters are omitted.

Place tape No. 1 on the Instructograph, as shown by Figure No. 1, wind the machine fully and regulate the speed to a slow movement. Have the list of the characters handy, and immediately after the machine makes a letter or character, you make it on the key. Try to imitate the machine's sending, paying particular attention to the sound of them. To begin you will experience some difficulty making the letters before the machine makes the next one, but a little practice will enable one to make most of them twice in the space allowed. If you should make them on the key at the same time that the machine is making them, the result will be a conglomerated string of sounds and make nothing that may be understood.

### CONTINENTAL MORSE CODE GROUPS

Group 1			Group 2			Group 3						
E	•		T	—		A	•	—				
I	••		M	—	—	U	••	—				
S	•••		O	—	—	—	V	•••	—			
H	••••		Ch	—	—	—	—	4	••••	—		
5	•••••		Cipher	—	—	—	—					
Error	••••••											
Period	•••••											
Group 4			Group 5			Group 6						
W	•	—	—	N	—	•	Z	—	—	•		
J	•	—	—	—	D	—	••	G	—	—	••	
Fig. 1.	•	—	—	—	—	B	—	•••	7	—	—	•••
			6	—	••••							
Group 7			Group 8									
K	—	••	X	—	•••							
R	•	—	•	2	••	—	—	—				
L	•	—	••	8	—	—	—	••				
F	••	—	•	3	•••	—	—	—				
Y	—	•	—	—	9	—	—	—	—			
Q	—	—	••	—	C	—	•	—	•			
P	•	—	—	•								

At this time particular attention should be paid to making the characters perfectly, just as made by the Instructograph. As an illustration, the letter "A" is composed of a dot and dash, • —, but if made with a slight pause between the dot and dash, • —, it would be read as E T. The same is true with the letter "N". It is composed of a dash and dot, — •, but if made with a slight pause between the dash and dot, — •, it would be taken for T E.

Probably the most common difficulty beginners have, is to make the dot or dots following the dash, properly and without pause. This is occasioned by un-

consciously allowing the key lever to raise before beginning the dot or dots. Normally one starts to make all characters with the key lever up. Hence, the tendency to allow the key to raise to a normal position. But, when making dots following a dash, (parts of the same character) they are made from the downward position of the key. That is, make the one, two or more dots following the dash from the downward position, without consciously allowing the key lever to raise.

Continued practice, closely following the sounds of the characters as made by the Instructograph, will soon eliminate all difficulty, if any is experienced, in making them correctly.

Practice with this tape should be continued until the student is able to make every character correctly and easily, just as they are made by the machine. Plenty of time should be put in on this tape, in order that the characters may be made correctly without having to hesitate to figure out just what dots and dashes make them up. Proper practice with this tape is the basis of your whole study, and the better it is learned, the better the ultimate result.

This tape should be reviewed occasionally to check up on the sending to see that the student is still making the characters correctly, and just as the machine makes them. One is liable to drift into an incorrect "swing" which is hard to eradicate when once formed.

After having learned to make the characters correctly, and the student feels that he may lay tape No. 1 aside for a time, tape No. 2 may be taken up.

### Lesson and Tape No. 2

**TAPE NO. 2:** This tape consists of the alphabet, numerals and some of the conventional signals in mixed form on one side, and small two and three letter words on the other side. To begin with, it may be a good idea to run the tape through the machine a few times, watching this copy and listening to the sound of the characters as the machine makes them, without attempting to write them down. This kind of practice has a tendency to impress the sound of the characters on the mind. The matter on tape No. 2 reads as follows:

#### First Side:

L A T G W S J O U Y C F H Q 2 X R F M B (1) Double Dash Y J G 6  
 W V F 3 M U A E G 7 X U I O 7 R ? K Period G P D 9 5 2 V F E 2 M Z  
 U C J L Attention signal—Double-dash (1) T W K B Q N D H V F Q Y  
 Period—End of message X K A O 6 U H C K 9 U K F 4 ? N U L G U D  
 A N Z (O) J P Q F C 8 2 L O R B H I E S T Double dash—End Message  
 7 W L M Q Period 3 V R H D I X Double dash—End Message—Atten-  
 tion signal H J W P J A Z K 9 U (1) Q U Y 9 3 R F L 7 Z W H F Q P B  
 3 V 8 S G L W (O) Y Error 8 F N 9 Q Q T X 9 H C P B 2 7 E O V Y  
 Double dash—End Message L A T G W S J O U Y C F H Q 2 X R F M  
 B (1) Double dash Y J G 6 W V F 3 M U A E G 7 X U I O 7 R ? K Pe-  
 riod G P D 9 5 2 V F E 2 M Z U C J L Attention Signal—Double dash  
 (1) T W K B Q N D H V F Q Y Period—End Message X K A O 6 U H C  
 K 9 U K F 4 ? N U L G U D A N Z (O) J P Q F C 8 2 L O R B H I E S  
 T Double dash—End Message 7 W L M Q Period 3 V R H D I X Double  
 dash—End Message—Attention signal H J W P J A Z K 9 U (1) Q U  
 Y 9

#### Second Side:

ANY AND ACT AID ARE AXE BAD BAN BOY BAG  
 BET CAB CON CAP CAD CRY COY DAB DEN DIG

DOT DUN DRY EAR EBB EAT ERE EYE EGG FAN  
 FED FIN FOX FUN FOR GAP GEM GIN GOT GUY  
 GNU HAT HER HIM HOW HAS HOT IN ICE ILK  
 INK IRE IT JAB JET JIG JOY JAG JIM KEY KEN  
 KIN KEG LAX LEA LIP LOW LAY LET MAD MEN  
 MIX MOW MUD MAY NAB NAY NEW NOT  
 NUN NOR OAR OAK OIL OUR ORE OWN PAD PEN  
 PIE POD PUN PRY QUE RAN RAY RED RIP ROB  
 RUT SAG SEW SIP SOB SUN STY TAN TED TIP  
 TOY TUG THE URN USE ULT VAN VIE VOW VIA  
 VAT WHY WAS WEN WAS WON WAR YES YAM  
 YET YEW YOU ZAN ANY AND ACT AID ARE AXE  
 BAD BAN BOY BAG BET CAB CON CAP CAD CRY  
 COY DAB DEN DIG DOT DUN DRY EAR EBB EAT  
 ERE EYE EGG FAN FED FIN FOX FUN FOR GAP  
 GEM GIN GOT GUY GNU HAT HER HIM HOW  
 HAS HOT IN ICE ILK INK IRE IT JAB JET  
 JIG JOY WAG JIM KEY KEN KIN KEG LAX LEA  
 LIP LOW LAY LET MAD MEN MIX MOW MUD MAY  
 NAB NAY NEW NOT NUN NOR OAR OAK OIL OUR  
 ORE OWN PAD PEN PIE POD PUN PRY QUE RAN  
 RAY RED RIP ROB RUT SAG SEW SIP SOB SUN  
 STY TAN TED TIP End Message

Start the first side of tape No. 2 through the machine quite slowly, in fact, just as slowly as it will make the characters plainly, and see how many of them you can get and write down. When you hear one put it down on the paper, but if you do not get it instantly, forget it and "lay" for the next one. If you try to figure out a letter that you do not get instantly, or hesitate to think about it, the machine will have made the next one when you are not prepared for it, and that also will be lost.

Simply force yourself to read them instantly. If at first you only get an occasional one in the whole side of the tape, it is a start and you are doing well. At the beginning it may be necessary to run the second side of the tape (the words) through the machine and just watch the copy, but not try to write them down, until you are somewhat familiar with the letters and figures. But, begin the words just as soon as possible.

After a time these simple words will become familiar, and you will know pretty well what is coming next, but that makes no difference, copy them just as carefully and faithfully as in the beginning, as it trains the ear to hear them quickly, without a moment's hesitation, just as you should do. Just run the tape a little faster after they become familiar.

There is a whole lot of practice on this tape, and if you are able to copy all of the matter correctly, at the rate of 10 words per minute within 30 days you will be doing well indeed.

**SENDING PRACTICE:** Do not attempt to send words at this time, unless it be the small words copied from tape No. 2. Practice making the letters and conventional signals over and over again. Always use copy to send from. If there is any question as to whether you are making the characters correctly, run tape No. 1 a few times to get the sound of the characters more firmly impressed upon the mind.



## Lesson and Tape No. 3

**TAPE NO. 3:** Tape No. 3 consists of words larger than those on the second side of tape No. 2. Indeed some of the words are quite difficult and will tax your ability to copy them correctly even after they are a little familiar. These words have been selected as containing combinations of letters rather difficult to read and should provide splendid practice.

The matter on tape No. 3 reads as follows:

**First Side:**

THE THIS THEM THOSE TIE TIME TIDE TITHE TEND  
 TEN END NAME DATE MOAT HOME HAND SAND SITE  
 AMEN AND TOAST MOAN MADE MATE ONION SODA  
 SOME HIM HAND HOST IDEA INDIA IDIOM IDES  
 IDIOT INTESTATE ITEM IODINE IONIAN INTO TEA  
 TEST INTEND EASE EASEMENT EASINESS EAST  
 EAT EDEN EDEMA EDIT EDITION ESTIMATION  
 EATEN TINNED TEND TENSION TENTH TITHE  
 TOTEM TOAD TOOTH TENT TIME MOTE MOTH  
 MOTION MITTEN MONSTER MOON MISSION ADAMANT  
 ADD ADEEM ADMIT ANISE NAME NINE NITID  
 SEASON STATE SEEM MISS DITTO DISTEND DINE  
 DINNER DIADEM DASH DANE AMEN MIST TOOTH  
 IMMINENT EMEND ESTATE EMINENT EMIT EMOTION  
 ESTIMATE END OATS ODE ODDS OSTEND SADDEST  
 SAID SOON SODOM SOME SAINTED NOTION NOISE  
 HAD HASTEN HEAT HOSTESS USE UDOMETER  
 UNABASH UNBOSOM URBANE UNIT UNITE UNITY  
 UNIVERSE UNION BABE BENIGN VAIN NOTATION NEATH  
 HAND HEAD HAITI HINT GAD GAGE GAIT GAMIN  
 GAMBIT GAUGE MITTEN MADDEN IMMEDIATE ONE  
 OMIT ONSET ONION ONTO OMEN OASIS ODD  
 OMISSION OINTMENT OSTEND STOOD SHED SASH  
 SATAN SATIATE SEAMAN VANISH VANE VAN  
 VAUNT VEIN VEND VIAND VIARIAN VIA BABOON  
 BESOM SAND SITE SAMENESS STINT DANISH  
 DOOM DOMINATE MAIM MAINTAIN MINE DATED  
 DODO DENTINE DOME DISMISS DETEST ADAM  
 AMMONIA ADMONISH INTONE INTIMATE INDENT  
 OSTENTATION OTTOMAN TASTE TIME TESTED  
 TAINT TETE A TETE TANNIN

**Second Side:**

AMASS ADMIDST AMISS ANODE NEAT NOME NOTED  
 CYCLONE COCOA CACHE CACTUS CADUCITY  
 CALORIFIC CAMBRIC CARDIAC CATCH CHICORY  
 CHICKEN CHOCOLATE CLOCK COCKLE CACAO  
 COMMENCE CUCKOO CUTICLE CYCLE COMMERCE  
 FIFTY FARTHING FORFEIT FLIER FORGE FRAIL

FRAY FREAK FRITTER FULLY FURBISH FURL  
 FURROW FUTILE FUSE FURTHEST FUSTIAN  
 FURTHER FUNNY FYKE LABIAL LANDLORD LEGAL  
 LEGALLY GENESIS GOAD GOAT GONG BEDASH  
 BOMBAST MENTION YACHT YULE YAWN YAWL  
 YELL YELK YEOMAN YARD YIELD YESTERDAY  
 YONDER YOUTH YEAST YARROW YAK YAWN  
 YOUNG YEA YOKE YORE LONELY LOYAL LOWLY  
 LORDLING LULL LUNULAR LUSTILY LUCULENT  
 LULLABY LUNAR KAFIR KENNEL KERNEL KHEDIVE  
 KHAN KINDRED KNEAD KNIGHT KNOCKER KNOW  
 KNUCKLE KNURL KNIFE KORAN PALPITATE PAMPHLET  
 PANOPLY PANTAGRAPH PAPOOSE PAPACY PAPER  
 PAPIST PERPETRATE PERSPIRE PERPLEX PERIPHERY  
 RAFTER RAMBLER RAPPER RAPIER RASHER  
 REAPPEAR REAR RECEIVER QUACK QUARTER  
 QUADRANGLE QUALITY QUARTET QUERY QUESTION  
 QUIBBLE QUICK QUIET QUILL QUILT JILT WINGLE  
 JOINT JOVIAL JUDICIAL JUMBLE JUSTICE JURIST  
 JUNIOR JUNIPER XANTHIC XANTHIN XEBEC ZEAL  
 ZEBRA ZERO ZEPHER

Do not become discouraged if it takes quite a little while to be able to copy this matter at a fair rate of speed. Remember you are copying real large words, and in fact, well on your way towards becoming an operator. If you have gotten this far in ten weeks you are to be congratulated.

**SENDING PRACTICE:** Do not overlook the instructions under "Sending," Page 17, when practicing, and at this time it would be splendid practice to use the words reproduced by tape No. 3. Remember do not try to send faster than you can receive the characters, as made by the Instructograph. Leave plenty of space between the letters of words, and more between the words, of course. Always try to keep in mind that some one must read what you are sending, and unless they can do so, it is a waste of time sending it. So, when you make a letter or word incorrectly, the wrong number of dots or incorrect spacing, make it over.

You should put in at least one third as much time practicing sending as you do on the receiving end of the work.

### Lesson and Tape No. 4

**TAPE NO. 4:** Tape No. 4 consists of four letter code combinations, and the letters making the combinations were selected with a view to affording diversified practice. That is, they bring into use frequently, letters that do not appear often in regular matter. As an illustration, it is just as necessary that the operator be able to distinguish the letter "Z" as it is the letter "E," although the latter is probably used 50 times more than the former in ordinary reading matter.

Tape No. 4 should be placed on the Instructograph in the usual manner, and to begin should be run very slowly. In fact, just as slowly as the machine will make the letters correctly. Practice with this tape should be continued indefinitely, and if it is mastered within four to six weeks, good progress is being made.

The matter of tape No. 4 reads as follows:

FIRST SIDE: Attention signal Double dash Tape No. 4 Double dash Four letter code combinations Double dash

AXSE	WEDC	XQAX	IKML	NGRF	AYFC	SWTU	YEXH
BYJL	WEQC	OHNO	JNMG	RUGK	PKIO	PQTW	SGDF
NBVG	HYGT	MKNH	KLOI	MKLO	LPSI	POWU	OPWR
XAQW	WSDR	JUHZ	RCFU	VRGF	HJNI	YMYM	AZCF
AZXS	WDFT	KMVY	NPZT	ZNOL	LYRO	JKFH	ALPC
GJKI	ETYR	RYTU	BVCF	GFRT	LAMK	NJKI	NJKY
FHJS	WIRV	THID	EDSA	MHGF	GTFR	GTYH	TYNH
HYLM	TGBY	GVCD	FVGB	GNOT	LOLQ	FDER	NLPO
HIDA	GJHK	QMIO	EHUF	TUYI	GJHK	VCXD	FDER
XAOP	RBPE	FHYR	ALDK	CNJS	CIDH	ZDRF	JUIK
FVED	HBDC	JUNI	GAET	RCFU	BYJI	SCQU	DCSA
UJMP	NPXJ	LJUT	ZEDS	VNMH	FHRY	RHUT	YIUO
BMJF	CXZD	DSWE	QWKL	SJLR	DGTR	VNJI	ALSF
SLDK	GBVE	MHJZ	UMIK	VRFE	VRFG	CRTY	ASER
DKIR	UMIK	VPOT	HUIK	RCFU	GHIJ	DWZS	RYUD
SGWT	BMKG	IOPU	NHYB	LKJO	NJKI	SDJK	COTY
FGYU	WOIR	WOID	WOIU	HNGF	XDSR	DCFE	SAYZ
DCRF	GAET	GAVC	HUMK	TGBY	DCW	SCDP	GRIF
RGFD	ALOP	FJIG	AFQR	JNHV	ADSF	GTVF	KJHI
NHJY	ERNM	VOPR	HJIO	THUD	IRYT	VNJD	VRDQ
GBHN	GTRE	RTYU	OFRD	WHNC	JMIF	ZNOL	GHJU
NHOT	CBHJ	EGYD	GJHK	LOKI	GHYT	YUDF	MKLO
NSJO	GLSI	BKDL	UJBG	BFGD	WHNO	LOPJ	ZFNP
TFFD	LNOP	NMKL	RGHF	HLJK	MJUN	BHUI	RTIO
NJKI	ANJE	ALSF	SLOI	End Message			

SECOND SIDE: Attention signal Double dash Tape No. 4 Double dash Four letter code combinations Double dash

NGRF	VICU	USQB	TUJH	UPJH	QSBP	XBDG	GJIO
GUIT	ADFS	JHGU	GYFT	POIU	NBGT	TOSU	CNJI
BJDL	AZCF	KINY	RGFT	FGRU	OHNS	NOHJ	
CNMV	NJKD	OIYU	FRCD	HGFU	LPFT	NJKI	BJKI
WOJR	WIUR	WUIR	FVCD	XBHW	DPKU	RFHU	LYRO
OHTN	FJGH	AGHE	SFDG	DEXS	GFDS	HIRE	WRTE
PRYE	GHSI	THKD	POEU	BYHU	QISH	FEWS	OPZS
LJIT	NBOF	JKLU	ACVS	DGFH	SWZA	YUTR	VNHK
SHFY	ALIR	SFJS	WODU	IFJH	ESXA	CDEW	XAQX
LMKI	FRGN	CFYA	UTWS	HXEY	LWYB	CQEW	ONHO
GMNJ	KGUR	OIKP	WTQP	FDGS	GVBN	TGYH	HNKM
IOLK	OLKM	ISPL	UWOP	RWPO	WQAX	RDSW	ZHUJ
UFGR	FGRV	INJH	MYMY	FCZA	SXZA	TFDW	YVMK
TZPN	LONZ	ORYL	HFJK	CPLA	IKJG	RYTE	UTYR
FCVB	TRFG	KMAL	IKJN	YKJN	SJHF	VRIW	DIHT
ASDE	FGHM	RFTG	HYTG	HNYT	MLYH	YBGT	DCVG

BGVF	TONG	QLOL	REDF	OPLN	ADIH	KHJG	OIMQ
FUHE	IYUT	KHJG	DXCV	REDF	PAX	EPBR	RYHF
KDLA	SJNC	HDIC	FRDZ	KIUJ	DEVF	CDBH	INUJ
TEAG	UFCR	IJYB	UQCS	ASCD	PMJU	JXPN	TUJL
HMNV	YRHF	TUHR	OUIY	FJMB	DZXC	EWSD	LKWQ
RLJS	RTGD	IJNV	FSLA	KDLS	EVBG	ZJHM	KIMU
EFRV	GFRV	YTRC	RESA	RIKD	KIMU	TOPV	KIUH
UFCR	JIHG	SZWD	DUYR	TWGS	GKMB	UPOI	BYHN
OJCL	IKJ	KJDS	YTOC	UYGF	RIOW	End Message	

Tape No. 4 is a decided advancement over tape No. 3 and will afford a lot of good learning practice. Indeed, when you are able to copy tape No. 4 at a fair rate of speed, say 12 words per minute, you are well on your way to being an operator. From now on it is simply a case of consistent practice to gain speed and technique in the art.

**SENDING PRACTICE:** Sending practice should be continued zealously. No danger of overdoing it. You will never be able to send as fast and smoothly as you would like, even if you become a first class sender, after you are in the actual work.

It might be mentioned here that in sending code combinations, and they are used very extensively in radio work, every character must be made perfectly. No guessing with this class of matter. And, more space should be left between the letters and considerably more between the combinations. Make every letter perfectly and space correctly.

The words contained in tape No. 4 should be sent repeatedly, as well as other words which may be taken from a paper or magazine. Continue to keep your sending down to the speed you can receive. It is easy to get speed, but difficult to send smoothly and evenly.

**ERRORS IN TRANSMISSION:** At this stage of the work it is necessary to bring up the question of making errors when sending. Naturally errors are made in sending—a word may be omitted, misspelled, a line skipped in reading the copy, or numerous other causes for sending, or starting to send, a word incorrectly. Such errors must, of course, be corrected by the sender in order that the operator receiving the matter may get his copy written just as it should be.

When an error is made in sending, it is the usual practice to correct it in the following manner. Immediately upon discovering the error, the sender would make the error signal (a succession of quick dots), and repeat the last word sent correctly and proceed with the message. The receiving operator upon hearing the "Error Signal" would discontinue copying and watch for the correction. And, unless copying too close to the sender, he would probably not have written or started the erroneous word.

It may be mentioned in this connection that in the American Morse Code no "Error Signal" is provided, but the interrogation is used as such. Indeed, the interrogation is sometimes used for correcting errors in the Continental Morse, instead of the regulation error symbol. This latter practice, while probably not authorized, has most likely been introduced by operators formerly working with the American Morse Code.

Beginning with tape No. 5, and in subsequent tapes, these errors may be made, just as they will appear in actual work, and the student must look out for them, and see that his copy is not mutilated or words written over. There is no time for correcting copy while receiving a message, and it must be written down just as it is intended to be delivered to the party to whom it is addressed.

## Lesson and Tape No. 5

TAPE NO. 5: Tape No. 5 consists of five letter code combinations, and is a little faster than tape No. 4. The matter on this tape reads as follows:

FIRST SIDE: Attention signal Double dash Tape No. 5. Double dash Five letter code combinations Double dash Double dash

XMJSE	ABEFD	CKPS	AJZKY	HMPVJ	OWEGH	CRDVW	ZEENI
ZLPKT	CNZDZ	BEYBN	XPUHC	QCVGF	AQCMF	GHTBF	
NPXCD	CHLMA	YQESA	OPWRT	QTEYR	ZXFHU	CVBHF	
DFREG	ZYCDS	ATFSM	OYTOD	ZTYGS	BNIHD	HMPVJ	
DNCAI	SCNCO	OHSEL	GANGW	YOQBA	TTVGX	LMOBD	
GNMXC	RACTM	LMPKJ	AISTN	FCHNO	KOIRT	MCKOD	
OIRYT	JKOUI	BNJKM	BNHYT	BHGTY	CNZDZ	SZDHS	
SVUMH	DHAKX	HMPBJ	OWGEH	BNZBI	NJIZJ	SGMKP	
JZZBB	TGYGX	DVNTA	MCDTU	BHQAL	ZTBNR	HPSHO	
SLNOH	JIORU	ALOSR	OIPUI	NMKJH	NJKIU	MJKHY	
NJMKU	AQCMF	CSBSF	LYWAZ	YREUR	DMSNS	CEDEU	
XFZTS	DLXXS	NBFLO	TUOGR	GBFAG	FHILJ	DPOLN	
BQZTG	TWHCL	OFLMO	PCHNJ	DJLET	VNFJK	BXGRE	
BFGDE	LKOJU	LOPIU	LOIKU	DSTCD	WZZAA	AGXGE	
WTRQA	VJXZT	AZACB	SQEDK	ZJVPB	GSCLP	BSSH8	
ERTVG	FLAWA	AQEER	MXFQL	GFLYU	NCOAL	SLNOH	
OPWRT	RTYED	MKLUI	DGTRE	MKIJU	MJKLO	MJKIU	
CDFWW	VBRC8	ZQQZM	VBGLP	GSABF	SWCLX	ASBUF	
MSCQA	WWCHN	MQJZC	RBCHL	WOEAD	HCMPO	GCPAS	
SLFCH	AFJ8K	VEGRT	VBHGF	CDFRE	MNBVC	FCZTU	
FGHJD	WASQK	ATFSM	GHSAL	BNXOP	WEAGD	GBAVI	
GMQHS	WEAXZ	PL8MB	FLPWA	CN:—	Error	CNRPS	FSPAS
AL8WI	FGYRE	JKOLP	VBNBV	SDEWQ	Double dash	End	

Message

SECOND SIDE: Attention signal Double dash Tape No. 5 Double dash Five letter combinations Double dash Double dash

BZCNS	ZXMVU	EOMHT	SSCGW	WNAXB	LPBCZ	VNGAL	
BVABW	UQUAL	GALTI	WYCBI	CMBJC	FNCLH	SHVSH	
KIFHR	NHJUT	MNJKI	YCVFD	NJKHT	OWGEH	GDQDS	
RODGU	GHGWP	CQRYV	BD8CN	DRGCM	RFEPK	CYFTD	
LTW8F	PLSKA	HNCFL	CHOPF	JKDIE	OPRYT	CGDET	
VBNHT	NHJUY	POIUY	MRXXZ	AQFUZ	OZHDW	ONCAI	
SQCLX	NBGLA	XSQPT	RVNAQ	XCABH	OLTDS	RTJKH	
STUFV	YNCHA	OFISU	OIDUR	ZCFYE	DFREG	BGFRT	
HGFDS	ESJMZ	DFEBA	SPKCD	YKZJA	JVPMH	HGEWO	
WVDRQ	INEEZ	TKPLZ	ZDZNC	NBYEB	CHUPX	FGVCQ	
FMCQA	FBTHG	DCXPN	AMLHC	ASEQY	TRWPO	RYETQ	
UHFXZ	FHBVC	8FERD	SDCYZ	MSFTA	DOTYO	SGYTZ	
DHINB	JVPMH	IACND	OCNCS	LESHO	WGNAG	ABQOY	
XGVTT	DBOML	CXMNG	MTCAR	JKPML	NTSIA	OXHCF	
TRIOK	DOKCM	TYRIO	IUOKJ	MKJNB	TYHNB	YTGHB	



ZDZNC SHDZS HMUVS XKAHD JBPMH HEGWO IBZNB  
 QZIJN PKMGS BBZZJ XGYGT ATNVD UTDCM LAQHB  
 RNB TZ OHSPH HONLS UROIJ RSOLA IUPIO HJKMN  
 UIKJN YHKJM UKMJN FMCQA FSBSC ZAWYL RUERY  
 SNSMD UEDEC STZFX SXXLD OLFBN RGOUT GAFBG  
 JLIHF NLOPD JTZQB LCHWT OMLFO JNHCP TEIJD  
 KJFNV ERGXB EDGFB UJOKL UIPOL UKIOL DCTSD  
 AAZZW EGXGA AQRTW TZXJV BCAZA KDEQS BPVJZ  
 End Message

Tape No. 5 also provides a great deal of practice. It should, of course, be run in the usual manner, and regulated to the speed best suited to the student's ability to copy. It should be remembered, however, that in order to get the maximum results in practice to always regulate the machine so that it will send at a speed that will "crowd" the student just a little.

When able to copy this tape at the rate of 12 to 15 combinations per minute good progress has been made, and No. 6 tape may be taken up. Both tape Nos. 4 and 5 should be reviewed frequently, as they will both afford excellent practice up to the time this training is finished.

**SENDING PRACTICE:** Practice sending the five letter combinations as reproduced by tape No. 5, as well as the four letter combinations on tape No. 4. Watch the sending for smoothness. Care must be taken to avoid making one letter quick and the next slow, and special care should be used to see that the spacing is uniform, the same between all letters. It naturally follows that uniform spacing should be used between all words. Nothing but constant careful practice will make one a good sender. Try to be one, as they are the exception to the rule.

It assists one materially in his sending practice to place a tape on the machine and simply sit back and listen to its sending. The spacing is absolutely correct and the letters are made as they should be. This practice teaches one to distinguish shortcomings in his own sending, and correction naturally follows.

### Lesson and Tape No. 6

**TAPE NO. 6:** Tape No. 6 consists of numerals entirely, divided into combinations of five. Students often experience trouble in sending and receiving the numerals and this tape will afford sufficient practice to correct this trouble if it is encountered.

Only the complete contents of the first five tapes are reproduced in the lesson material. From No. 5 on the student can easily get the matter from the tapes when they are run on the machine, and it is considered better teaching logic to reproduce only a sample of the matter. Just enough to give a comprehensive idea of it.

Following is a list of a few of the numerals contained on the first side of tape No. 6. The other side is exactly the same, except different combinations, of course:

**FIRST SIDE:** Attention signal Double dash Tape No. 6 Double dash  
 Numerical Code Double dash Double dash.

12345 02397 9876 32561 26274 93461 10807 30765 55661 96081 38990  
 87463 43295 32760 78261 36386 06731 54545 59364 37254 23492 54863  
 93814 72832 36370 77655 27561 46789 42391 46743 46821 72654 84736  
 50375 32157 85841 67890 98763 76834 54827 14960 46803 36321 32176

And so on to the end.



**SENDING PRACTICE:** It will be well to practice sending numerals, particularly combinations of them, until you are able to make them uniformly and with correct spacing.

Continual sending of the numerals gets to be rather irksome, and it is recommended that such practice be divided between the numerals and words or sentences. Always note the quality of the sending rather than the speed of it. Again, it will serve as good practice to listen when the Instructograph makes the numerals, as it makes them perfectly and as they should be made.

You should be sufficiently advanced in the sending at this time to take up the sending of newspaper and magazine articles or other matter that appeals to you. Do not allow yourself to get in the habit of sending without realizing that it should be sent so that it may be easily read.

### Lesson and Tape No. 7

**TAPE NO. 7:** Tape No. 7 consists of five character letter and figure mixed code combinations. It is probably the most difficult of the set of ten. Indeed, it is used more by students in the preparation for their Government Examination, than any other of the number.

Following is a list of a few of the combinations contained on the first side of tape No. 7. The second side consists of the same class of combinations.

**FIRST SIDE:** Attention signal Double dash Tape No. 7 Double dash Mixed Code Double dash Double dash.

H3STM	BSTJD	6VU5H	5H545	WHCNP	BV65H	SES4V
T89B4	12BAS	CHPNJ	BCKMP	7689W	EUNB9	HS20K
S5BH5	5HSDW	CMKLQ	46B71	BD6UV	QWE4L	C875W
SH4B6	ONPQA	984L8	ABLXW	GBC87	EPL84	943DV
SVBH5	AZM36	2199W	SF136	HSTM7	SBDGS	4AQSZ
POTL8	SUGBW	S4VB6	36834	13494	H8765	KNCTW
NWRK7	HLT97					

Practice with this tape should be continued indefinitely up to the point of completing the training. After it is mastered so that it may be copied at a speed of 15 to 18 words (5 characters to the word) per minute, it may be put aside for a while for tape No. 8, but return to it frequently as you will find no better practice.

**SENDING PRACTICE:** There is little that may be added in the way of instruction in sending, other than to urge continued practice. At this stage the sending may be speeded up somewhat, although speed is secondary to good clear and smooth sending. Use newspaper and magazine articles for copy, and never overlook the fact that every character must be made readable, otherwise it is useless to send it.

### Lesson and Tape No. 8

**TAPE NO. 8:** Tape No. 8 consists of miscellaneous matter as follows:

**FIRST SIDE:** U. S. Weather bulletins or forecasts such as are sent broadcast to sea through naval coast radio stations at certain times, varying with the locality. The first two bulletins—in code, which we cannot interpret, of course, reads as follows:

U S W B S 96465 T 91674 D B94686 H 99886 C 01214  
K 02622 P 03613 B 00065

U S W B DU95826 M 97635 U 00443 G 96046 CH 05265  
L 00513 D 00842 V 01054 F 01656

The other bulletins are similar and continue to the end of the first side of the tape.

**SECOND SIDE:** This side contains disconnected phrases which teach the student to keep his mind on the actual signals coming and not "guess ahead," as there is no way to anticipate what is coming. The first sentence reads as follows:

Seven unlucky men jeopardized the safety of all  
on board altho with extra care and uniformity.

Similar matter continues to the end of the second side of the tape.

**SENDING PRACTICE:** It is recommended that the matter copied from Tape No. 8 be used when practicing sending, and great care should be used to see that it is plain, clear and even, so that it could be copied regardless of its disconnected character. Other matter may be used in connection with practicing sending at this time. The only important thing is that sufficient practice may be indulged in, and that extreme care is used in sending correctly.

### Lesson and Tape No. 9

**TAPE NO. 9:** Tape No. 9 consists of typical radiograms such as would be sent by steamship and land stations in actual work. All commercial companies do not use the same message form, but generally speaking there are four parts to any commercial message as follows:

1. The preamble (the business of the message)
2. The address (to whom sent)
3. The text of the message (the contents)
4. The signature (name of the person sending it)

Punctuations in messages are usually omitted, and when they are sent, upon specific request, they are charged for as words. The first message on the first side of tape No. 9 reads as follows:

(P NR 1) SS Baltic Wds 15 Rdo Fld 9 35 A M (To)  
Melissa Shute  
1356 Baltimore Avenue  
White Plains N Y (Double dash)  
Will expect a donation from the family soon (Double dash)  
(Sig) Jack

The message would be sent substantially as shown but the operator receiving it would omit the words or characters inclosed in brackets from his copy, as they are simply signals for the receiving operator's information and would be unintelligible to the party receiving it. Similar radiograms continue to the end of the tape. The reverse side of the tape contains the same class of matter.

This tape will afford quite a lot of good practical practice and should be used even after the matter is more or less familiar.

**COPYING BEHIND:** All efficient operators copy a little behind the sending. That is, they would probably not write down the first word sent until the sending operator had sent one or two additional words. The number of words one is able to copy behind varies with the class of matter being copied and the ability of the operator, but a couple of words will be quite enough in ordinary work.

The advantage of copying behind is that one learns to have the full text of the matter being sent in mind instead of just one or two words. One is able to attain greater speed and is less liable to make an error. Again, should the

sending operator make an error and correct himself by making the error signal and repeating a few words, if copying too close the receiving operator would have the erroneous word written, or at least begun, and would have to erase or make another copy.

A very good way to acquire the habit of copying behind is to begin the practice with words and messages which are more or less familiar, and one has some idea of what is coming. After learning to copy a few words behind with this familiar matter, try it on messages with which you are not familiar. Continued practice only will produce the desired results.

The simpler and easier the matter the greater number of words one is able to copy behind. One word, or 3 or 4 letters is considered very good in difficult code combinations.

**SENDING PRACTICE:** Practice sending the matter copied from tape No. 9. Be very careful about the spacing and try and send as near like the Instructograph as you can. Speed up a little, but gradually, and always remember that accuracy is far more important than speed at this time. Bear in mind that just such messages as these reproduced by tape No. 9 are what you will have to handle when you are actually engaged in the work.

In practicing sending these messages try to imagine yourself sending from a ship at sea, and that another station's operator is copying your stuff. Again, one must bear in mind that conditions are not always the best, and the sending even when good does not always carry clear, and the better and firmer it is sent the better it will reach its destination under adverse conditions.

### Lesson and Tape No. 10

**TAPE NO. 10:** Tape No. 10 is the last of this training and when you have finally concluded practice with it you should be an operator in every sense of the word, so far as the code is concerned. The matter reproduced by tape No. 10 consists of disconnected material similar to that given to candidates for a Government radio operator's license. The first paragraph of the first side of the tape reads as follows:

Standard 903 sent 1  $\frac{3}{4}$  6000 to Frank G Sullivan  
323 Plainview Avenue Erie Pa summer, SOS SOS SOS NAF NAF  
NAF DE NAD NAD NAD copper wheat pfd 33  $\frac{7}{8}$  1919.

This class of matter is continued through both sides of tape No. 10. Practice with this tape should be continued indefinitely, or until the student is able to pass the Government test. All tapes from No. 4 to No. 10 inclusive should be reviewed occasionally, or as long as necessary. Indeed, telegraphy is like music. One never gets so good but what continued practice is necessary. The Instructograph will afford such practice.

**SENDING PRACTICE:** Keep in mind that sending is an important part of your code examination for an operator's license. Good sending always indicates a good operator. The other fellow can't tell what conditions you are receiving under—how it's coming to you, and can't judge your receiving ability accurately, and will give you the benefit of the doubt. But, he can judge your sending all the time and judge it right.

While there is presumed to be no service in connection with these instructions we will be glad to answer questions, to the best of our ability, if there is any point upon which the student is not entirely clear. Again, if further practice should be necessary, which is doubtful, after the present tapes are disposed of, other tapes with different matter may be procured from the Instructograph Co.

The section captioned "Miscellaneous," at the close of the "American Morse Code Instructions" following, will be found to be of particular interest to radio operators, or those desiring to engage in that work.

# AMERICAN MORSE CODE INSTRUCTION

These instructions include the use of ten double perforated tapes. That is, each tape contains two rows of perforated characters, reading from opposite ends, which permits both sides being run by turning the spool over after it has passed through the machine, and running it again in the same direction, without having to rewind it as would be necessary with an automatic piano roll, for instance.

The tapes are graduated from a very slow sending tape to exceptionally fast ones. Besides the tapes being made from very slow to very fast, by reducing the space between the letters and words, the speed of their passing through the machine may be regulated by use of the speed regulator.

It should be remembered, however, that it is best to practice with the slower tapes until the fast ones may be run normally, as running a fast tape too slow, (or any tape for that matter) distorts the sound to the extent that the characters are not made properly.

A list of the American Morse Code and conventional signals is shown on page 37, which may be used in connection with these lessons. Also to facilitate learning the code characters, they have been arranged in eight groups, as illustrated on page 38. The first group being all dot letters, the second all space letters, the third all dash letters, and so on. It is recommended that each group be practiced separately at first beginning with number 1 group and practicing on it until the sound of each is perfectly familiar. Then pass on to the next.

In practicing the dot letters it is a good plan to begin as follows: Before beginning to form the characters themselves, just make the dots. Start with one each second until you have made about 20, being careful that each is a quick, clear-cut sound, and made by a distinct motion of the wrist. Stop and rest a moment and then try two each second, then three and so on until you have attained a speed of about 250 per minute. The dash letters then may be taken up. The dash letters should be practiced just as carefully. Remember that a dash is presumed to be three times as long as a dot, and naturally the dashes may be made just one third as fast.

Listening to the Instructograph make the letters will soon teach the student just how all letters should be made, and little trouble will be experienced if the student takes the pains to make the characters just as they are made by the machine.

## Lesson and Tape No. 1

**TAPE NO. 1:** This tape is what is called the "Sending" tape. That is, it is intended for use by those with no knowledge of how the characters should be made. The letters, numerals and conventional signals are made with sufficient space between for the student to make them on the key after the machine makes them correctly.

The characters reproduced by tape No. 1 follow:

### First Side:

A A B B C C D D E E F F G G H H I I J J K K L L  
M M N N O O P P Q Q R R S S T T U U V V W W  
X X Y Y Z Z . . 1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 9 9 0 0  
. . , , ? ? . . Beginning again with the letter A the same letters, figures and punctuation marks are repeated over to the end of the tape, and in the same order. Both sides of the tape are exactly alike.

Place tape No. 1 on the Instructograph, as shown by Figure No. 1. Wind the machine fully, and regulate the speed to a slow movement. Have the list

## AMERICAN MORSE CODE AND CONVENTIONAL SIGNALS

A	• —	Period	..... • • — — • •
B	— • • •	Comma	..... • — • —
C	• • •	Interrogation	..... — • • — •
D	— • •	Dollars	..... • • • • — • •
E	•	Semicolon	..... • • • • •
F	• — •	Dash	..... — • • • — • •
G	— — •	Paragraph	..... — — — —
H	• • • •	Capitals	..... • • • • — • •
I	• •	Decimal point	..... — • • • • —
J	— • — •	Cents	..... • • •
K	— • —	Colon	..... — • — • •
L	—	Colon dash (:—)	..... — • — • — • •
M	— —	Colon quotation (:")	..... — • — • • — •
N	— •	Hyphen	..... • • • • • — • •
O	• •	Beginning quotation	..... • • — • • — •
P	• • • •	Ending quotation	..... • • — • • — • • — •
Q	• • — •	Apostrophe	..... • • — • • — • •
R	• • •	Brackets	..... — • • • • • — • •
S	• • •	Beginning parenthesis	..... • • • • • — •
T	—	Ending parenthesis	..... • • • • • • • •
U	• • —	Pound sterling	..... • • • • • • — • •
V	• • • —	Shilling	..... • • — —
W	• — —	Pence	..... — • •
X	• — • •		
Y	• • • •		
Z	• • • •		
&	• • • •		
<hr/>			
1	• — — •		
2	• • — • •		
3	• • • — •		
4	• • • • —		
5	— — —		
6	• • • • •		
7	— — — •		
8	— • • • •		
9	— • • —		
0	— — —		

of characters handy, and immediately after the machine makes a letter or character, you make it on the key and imitate the sending of the machine. To begin you will experience some difficulty making the letters before the machine makes the next one, but a little practice will enable you to make most of them twice in the space allowed. If you should make them on the key at the same time that the machine is making them, the result will be a conglomerated mess of sound that is unintelligible.

At this time particular attention should be paid to making the characters perfectly, just as made by the Instructograph. As an illustration, the letter "A" is composed of a dot and dash, —, but if made with a slight pause between the dot and dash, . —, it would be read as E T. The same is true with the letter "N". It is composed of a dash and dot, —., but if made with a slight pause between the dash and dot, —., it would be taken for T E.

### AMERICAN MORSE CODE GROUPS

Group 1	Group 2	Group 3	Group 4
E .	C . . .	T —	A . —
I . .	R . . .	L —	U . . —
S . . .	O . .	O — —	V . . . —
H . . . .	Y . . . .	M — —	4 . . . . —
P . . . . .	Z . . . .	5 — — —	
6 . . . . .	& . . . .		
Group 5	Group 6	Group 7	Group 8
N — .	W . — —	G — — .	J — . — .
D — . .	1 . — — .	K — . —	Q . . — .
B — . . .	2 . . — . .	7 — . . . .	X . — . .
8 — . . . .	3 . . . — .	9 . . . . —	F . . .

Probably the most common difficulty beginners have, is to make the dot or dots follow the dash properly and without pause. This is caused by unconsciously allowing the key lever to raise before beginning the dot or dots. Normally one starts to make all characters with the key lever up. Hence, the tendency to allow the key to raise to a normal position. But, when making dots following a dash (of the same letter) they are made from the downward position of the key. That is, make the one two or more dots following the dash from the downward position, without consciously allowing the key lever to raise.

Particular attention is called to the "Space" letters, C R O Y Z and & (short and). In the groups of characters on page 38, the second group is composed of these space letters and symbols and should receive careful attention, as well as be given considerable practice. As before stated, the space is simply a short pause equal to one dot. Therefore, to make the letter "O" for instance, would be like making the letter S (...) leaving out the middle dot (. .). The other space letters are exactly the same, a space equal to one dot between the several dots making up the character.

Continued practice, closely following the sounds of the characters as made by the Instructograph, will soon eliminate any difficulty in making the letters correctly and properly.

Practice with this tape should be continued until the student is able to make every character correctly and easily, just as they are made by the ma-



chine. One can not hesitate to figure out what dots and dashes comprise them. Consistent practice with this tape is the basis of your whole study, and the more thoroughly it is mastered the better the ultimate result.

This tape should be reviewed occasionally to check up on the student's sending to see that the characters are being made properly, and just as the machine makes them. One is liable to drift into an incorrect "swing" which is hard to eradicate when once formed.

After having learned to make all characters correctly, lay tape No. 1 aside for a while and take up No. 2.

### Lesson and Tape No. 2

**TAPE NO. 2:** This is the first tape that is intended to assist the student in beginning to read the characters as they are made by the Instructograph. The characters reproduced by this tape are as follows:

#### First Side:

A A B B C C D D E E F F G G H H I I J J K K L L  
M M N N O O P P Q Q R R S S T T U U V V W W  
X X Y Y Z Z .. 11 22 33 44 55 66 77 88 99 00  
.. ,, ? ? .. Beginning again with the letter A the same characters are repeated over and over again in the same order to the end of the tape.

#### Second Side:

G P O C N Z J S Y L A H W E R X I V B Q U D T M F K . 7 2 9  
1 5 0 4 8 3 6 . ? , . P U C X G A N R J W B L S F Y H V T Z M O  
D Q K E I . 6 3 8 1 0 7 2 9 5 4 , . ? T K X E J Q Z D U L Y A W N  
H V B J P C R O F M G S . 3 8 1 9 0 5 2 7 4 6 . ? , . Beginning again with the letter G the same letters, figures and punctuations are repeated in the same order to the end of the tape.

The first side of this tape is similar to tape No. 1, except that it is some faster. Considerable space is left between the characters in order to allow the student time to write them down. It will be slow work to begin with, and plenty of space will be required.

It may be a good idea at first to run the tape through the Instructograph a time or so, watching the copy and listening to the sound of the characters as the machine makes them, without attempting to write them down. This kind of practice has a tendency to impress the sound of the characters on the mind.

Start the first side of tape No. 2 through the Instructograph quite slowly at first, just as slowly as it will make the characters plainly, and see how many of them you are able to read and write down. When you get one put it down on the paper, but if you do not get it instantly forget it, and "lay" for the next one. If you try to figure out a letter that you do not get instantly, or hesitate to think about it, the machine will make the next one when you are not prepared for it, and that also will be lost. Simply force yourself to read the characters instantly. If at first you only get an occasional one on the whole side of the tape, it is a start and you are doing all right. While quite simple, this tape is an important one and should receive careful attention. How one starts is an important factor in learning telegraphy, and is the basis of the whole study.

**SENDING PRACTICE:** Sending is also an important factor of telegraphy and must receive careful attention and diligent practice. How one starts to send is also very important, and much depends upon how the student begins to make the characters, spacing, etc.

Do not attempt to send words or phrases at this time. Practice making the letters, numerals and punctuations over and over again. Always use copy to send from. You may use the copy you have made from copying the second side of tape No. 2. If there is any question as to whether you are making the characters just as they should be, run tape No. 1 a few times to get the sound of the characters more firmly impressed upon the mind.

One great asset of a telegraph operator is good hand writing. It need not be "Spencerian," or particularly symmetric, but it should be plain, neat and easily legible. Even in this age of typewriters when a large percentage of telegraphic matter is written on the "Mill," an operator has much occasion to use the pen, pencil or stylus. Therefore, select a good clear legible style of writing and practice constantly to improve it. In practice always strive to make your copy neat and clean. Have it clearly legible, even if it is thrown away the next minute.

### Lesson and Tape No. 3

**TAPE NO. 3:** This tape consists of small words, and is quite an advancement over No. 2. While the words are small, they are used constantly in writing and the student will find that being familiar with their sound on the instrument will materially assist in reading regular matter a little later. The matter of Tape No. 3 reads as follows:

#### First Side:

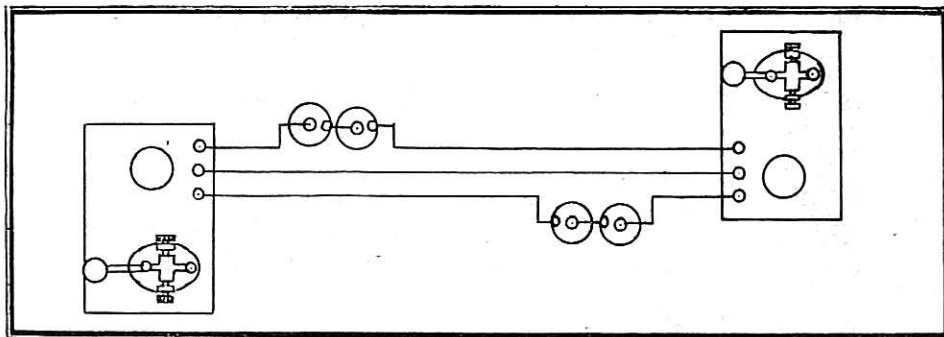
AM AN AS AT BE BY DO GO HE IF IN IS IT JO ME MY NO OF  
ON OR OX SO TO YE . . AND ARE AIM AGE AID ANY BOX BOY  
BEG BUY CAN CAR CAT COX DAY DAN DEN DIG EAT END  
EGG EAR ELM FAD FAG FAN FAT FED GAG GAP GAS GET  
HAD HAT HAY HEM HEN HER ICE ILK INN INK ITS JOB JAM  
JAR JIM KEN KEY KIP KIT LAD LAM LAM LAW LAG LAP  
LAX MAD MAN MET MID NAB NAG NAP NOR NOW OAR OAK  
ODD OFF OIL PAD PAN POP PAR PAT RAG RAM RAP RAT RAY  
RED SAY SEE SET SIN SIX SKY TAB TAG TAN TAP TAR ULE  
URN USE VAN VAT VIA WAG WAN WAR WAS WAX WED WHO  
WHY WAY YAM YEA YES YEW . . AM AN AS AT BE BY DO GO HE  
IF IN IS IT JO ME MY NO OF ON OR OX SO TO YE . . AND ARE  
AIM AGE AID ANY BOX BOY BEG BUY CAN CAR CAT COX  
DAY DAN DEN DIG EAT END EGG EAR ELM FAD FAG FAN  
FAT FED GAG GAP GAS GET HAD HAT HAY HEM HEN HER  
ICE ILK INN INK ITS JOB

#### Second Side:

SIX CAR USE AGE MY INN KIP TO WAN BOY HE SKY YEW  
AS TAR DO MAN GAG IF VAN DIG IS SIN AID BE YAM INK  
WAG AM NAG BUY ODD TAG BY ILK SAY AIM JO NOW VIA KIT  
OX MET ARE SET CAN JAM TAN IT HAD LAW YE VAT DEN HEN  
URN BOX YEA ATWAX CAT RAG ICE POP OF WHO OR ELM WAS  
FAN DAY EGG MAD ULE GO BEG JIM FED KEN MID END

HAY RAY ITS ME DAN TAB FAG NOR IN EAT KEY OAR YES  
 SO . ANY OIL RED EAR PAT RAT ON WED . LAP NO GET FAT  
 WAR LAM COX AN FAD SEE TAP LAD JOB HER WHY HEM  
 AND GAS LAX OFF PAN GAP LAG HAT JAR NAB OAK NAP  
 PAD RAP WAG PAR . . RAM SIX CAR USE AGE MY INN KIP  
 TO WAN BOY HE SKY YEW AS TAR DO MAN GAG IF VAN  
 DIG IS SIN AID BE YAM INK WAG AM NAG BUY ODD TAG  
 BY ILK SAY AIM JO NOW VIA KIT OX MET ARE SET CAN  
 JAM TAN IT HAD LAW YE VAT DEN HEN URN BOX YEA AT  
 WAX CAT RAG ICE POP OF WHO OR ELM

It may be a little difficult in getting started to copying these words as you would like, and if any serious difficulty is experienced, with the machine running very slow, it indicates that you have not had sufficient practice on the sound reading. In this case run the tape through and follow the copy with the eye, without attempting to copy it at this time. Pay strict attention to



Showing Hook-up of Two Signal Practice Sets

the sounds as you follow the reading of the characters, as made by the Instructograph. If necessary run the tape a number of times in this way.

Next prepare to copy the matter, with the machine running very slow. The same rule will apply here, that is, if you do not get a word, or letter of a word, pass it up and look out for the next one. Do not attempt to figure it out. One never has time for that in telegraphy. If you don't get it, it is lost. If you only get an occasional one to begin with, it will soon begin to come to you, and you will be able to copy it without trouble.

You should continue to copy the words on Tape No. 3 until you are able to copy the matter on either side correctly with the tape moving at a fair rate of speed. Or, with the tape passing through the machine in about eight minutes. When that point is reached, tape No. 4 may be taken up.

**SENDING PRACTICE:** Do not overlook the instructions under "Sending" on page 17, when practicing, and remember that it is quite necessary to maintain a correct position at the table, hold the key easily and do the practicing just as though you were engaged in actual work. Also remember that you should send so that it is easily read, or it is no use sending it.

The words copied from tape No. 3 may be used to practice sending, and it would be better to attempt no speed, but continue to make the characters very clear and evenly spaced. That is the important factor. Speed will come

in good time, as you continue to practice. You should put in at least one third as much time practicing sending as you do on the receiving part of the work.

### Lesson and Tape No. 4

Upon completing this lesson and tape No. 4 you will have prepared yourself to begin receiving routine material, such as is commonly copied by the telegraph operator in regular work.

**TAPE NO. 4:** This tape consists of words larger than those contained in Tape No. 3. Indeed, some of the words are quite difficult, and have been selected as affording splendid practice in receiving. The second side contains abbreviations commonly used in wire work. They are not interpreted as it would serve no good purpose to do so, as they vary with the practices of operators of various lines. They may be figured out in the main, and afford very good practice. They are, in a sense, code combinations. The matter of the tape reads as follows:

#### First Side:

##### (iii Period Tape No. 4 Words Period)

THOSE NAME HOME ONION HAND INDIA IODINE INTO  
 INTEND EAST EDEN EDITION EATEN TENTH TENT  
 TOOTH ESTATE ESTIMATE OATS SAID SOON SOME  
 MITTEN MADDEN OMIT ONTO OASIS OMISSION SHED  
 SATAN INTONE TIME TESTED TENNANT MADAM MAD MEND  
 TIME MOTION MISSION ADMIT SEASON DITTO DINNER  
 NOTION HEAT UNITE UNION NOTATION HINT GAIT GAUGE  
 VANISH VAUNT VEND BABOON SAND DANISH DOMINATE  
 MAINTAIN DATED DETEST DISH DEMAND DISSSENT AMID  
 NONE NOTE HOTTEST HAM HIDDEN WASTE WEIGHT  
 AMASS NEAT NOTED GOAT BOMBAST NOD NOSE WHIST  
 WHITE WAGON BEE BUNTING CACTUS CAMBRIC CATCH  
 CLOCK COCOA COMMERCE YACHT YELL YARD YESTERDAY  
 YEAST YOUNG YOKE PALPITATE PAPER POPPY PREPARE  
 PLEASANT PLEAD QUACK QUALITY QUESTION QUICK  
 QUILT QUIZ FORGE FRAY FULLY FUSE FUNNY LEGAL  
 LOYAL LULL LUNAR KENNEL KNIGHT KNOW KNIFE  
 KORAN RAFTER RASHER RECEIVER RECTOR ROAR RURAL  
 RUMOR JANGLE JILT JOINT JUDICIAL JUSTICE XANTHIC  
 XYSTER ZERO ZINC LEGISLATE LIKELY LILY LOCAL  
 KNOLL KNEE JANITOL JASPER JEWEL ZEST PERIOD  
 PERIOD THOSE NAME HOME ONION HAND INDIA IODINE  
 INTO INTEND EAST EDEN EDITION EATEN TENTH TENT  
 TOOTH ESTATE ESTIMATE OATS SAID SOON SOME  
 MITTEN MADDEN PERIOD PERIOD

#### Second Side:

##### (iii Period Tape No. 4 Abbreviations Period Period)

ABT ACCT ADS AGT ANS AY R AUG AVE B BK BAGE BATY  
 B4 BETW N BLK BLNX BOT BLDG BIZ BI CN CASHR CKT CLR  
 COLL C O D COMSN CO CONDR C & E O K CLD XNG  
 DA D H DEC DELY DISPR DD DIF DINR DIST DBT DOZ

DUP ELECTN ENGR EXCN EXA FEB R FWD FRT 4 MAN  
 G B A G P A G S A G D G M GOVT GTD HF HR IMMY  
 INC INV JAN NU LRN LITE LO LTD MD MN MK  
 MGR MFLD MFST MFR MNY MAR MKT MTR MA MSG  
 MSGR MI MIN MRS MOS MCH NR N NTG NVR NU  
 NOV NO OCT O K OT OPN OTR R PKG PD PA PLS  
 LB PFD PREST QK RY RDY RECD REFR REPT SD  
 SM SA C CN SLO SDG SIG STA SMTNG SPL SEPT  
 SUPT SW SYS TF TT T TN TS THO TODA TRK  
 T P A VY WTR W B WN WR WO YD UR PERIOD  
 PERIOD ABT ACCT ADS AGT ANS AY R AUG AVE  
 B BK BAGE BACTY B4 BETWN BLK BLNX BOT BLDG  
 BIZ BI CN CASHR CKT CLR COLL C O D COMSN CO  
 CONDR C & E O K CLD XNG DA D H DEC DELY DISPR  
 DD DIF DINR DIST DBT DOZ DUP ELECTN ENGR  
 EXCN EXA FEB R FWD FRT 4 MAN G B A G P A PERIOD

The more thoroughly you master this lesson and tape, the less trouble you will experience with the matter of subsequent tapes. The tapes hereafter will consist of messages, railroad and commercial, train orders, press reports, etc. Therefore, it is important that this tape be given careful attention and considerable practice.

Do not attempt to run this tape at all fast until you have used it for a considerable time. The words and abbreviations have been selected with a view to bringing into frequent use the letters of the alphabet which are but seldom used in actual work. It is just as necessary for the operator to be able to distinguish the letter "Q" as it is the letter "E" although the latter is used continually and the former but occasionally. When you are able to copy the words and abbreviations with the tape passing through the Instructograph at a fair rate of speed, say at the rate of 12 to 15 words per minute, you will be ready for the next lesson and tape.

**SENDING PRACTICE:** Sending practice should be kept up by all means and very careful attention given to the spacing, as that is an important factor of transmission. The words and abbreviations copied from tape No. 4 will be found to be excellent practice in sending. The abbreviations are always sent slower, and must be perfectly clear and distinct. They cannot be guessed at. Other matter may be used for practice, but the speed should be kept down to the rate you are able to receive, for the time being at least.

**ERRORS IN TRANSMISSION:** At this stage of the work it is necessary to bring up the question of making errors when sending. Naturally errors are made in sending—a word may be omitted, misspelled, a line skipped in reading the copy, or numerous other causes for sending or starting to send a word incorrectly. Such errors must, of course, be corrected by the sender in order that the operator receiving the matter may get his copy written just as it should be.

When an error is made in sending it is the usual practice to correct it in the following manner: Immediately upon discovering the error, the sender would make an interrogation (—.—) which is the recognized error signal in this code, and repeat the last word sent correctly and proceed with the message. The receiving operator upon hearing the error signal would immediately discontinue copying and watch for the correction. And, unless copying too close to the sender he would not have written or started the erroneous word.

Beginning with tape No. 5, and in subsequent tapes, these errors may be made just as they will appear in actual work, and the student must look out

for them, and see that his copy is not mutilated or written over. There is no time for correcting copy while receiving a message, and it must be written down just as it is intended to be delivered to the party to whom it is addressed.

### Lesson and Tape No. 5

The student has now reached the stage of the work where he will copy the exact material that he will be required to copy when employed as an operator. It is now a case of practice with a view to developing speed in both receiving and sending. The "irksome" part is over, and the practice should be very interesting from now to the end of the training.

**TAPE NO. 5:** This tape contains typical railroad messages, just as they are sent by railroad employes for the convenience of the company. They will afford considerable splendid practice. The messages are transcribed in full below:

To begin work with this tape it should, of course, be started quite slow, and gradually speeded up until the student is able to copy it at the rate of 20 words per minute (five letters to the word). It will require considerable time to complete this tape, but it should be remembered that you are copying regular matter now, and well advanced in the art of telegraphy.

After a while these messages will become more or less familiar and more easy to copy. Work with the tape regardless of that fact, as it is just as good practice, when the matter is a little familiar as it is otherwise. It is all the time training the mind to associate the sound of the letters with the letters themselves.

#### First Side:

(i i i period) Railroad messages (hr ds fm) Chicago 29 (To)  
Condr No 227 Fn (Period)

Pick up car flour at Duval and car hay at Hamilton  
(Sig) K C K (Period)

(hr ds fm) Chicago 29 (To)  
Agent Fn (Period)

In filling out train No. 233 give coal preference over other dead freight  
(Sig) K C K (Period)

(hr 2 copies ds fm) Chicago 29 (To)  
C & E No 210 Fn (Period)

Look out for cam ? (Error) cattle on right of way between mile  
post 196 and 198  
(Sig) K C K (Period)

(hr ds fm) Chicago 29 (To)  
W C Brand Care of Condr No. 237 Fn (Period)

Get important mail at Fallon and report prompt ? (Error) promptly  
on matter referred to  
(Sig) D E Babcock (Period)

(hr ds fm) Chicago 29 (To)  
Condr No 246 Fn (Period)

F & G car No 32716 at Gasco has drawbar out chain up and bring  
to Chicago  
(Sig) K C K (2)



(Hr gi fm) Gilroy 29 (To)  
 Chief Spl Agent Fn (Period)  
 P & O y ? (error) car 2769 car load of merchandise on house track  
 broken into last night and contents pilfered (Period) Apparently con-  
 siderable stuff taken but just what is missing cannot be determined  
 until a check of consignees invoices is made Detailed report by mail  
 (Sig) A D M (Period)

(Hr Ds Fm) Chicago 29 (To)  
 Baggage Agent Fn (Period)  
 Forward baggage bearing check 9673 to Chicago immediately  
 (Sig) An ? (Error) A N Campbell  
 (Period) N M

**Note:** The letters inclosed in brackets are not copied by the receiving oper-  
 ator. They are the usual preamble to sending a message, etc. "Hr" is com-  
 monly used to indicate "Here" or "Another Message;" "Ds" is the office call  
 of the office sending the message, and "Fm" means From the place sent, and  
 "Sig," of course, means the signature. A period is usually made between each  
 message.

Second Side: (i i i Period) Railroad Messages (Period) (Hr All copy Ds Fm)

Chicago 29 (To)  
 Am ? (Error) All Agents (Period)  
 Brown leather suit case marked B F M on one end and presumed to  
 bear check No 22794 for Manning has gone astray (Period) Search  
 your baggage and freight rooms f ? (Error) and report promptly if  
 found  
 (Sig) J D Grant (Period)

(Hr Ds Fm) Chicago 29 (To)  
 D J Clary opr Fn (Period)  
 When relieved at Ferrin report to Agent Wheeling immediately  
 (Period) Pass on No 233  
 (Sig) K C K (Period)

(L ? "Error" Hr Ds Fm) Chicago 29 (To)  
 Agent Fn (Period)  
 Your report of passenger earnings for week ending 14th not yet re-  
 ceived (Period) Please forward promptly  
 (Sig) L D B (Period)

(Hr Fn Fm) Ferrin 29 (To)  
 K C K Chicago (Period)  
 Shipper wishes to begin loading the 15 cars of cattle at 4 30 A M the  
 23rd (Period) Please have engine and crew on hand  
 (Sig) M H W (Period)

(Hr Ds Fm) Chicago 29 (To)  
 Agent Fn (Period)  
 This message stamped and countersigned by you will be authority for  
 Conductor No 226 to pass D J Clary Ferrin to Wheeling  
 (Sig) L D Baker (Period)

(Hr Ds Fm) Chicago 29 (To)  
Section 4 Man Fn (Period)

Cattle reported on right of way between mile post 196 and 198  
(Sig) A D J (Period)

(Hr Ds Fm) Chicago 29 (To)  
Condr No. 233 Fn (Period)

No water at Grenada  
(Sig) K C K (Period)

B sure 92 last 1 (means be sure and deliver last message)

### Lesson and Tape No. 6

In view of the fact that many students learning the American Morse Code have in mind being employed by a railroad company, the matter on tapes 6 to 10 inclusive contains material largely used in railroad work, such as commercial messages, train orders, etc. If one has some other field in mind, this material will answer every purpose just as well as other matter, as it is simply a case of learning to read the characters from the telegraph instrument, and one class of matter is as good as another. The train orders particularly afford splendid practice, as they contain not only words and figures, but the names of towns and cities as well.

**Tape No. 6:** Tape No. 6 consists of typical Commercial telegrams, such as are sent by the Postal or Western Union offices, whether such offices are exclusive commercial offices or operated by the railroad company at their local stations.

All commercial companies do not use the same message form, but generally speaking there are four parts to any commercial message as follows:

1. The preamble (the business of the message).
2. The address (to whom and where sent)
3. The text (the message to be conveyed)
4. The signature (the name of the person sending it)

Punctuations in messages are usually omitted, and when they are sent, upon specific request of the sender, they are charged for as words.

Only the complete matter of the first five tapes is reproduced in the lesson material. From now on the student can easily get the characters from the tapes as they are sent by the machine, and it is considered better teaching logic to give only a sample of the matter. Just enough to give a comprehensive idea of what the tape contains. Therefore, if you desire copy to check your receiving by, make a copy of all the messages and compare them with the next copy you make.

The first message on the first side of tape No. 6 reads as follows:

(i i i Period) Commercial messages (Period)  
(Hr No 21 jacm ?) (Error) (Ck) 9 (Fm) Ca Charleston W Va  
9 55 A M 9 (To)  
Clay D. Danner,  
Hampton Ind (Period)

Have position open at one fifty wire immediate acceptance  
(Period) (Sig) Clayton & Brown (Period)

While it is not the intention to give any particular information as to the form of messages, as it varies with every company, and would be of no material benefit, a little explanation of the message just quoted may be helpful. Usually

the letters, etc., inclosed in brackets are not copied by the receiving operator. They are sent to indicate certain things to the receiving operator and would mean nothing to the party receiving the message.

It is quite a common practice to make a period or so before starting transmission. The first line, however, is simply a key to what is on the tapes and has no connection with the messages proper. "Hr" (meaning here or another) is usually sent before each message to indicate that a message is going to be sent and for the receiving operator to prepare for it. The No. 21 is the number of the message, as all commercial messages are numbered consecutively for each day. In this instance the operator made an error and sent "jacm" in error—made an interrogation, and then sent the correct word or symbol "Ck" meaning the check, or number of words in the message. The 9 indicating that the message contains nine words in the body of the telegram. The "Fm" means the place from. The "Ca" is the call for the local office in Charleston from where the message was sent, and Charleston, W. Va., the name of the place from which sent. It is customary to give the office call for the office, if the message is sent from an office in the city other than the main office. The 9 55 A M means the time the message was filed and the "9" means the date of the message. The "To" of course, means, to whom addressed.

The message as copied by the receiving operator would probably read about as follows:

No. 21 Ck 9 Ca Charleston, W. Va. 9:55 A M Nov. 9  
Clay D. Danner,  
Hampton, Ind.

Have position open at one fifty wire immediate acceptance.

Clayton & Brown

These messages should be copied indefinitely. Even after they are quite familiar they will afford splendid practice. The next tape should not be taken up until you are able to copy these messages at the rate of at least 20 words per minute and make clearly legible copy of every message.

**SENDING PRACTICE:** Using the copy made from tape No. 6, the sending should be practiced for a considerable period. Make other messages and send them, keeping in mind that they must be read by one unfamiliar with their contents. Make all symbols clear and distinct. At this time in addition to practice on the message material, the student should practice sending newspaper and magazine articles, always paying particular attention to the spacing and try to maintain an even speed all the time. That is, adopt a certain speed that is best suited to your ability and keep it constant.

It is good practice to run a tape through the machine and listen to the sending without copying it. Just listen to the "rythm" as the machine sends just as you would if you were a perfect sender. The machine's spacing is correct in every particular, and listening to it should assist one in making the characters similar.

### Lesson and Tape No. 7

**TAPE No. 7:** This tape contains typical train orders and should afford splendid practice for the student, as it includes both letters and numerals, and is of such material that it will not easily become familiar.

The first train order on the first side of tape No. 7 follows:

(iii Tape No. 7 Train Orders Period)

19 West Order No. 18

To Fd No. 220

To Cn No. 219

To Bu Opr (Period)

No 219 eng 729 meet No 220 eng 713 at Buford

(Sig) T J W

The entire tape is made up of various orders, just as they would be sent by the train dispatcher to the operators on the line. A little explanation regarding train orders may be helpful in copying them.

A train order is sent to all operators concerned at one time so far as possible. The dispatcher would call each operator and say (in this instance) 19 West, meaning that he was going to send a "19" form of train order, and that it was intended for a Westbound train. He would tell each operator what kind of order was to be sent, and the direction of the train to be copied for. He would then start with the order number, and then send to each operator the number of the train that was to receive the order at his office. In this case it is also sent to the operator at the meeting station, as an extra precaution. He would then make a period, and proceed with the body of the order. All operators addressed would copy the order at the same time, and all should have it exactly as sent. Unless otherwise directed each operator copying the order would repeat it to the dispatcher in the order they were addressed, all other operators interested checking their copy to see that it is repeated as he has it.

Practice with this tape should be continued indefinitely, as it will afford a lot of good practice, and may be copied to good advantage ever after it becomes more or less familiar. When the student is able to copy the orders at a fair rate of speed, tape No. 8 may be taken up.

**SENDING PRACTICE:** It will be found to be splendid sending practice to send the train orders copied from tape No. 7, just as the dispatcher would send them, remembering that several operators are copying them, and that they must be sent absolutely correct. Pay particular attention to the spacing and regularity of the speed. The speed may be increased some, if it can be done without detriment to the class of matter being sent. Correctness in sending is far more important than speed, for one will have plenty of time to gain speed even after this training is completed.

All kinds of matter may be used in sending practice at this time.

### Lesson and Tape No. 8

**TAPE No. 8:** This tape also consists of train orders, a little more advanced than those on tape No. 7, but are more or less similar in general make up. They are, of course, different as to trains, meeting points, etc., and will afford considerable practice that will have a tendency to advance the student in his receiving.

The first train order on the first side of tape No. 8 reads as follows:

(i i i Period) Train Orders (Period) 31  
Order No. 80

To Do No 20

To W Opr

To G No 21 (Period)

No 20 eng 265 meet No 21 eng 308 at Woodstock

(Sig) J E C (Period)

The entire tape contains similar train orders, but they are more intricate as they advance, and longer. They will be found to be excellent practice.

**SENDING PRACTICE:** As with the last tape, No. 7, the material copied from tape No. 8 will make splendid sending practice, and the train orders should

be sent repeatedly. Other matter, such as newspaper and magazine articles may be used to good advantage. Never lessen your endeavor to make your sending clear and even, rather than fast. Speed will come with practice.

### Lesson and Tape No. 9

**TAPE No. 9:** This tape also consists of train orders, the first side being what is called a "Schedule" train order. That is, it is a telegraphic schedule over the entire division, and takes up the whole of the first side of the tape. This tape will afford splendid practice as it contains not only words and figures, but the names of many towns as well.

Only a start of the order is given below, but enough to show how it would be copied in actual work. The beginning of the first side reads as follows:

(i i i Period) Tape No 9 Schedule train order (Period)

31 West Order No. 79

To Cn Eng 783 (Period)

Eng 783 run stock extra leaving Cheyenne on Thursday Nov 9th as follows with right over all trains Leave

Cheyenne	3 50 A M
Borie	4 15 A M
Grants Canyon	4 37 A M
Ozone	4 46 A M
Buford	4 57 A M
Sherman	5 07 A M

This order continues to the end of the first side of the tape, and the other side is also standard train orders and messages.

**COPYING BEHIND:** All efficient operators learn to copy behind the sender. That is, they would probably not write down the first word sent until the operator sending the matter had sent one or two additional words. The number of words one is able to copy behind varies with the class of matter being copied and the ability of the operator, of course, but a couple of words will be quite enough in ordinary work.

The advantage one gains in copying behind is that one learns to have the full text of the matter being sent in mind instead of just one word. One is able to gain greater speed and is less liable to make an error. Again, should the sending operator make an error and correct himself by making the error symbol and repeating a few words, if copying too close the receiving operator would have the erroneous word written or at least begun, and would have to erase or make another copy.

A very good way to acquire the habit of copying behind is to begin the practice with words or messages which are more or less familiar, and one has some idea of what is coming. It is recommended that tapes 3, 4, 5 and 6 be used for this purpose. After learning to copy behind with this familiar matter, try it on messages with which you are not familiar. Only continued practice will produce the desired result.

The simpler and easier the matter the greater number of words one is able to copy behind. One word, or 3 or 4 letters is considered very fair in difficult code combinations.

We have purposely deferred bringing up copying behind until you have had quite a little of the training, because the student has had enough to contend with learning the code without taking up the more advanced part of the work.

**SENDING PRACTICE:** The schedule train order, as well as the other orders copied from tape No. 9 will make splendid sending practice. If you will try to remember how difficult it was for you to copy this schedule order, you will more readily appreciate the necessity of clear and correct sending. Therefore, watch that part of the practice as much as you have in the past.

There is little that may be added in connection with sending. Continued practice, trying to imitate the machine's sending will make you a good sender. It is, therefore, now up to you.

### Lesson and Tape No. 10

We have now reached the last lesson and tape of the training, and it should prove the most interesting of them all. It consists of a newspaper article, and it includes capital letters, quotation marks, brackets, paragraphs and probably other symbols not encountered in ordinary work. Therefore, you will have to "brush up" a little on the symbols and be prepared for them in this article.

**TAPE NO. 10:** The first part of the article is given below:

(i i i Period) Tape No. 10 (Period) Press Report by (CX) William (CX) Shinnick.

"It was inevitable, once the great valley and the plains between the (CX) Rocky Mountains and the (CX) Alleghenies were settled, that (CX) Chicago and (CX) New York would become what they are (DX) the largest and most important cities on the continent ( Period)"

This article continues through both sides of the tape, and will afford almost endless practice for the student. When it can be copied legibly at the rate of 25 or 30 words per minute (5 letters to the word), the student may consider himself an operator.

If the necessity for additional practice is felt, all tapes from probably No. 5 on, may be reviewed with good result.

**SENDING PRACTICE:** While no licenses are issued in connection with the American Morse Code, except in connection with a radio operator's license, an applicant for a position is usually subjected to an examination as to his sending and receiving ability. The better one can send the more favorable an impression he will leave with his prospective employer. Therefore, even after you have concluded this training do not relax your endeavor to become a better and faster sender.



## MISCELLANEOUS

It is not the intention of the Instructograph Company to particularly recommend any institution or text book, but when it is requested by the student we will take pleasure in informing him of his nearest residence school, which we consider reliable. Or, we will give them the name and address of reputable extension institutions. We shall also take pleasure in recommending text books on radio "theory," which we know to be reliable and authoritative.

Quite a few valuable books covering radio operating rules and regulations, report of the International Radiotelegraph Convention, U. S. Radio Act, Ship Act, Regulations Governing the issuance of radio operator's licenses both commercial and amateur, "Q" signals, and kindred subjects, are published, and may be obtained at moderate expense. Many of these volumes will prove valuable to the student.

The "Radio Amateur's Handbook" is published by The American Radio Relay League, of Hartford, Conn., and contains much valuable information for the beginner, and may be procured by addressing the "League" in Hartford.

The Department of Commerce, Radio Division, of Washington, D. C., publishes a few small publications, such as a list of Amateur Radio Stations of the U. S.; Radio Act of 1927; Commercial and Government Radio Stations of the United States, and Radio Service Bulletins, any or all of which may be procured for a few cents each by addressing the Superintendent of Documents, Washington, D. C.

**Radio Operator's Licenses:** Radio Operator's Licenses are issued by the United States Department of Commerce, Radio Division, upon the student passing the required examination as hereinafter explained. There are nine districts, with offices located in various cities of the United States, where examinations are held at stated intervals, and licenses issued.

Where the code is a factor, licenses are issued as follows:

**1. Commercial Extra First Class:** To be eligible for examination, an applicant for this class of license must have held a commercial first class license and must have been actually engaged as an operator at stations open to public correspondence for at least 18 months during the two years previous to his application. A speed in transmission and reception of at least 30 words per minute, in code groups, Continental Morse Code, and 25 words per minute, in plain language, American Morse Code (5 characters to the word), must be attained. The questions in this examination will cover the same subjects as required for a commercial second-class license but considerably wider in scope. A total percentage of at least 80 will constitute a passing mark. Holders of licenses of this class are authorized to act as chief operator at any licensed radio station.

**2. Commercial First Class:** To be eligible for examination, an applicant for this class of license must have been actually engaged as an operator at stations open to public correspondence for at least 12 months. Applicants for this class of license must pass code tests in transmission and reception at a speed of at least 20 words per minute in Continental Morse Code, in code groups, and 25 words per minute in Continental Morse Code, in plain language (5 characters to the word). The practical and theoretical examination will cover the same subjects as required for the commercial second class license. A total percentage of 75 will constitute a passing mark. Holders of this class of license are authorized to act as chief operator at any licensed radio station.

3. **Commercial Second Class:** Applicants for this class of license must pass code tests in transmission and reception at a speed of at least 16 words per minute in Continental Morse Code, in code groups, and 20 words per minute in Continental Morse Code, in plain language (5 characters to the word). The practical and theoretical examination shall consist of comprehensive questions under the following headings:

(a) Diagram of radio installation: Applicants are required to draw a complete wiring diagram of a modern marine radio installation as used aboard American vessels. The applicant may be required to draw either a spark, arc, or vacuum tube transmitter (with radiotelephone attachment).

(b) General principles of electricity, theory, adjustment, operation, and care of modern radiotelegraph and radiotelephone apparatus.

(c) Receiving apparatus.

(d) Operation and care of storage batteries.

(e) Motors and generators.

(f) International regulations governing radio communication and the United States Radio Laws and Regulations.

(g) Experience: The applicant's answers will be rated on the basis of 100 per cent. In addition to the percentage thus obtained, an allowance for experience will be added as follows: Three months' or more satisfactory service at a station open to public correspondence under a commercial license, 10 per cent; two months' satisfactory service at a station open to public correspondence under a commercial license, 7.5 per cent; one month's satisfactory service at a station open to public correspondence under a commercial license, 5 per cent; service at United States Government stations open to public correspondence, same as above; service at other United States Government stations of three months or more duration, 5 per cent; less than three months, in proportion; graduates of residence radio schools, 5 per cent; amateur operators or graduates of correspondence radio schools, 2 per cent. Applicants must present satisfactory written evidence of their experience in order to obtain due allowance. A total percentage of 65 will constitute a passing mark for this class of license.

The license is valid for the operation of any licensed land or aircraft radio station or on any vessel except as indicated in the following. Holders of this class of license are not authorized to act as chief operator on a vessel in the first class. They will be authorized to act as chief operator on a vessel in the second class upon submission of written evidence at any time during the term of the license indicating six months' or more satisfactory service as an operator at a station open to public correspondence.

4. **Broadcast Class:** Applicants for this class of license must pass code tests in transmission and reception at a speed of at least 16 words per minute in Continental Morse Code, in code groups, and 20 words per minute in Continental Morse Code, in plain language (5 characters to the word). The theoretical examination will cover the same subjects as indicated for the commercial second-class license, except that under subject (a) the applicant is required to draw a diagram of a modern broadcast transmitter and under subject (b) the questions will relate strictly to broadcast apparatus. An allowance for service as an operator at a broadcast or other station will be made in accordance with the scale indicated under 3, commercial second-class. Holders of this class of license are authorized to act as operator only at a licensed broadcast station.

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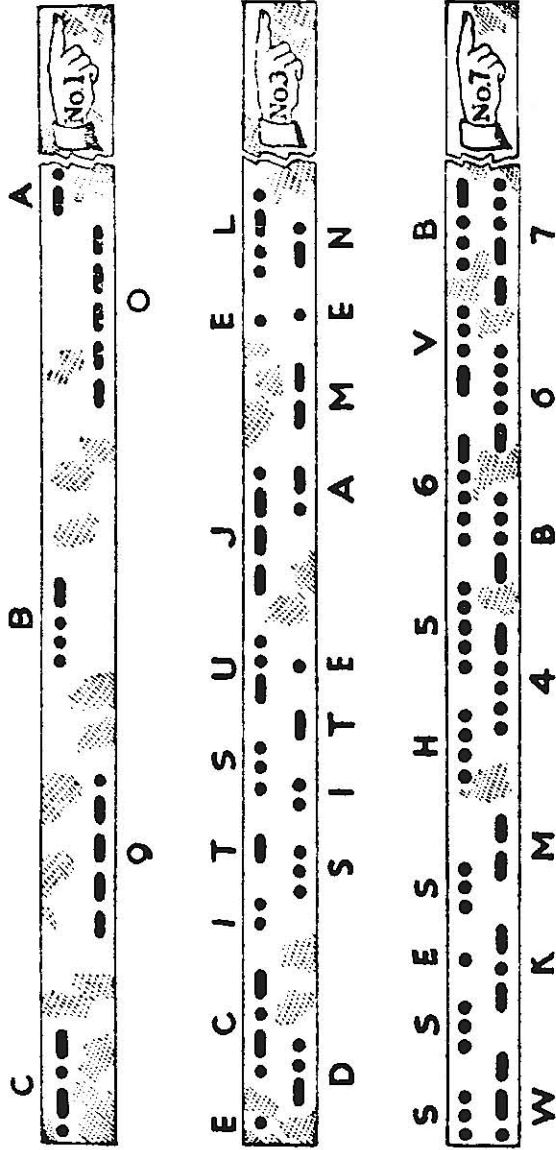
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