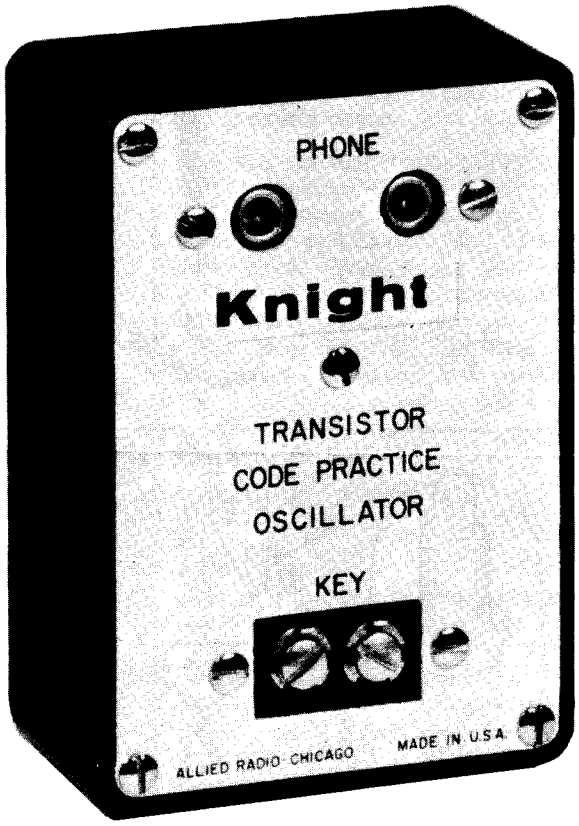
knight-kits

Allied knight®-kit TRANSISTOR CODE PRACTICE OSCILLATOR

83 Y 239



ALLIED RADIO
CORPORATION
100 N. WESTERN AVE. • CHICAGO 80, ILL. HAYMARKET 1-6800

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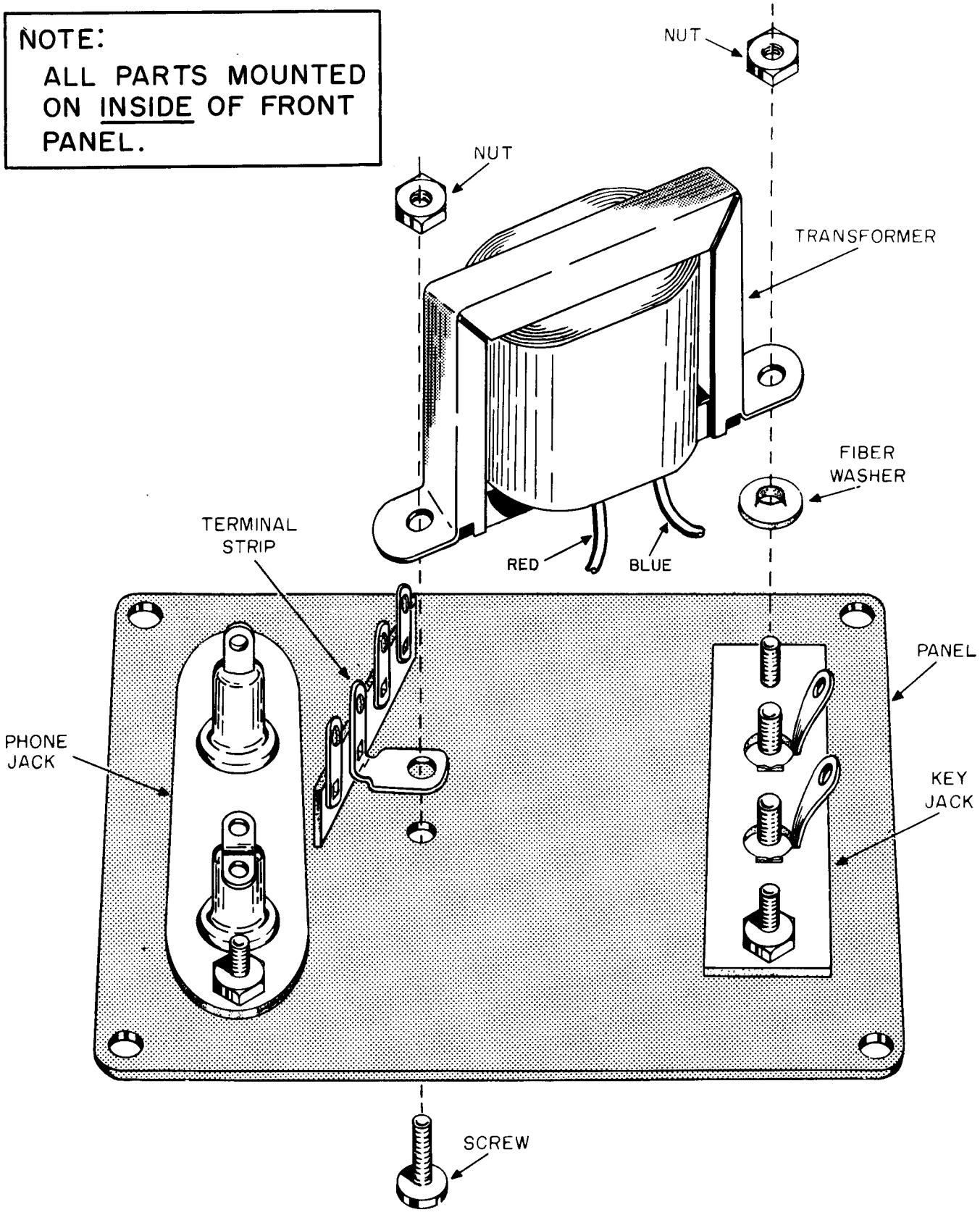


FIGURE 1. HOW TO MOUNT THE PARTS ON THE PANEL

THE KNIGHT TRANSISTOR CODE PRACTICE OSCILLATOR

SPECIFICATIONS

FREQUENCY ..... 400 to 600 c.p.s.

TRANSISTOR ..... General purpose P-N-P (CK-722 or equivalent)

BATTERY ..... 1½-volt penlite cell

CASE ..... 4 x 2⅞ x 1⅝"

PANEL ..... Screened anodized aluminum

INTRODUCTION

The KNIGHT Transistor Code Practice Oscillator was developed to provide a low-cost instrument for aspiring Amateurs and SWL's. The oscillator is completely portable because it obtains its operating power from its self-contained battery. The use of a transistor assures extremely long battery life–this unit will oscillate for approximately 30 weeks continuously on a single cell. Since equipment of this type normally is not subjected to this kind of use, it should operate for the shelf-life of the battery. The only accessories required are a set of headphones and a key. The stock numbers and prices of the accessories recommended by us are listed in the Parts List.

CHECKING YOUR KIT

Before building your KNIGHT Transistor Code Practice Oscillator, check each part of the kit against the Parts List on page 9. If you are unable to identify some of the parts, locate them on the pictorial diagrams in this manual.

CONSTRUCTION HINTS

The only tools needed to construct the KNIGHT Transistor Code Practice Oscillator are: A pair of long-nose pliers, a pair of diagonal cutting pliers, a medium-size screwdriver, and a soldering iron with a medium-size tip. A good set of tools is listed at the end of the Parts List.

We suggest that you read through the step-by-step instructions before starting to build your kit. As you are reading, study the pictorial diagrams thoroughly to become familiar with the recommended method of assembly. This procedure will help you avoid possible errors.

The step-by-step instructions were prepared by a skilled technician while he was actually building the KNIGHT Transistor Code Practice Oscillator. They are the best and fastest way of assembling this unit. Follow them closely. As you complete each step, check it off in the ☐. Some builders also like to color in each wire and part on the pictorial diagrams as it is installed. Both of these methods are good, and will assure speedy and correct wiring.

MOUNTING THE PARTS ON THE PANEL

REFER TO FIGURE 1.

Separate the three different types of screws. There are six 4-36 x ⅜" long, four 4-36 x ¼" long and one 6-32 x ¼" long screws supplied with your Transistor Code Practice Oscillator. Be sure to use the screw length specified in the instructions.

☒ From the front of the panel (the printed side), insert a ⅜"-long screw into each of the small holes next to the two large holes marked PHONES. On the rear of the panel, mount the dual phone jack on these two screws. Secure the phone jack to the panel by tightening a nut onto each screw.

☒ There is a screw hole on each side of the rectangular hole. From the front of the panel insert a ⅜"-long screw into the hole directly above the words MADE IN U.S.A. Do not put a screw in the other hole yet. On the rear of the panel mount the key jack on this screw with a nut so that the terminals are in the position shown in Figure 1.

☒ Now, from the front of the panel, insert a ⅜"-long screw into the screw hole on the other side of the rectangular hole. Insert another screw into the small hole between the key jack and the phone jack; place the terminal strip on this screw. Place the fiber washer, lip side up, on the loose screw in the key jack. Mount the transformer on both of the screws so that its red and blue leads are positioned as shown. Be sure the lip on the fiber washer fits into the hole in the transformer mounting tab. Secure the transformer with two nuts, one on each screw.

WIRING AND SOLDERING

How well a piece of electronic equipment functions often depends on the quality of workmanship used in its construction. It is for this reason that we strongly urge you to read the following paragraphs carefully before proceeding with the construction of your KNIGHT Transistor Code Practice Oscillator. Pay special attention to the phrases, sentences, and paragraphs in **heavy type.**

The wire furnished in this kit is pre-cut and stripped to spare you this tedious task. All you have to do is to connect the wire and solder it. The proper way to connect a wire to a terminal is shown in Figure 2. To connect a wire, first bend a hook in its end with your long-nose pliers. Next, insert the end of the hook through the hole in the terminal. Finally, squeeze the hook together with the long-nose pliers so the wire is securely mounted to the terminal. **All connections must be mechanically sound BEFORE they are soldered–solder must NOT be used to furnish mechanical strength; its only purpose is to insure a good ELECTRICAL connection.**

Kits can look very sloppy if the various parts are not properly mounted. Figure 3 shows the best way to mount a part. As illustrated, the wires on the ends of each part (called "end leads") should be as short

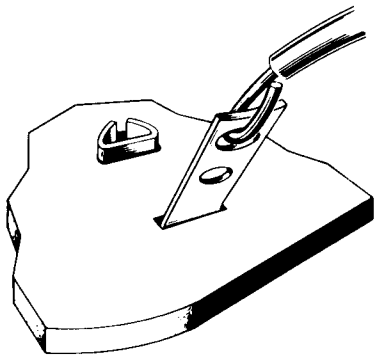


FIGURE 2. CONNECTING A WIRE TO A TERMINAL

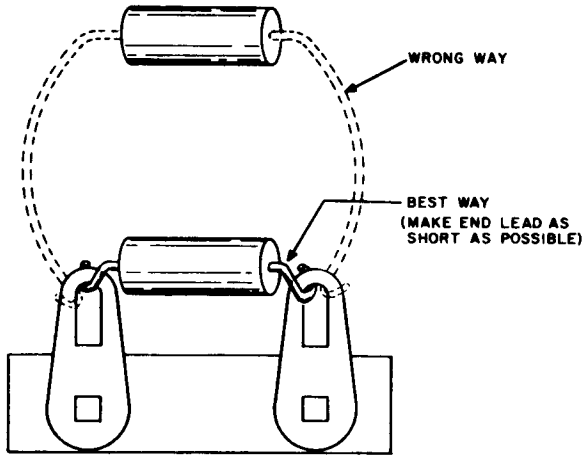


FIGURE 3. THE BEST WAY TO MOUNT A PART

as possible after the part is mounted. To mount a part, insert its end leads through the holes in the terminals to which it is to be mounted. Pull the leads through the terminals with your long-nose pliers until the end leads are as short as possible. Wrap each end lead around its terminal once. Cut off the excess part of each end lead with your diagonal cutters.

Before soldering, you will have to prepare your soldering iron. First, scrape the tip of the iron with a fine file or steel wool until the bright copper is seen. Next, plug the cord into a power outlet and let the iron heat up until solder melts when held against the tip. Coat the entire tip of the iron with a layer of solder. Now wipe the tip with a rag to remove the excess solder. The iron now should be shiny. What you have just done is called "tinning the iron." Always tin your iron before starting a day's soldering and, while soldering, whenever the tip becomes covered with oxidized solder (flakes of gray matter). Your iron operates much more efficiently when it is properly tinned.

For this or any other electronic work,

USE ONLY ROSIN CORE SOLDER.

KITS WIRED WITH ACID CORE SOLDER OR ACID FLUX WILL CORRODE AND WILL NOT WORK LONG. THE SOLDER FURNISHED WITH THIS KIT HAS A ROSIN CORE. ALLIED'S GUARANTEE ON KNIGHT KITS IS VOID IF ACID CORE SOLDER OR PASTE FLUX IS USED IN ITS CONSTRUCTION. SUCH KITS ARE NOT ELIGIBLE FOR REPAIR OR SERVICE.

To solder a connection, hold the tip of the iron against the connection until the connection is hot enough to melt solder. Melt the solder between the hot connection and the iron. Allow just enough solder to flow to fill the crevices between the wire(s) and the terminal. Remove the iron and solder. Do not disturb the soldered connection until the solder has hardened—if you do you will cause a "cold solder joint." Cold solder joints have a dull, frosty appearance and are not good electrical connections. Should you accidentally cause a cold solder joint, re-heat the connection and apply another very small amount of fresh solder to it.

Study the separate "How-To-Solder" booklet carefully.

Now you are ready to wire your KNIGHT Transistor Code Practice Oscillator. Position all the wires and parts as shown in the wiring views and, above all, ***use only rosin core solder.***

REFER TO FIGURE 4.

☒ Notice that the solder terminals on PHONE jack J-1 are made of two layers or "leaves." Separate the leaves of terminal 2 and spread them apart as shown—each leaf should be bent down so that it is parallel to the panel. The leaf closest to terminal 1 of J-1 will be identified as terminal 2-A, and the leaf closest to the mounting nut will be terminal 2-B.

☒ Connect, but do not solder, the blue lead from the transformer to terminal 2-A of J-1.

PLEASE NOTE: It is not necessary to cut any of the leads on the transformer. Leave them their full length.

☒ Connect, but do not solder, the black lead from the transformer to terminal 1 of KEY jack J-2.

☒ Solder one end of the yellow wire to terminal 1 of J-2. Connect, but do not solder, the other end of the wire to terminal 3 of the terminal strip.

PLEASE NOTE: Whenever you are instructed to solder, solder **all** the wires and leads connected to the particular terminal. For example, in this step you should have soldered both the yellow wire and the black lead from the transformer to terminal 1 of J-2.

☒ Connect, but no not solder, the green lead from the transformer to terminal 4 of the terminal strip.

☒ Connect, but do not solder, the red lead from the transformer to terminal 1 of the terminal strip.

☒ Solder one end lead of R-1, the 15,000 ohm resistor with brown, green, and orange colored stripes around its body, to terminal 4 of the terminal strip. Connect, but do not solder, the other end

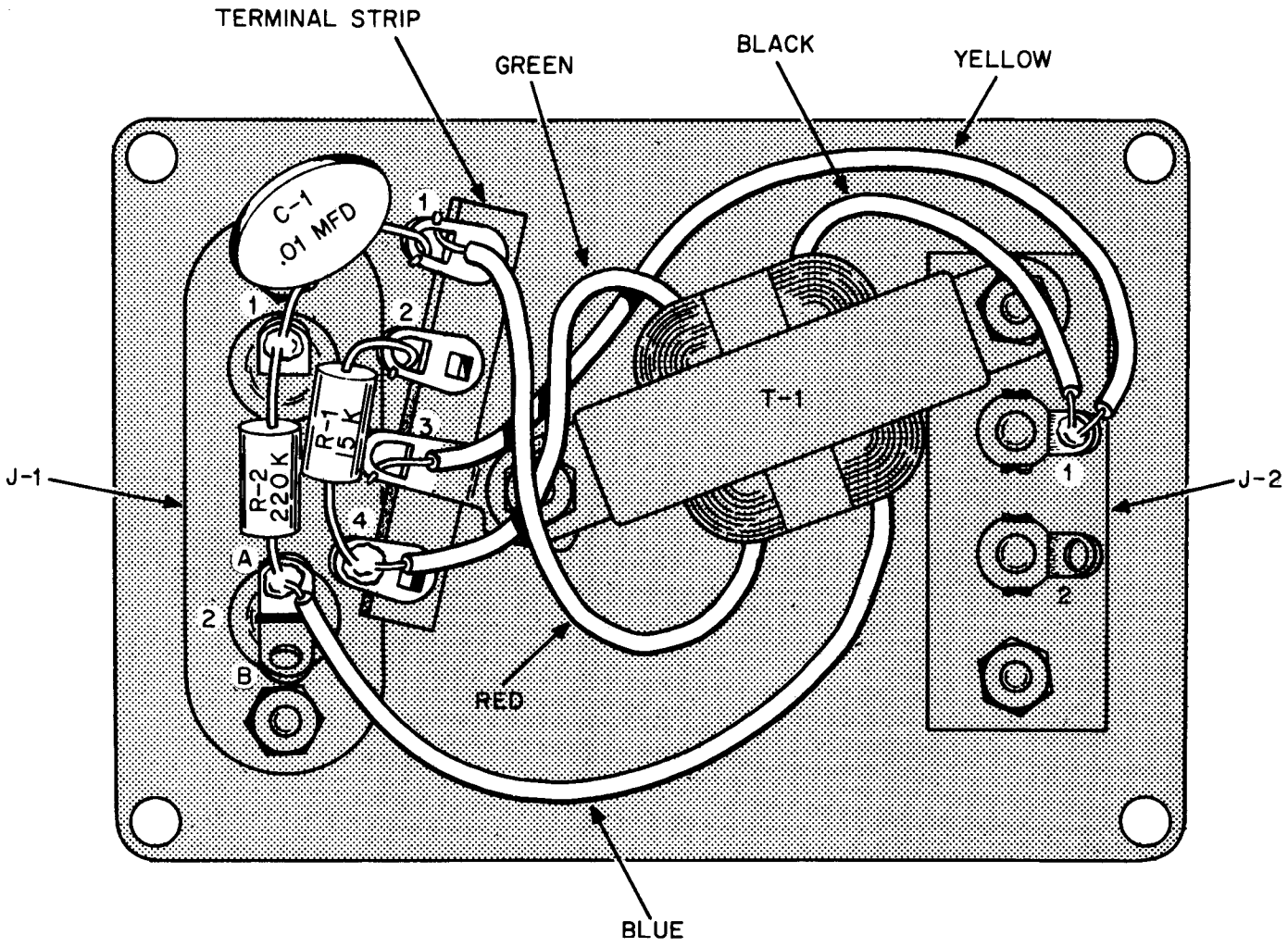


FIGURE 4. FIRST WIRING VIEW

lead of R-1 to terminal 2 of the terminal strip. Be sure the end leads are made as short as possible, as described in the paragraphs preceding this series of steps.

PLEASE NOTE: The resistors furnished with this kit may have a fourth colored stripe around their bodies, either silver or gold. This stripe merely indicates the tolerance of the resistor; it has nothing to do with the value. Therefore disregard it when evaluating the resistors.

☒ Connect, but do not solder, one end lead of C-1, the disc-shaped ceramic capacitor with .01 MFD (10,000 MMFD) stamped on its body, to terminal 1 of the terminal strip. Connect, but do not solder, the other lead to terminal 1 of J-1.

☒ Solder one end lead of R-2, the 220,000 ohm resistor (red, red, yellow), to terminal 1 of J-1. Solder the other end lead to terminal 2-A of J-1.

REFER TO FIGURE 5.

☒ Secure the battery clamp to the battery holder with the 6-32 x ¼" long screw and a nut.

☒ Mount the solder lug under the battery holder with a ⅜"-long screw and nut on the end of the board marked "+." Bend a hook in the free end

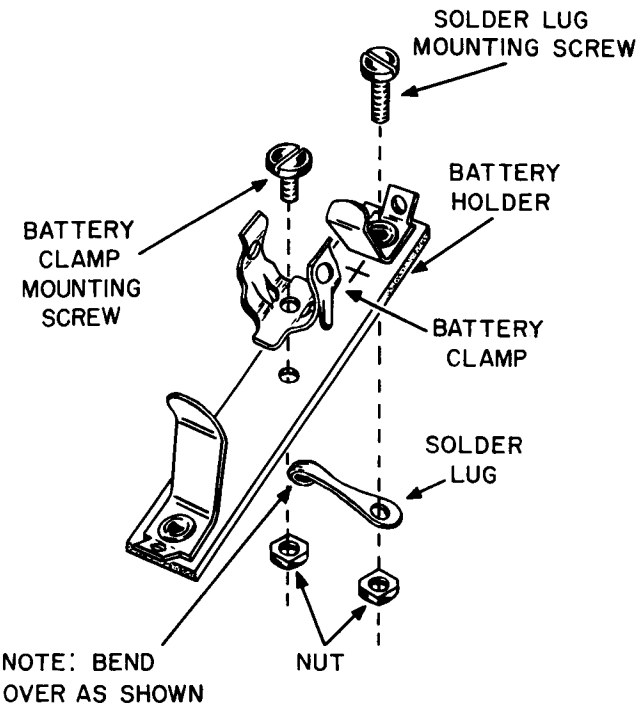


FIGURE 5. HOW TO ASSEMBLE THE BATTERY HOLDER

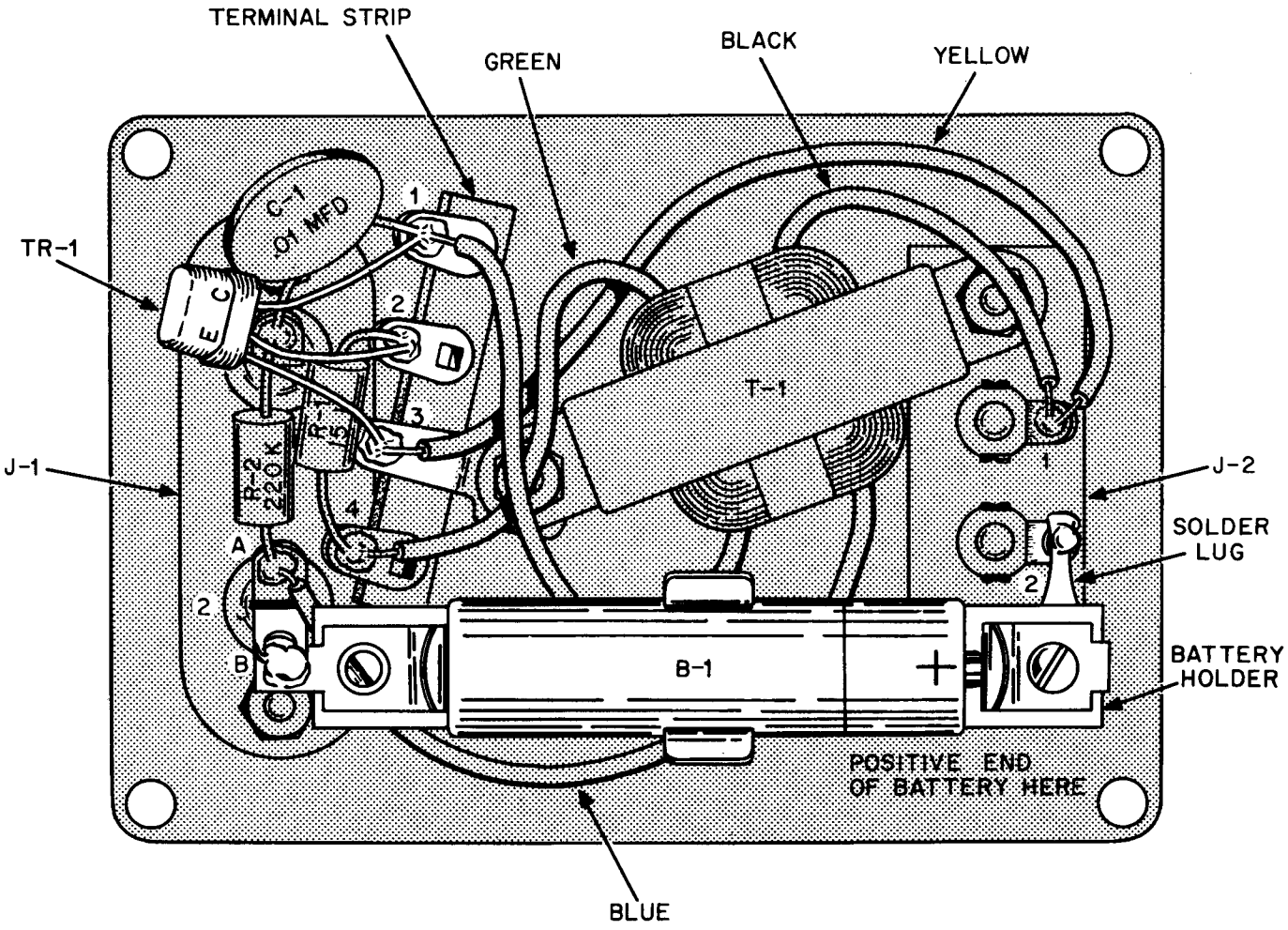


FIGURE 6. SECOND WIRING VIEW

of the solder lug with your long-nose pliers after it is securely mounted.

REFER TO FIGURE 6.

☒ Bend the end of terminal 2 of J-2 with your long-nose pliers so that it is parallel to the chassis. Hook the bent end of the solder lug on the battery holder onto the end of terminal 2 of J-2. Squeeze the hook closed on the terminal so that the solder lug is securely mounted. Solder the lug to the terminal.

☒ There is a small hole in the terminal at the other end of the battery holder. Place this terminal under terminal 2-B of J-1 so that a piece of bare wire can be passed through both holes. Using a a piece of wire that you cut off of one of the parts, secure this end of the battery holder to terminal 2-B by passing the wire through and wrapping it around both terminals. After the connection is mechanically strong, solder it.

☒ There is a pair of leads on one side of the base of the transistor (TR-1) and a single lead on the other side. Using the technique illustrated in Figure 7, solder the single lead to terminal 1 of the terminal strip. When soldering this lead you must clamp the lead between the jaws of your long-nose pliers so that the transistor will not be damaged by the heat from the soldering iron. The pliers absorb the heat before it reaches the transistor. Do not remove the pliers until the solder has hardened. To insure that the body of the transistor is far enough from the iron, you should mount it so that there is at least ½" of lead between the terminal and the body of the transistor.

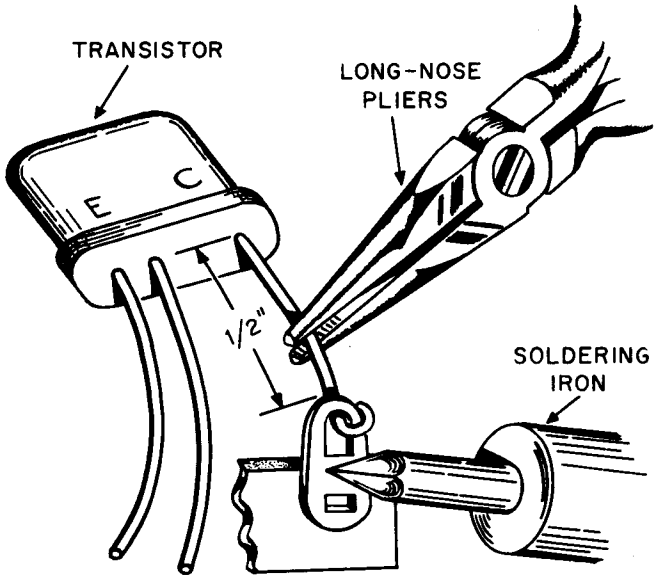
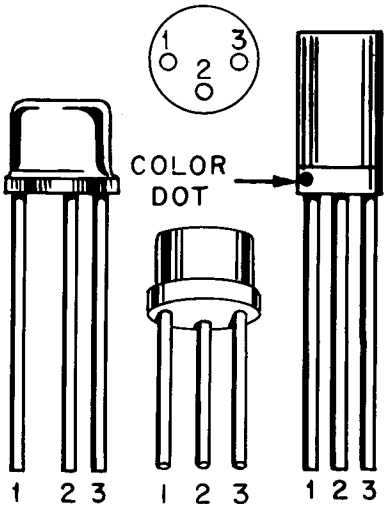


FIGURE 7. HOW TO SOLDER THE TRANSISTOR



1. COLLECTOR
2. BASE
3. EMITTER

FIGURE 8. ALTERNATE TRANSISTOR LEADS

tor. Using the same technique, solder the middle lead to terminal 2 of the terminal strip and the last lead to terminal 3. Should you receive a transistor manufactured by Raytheon, type CK-722, its leads will not be positioned the same as shown. Figure 8 shows the relationship between the two types.

☒ Mount the battery in its holder so the positive end (the end with the center post) is toward J-2.

☐ You have finished wiring your Code Practice Oscillator. Mount it in its case and secure the panel with a ¼"-long screw in each of the four corners.

OPERATING YOUR CODE PRACTICE OSCILLATOR

Plug the pin plugs from your headset into the pin jacks marked PHONE. Connect the two terminals on your key to the screw terminals marked KEY. Now each time you depress the key you will hear a tone in the headset. If you do not have a headset or key you can order them from Allied. These parts are listed under ACCESSORIES in the Parts List.

THE HISTORY OF RADIO

Radio had its beginning way back in 1873, when Ulysses S. Grant was President of the United States. In this year an Englishman by the name of James C. Maxwell made a prediction that electromagnetic waves, or, as he called them, "ether waves", could be sent from one place to another through the air, just as light rays were. However, Maxwell died without ever having tested his idea.

A young German scientist, Heinrich Hertz, worked on Maxwell's idea from 1885 to 1889. One day he announced that he had indeed succeeded in sending electromagnetic waves from one room to another in his laboratory in Karlsruhe, Germany. Hertz, however, did not pursue his discovery.

It remained for a young Italian engineer-inventor named Guglielmo Marconi to bring radio communication to the attention of the world. In 1890 he began experiments on his father's estate to test Hertz' theory. His experiments led to the invention of an outfit for sending code messages from one place to another without the use of wires. Code messages were used because no one knew how to transmit voice and music by radio.

Marconi's method of communication is shown in Figure 9. This method is still the most widely used of all systems because it is possible to send code messages much farther and more distinctly than voice messages with a given amount of power. This is especially important in amateur radio work where the maximum power allowed is 1,000 watts (1 kilowatt). As shown, code messages are sent from a transmitter that generates a radio-frequency (RF) signal of one frequency. The key, which is worked by

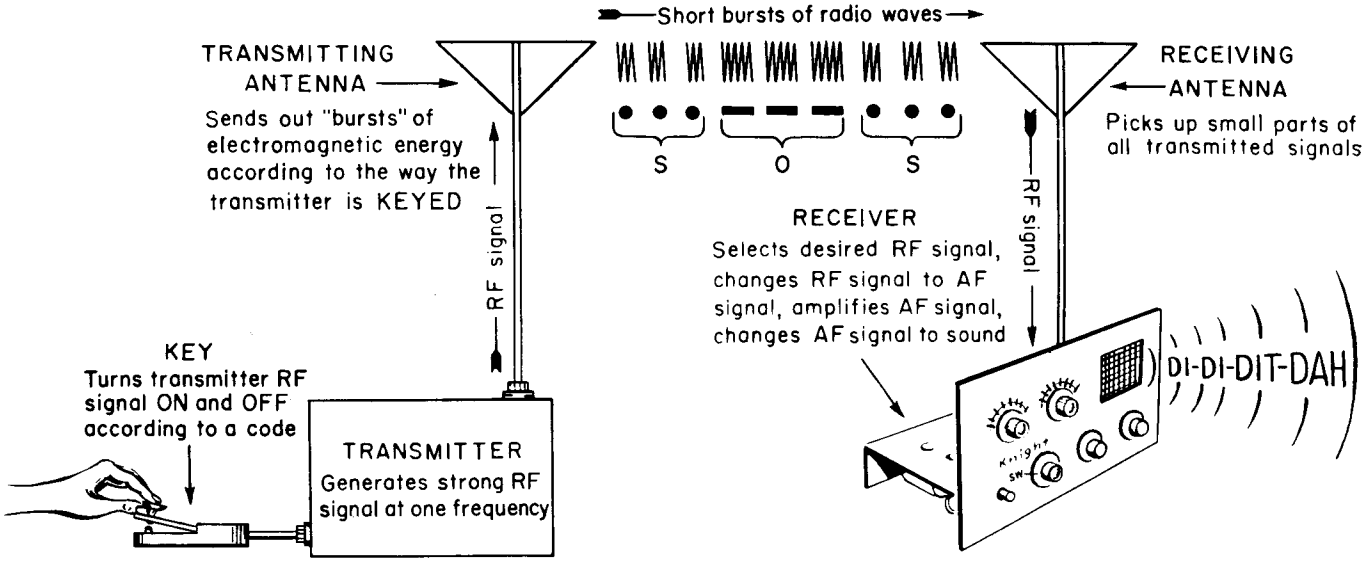


FIGURE 9. RADIO COMMUNICATION USING CODE

THE INTERNATIONAL MORSE CODE

The important thing when beginning to study code is to think of it as a language of sound, never as combinations of dots and dashes. It is easy to "speak" code by using "dit" for dots and "DAH" for dashes, so that "A" would be "diDAH". The "t" at the end of "dit" is dropped except at the end of a character. The sound "di" should be sharp; a code character like the number "5" should sound like a machine-gun burst–dididididit! Stress each "DAH" equally; they are capitalized in this chart because they should be slightly accented and drawn out.

Learn the code by **listening** to it. **Don't think about speed to start;** the first requirement is to learn the characters to the point where you can recognize each of them without any hesitation whatsoever. Concentrate on any difficult letters. Learning the code is not hard—it merely requires time and a little effort.

CHARACTER	CODE	PRONUNCIATION OF CODE	PHONETIC LETTER	CHARACTER	CODE	PRONUNCIATION OF CODE
A	• —	diDAH	Able			
B	— • • •	DAHdididit	Baker	1	• — — — —	diDAHDAHDAHDAH
C	— • — •	DAHdiDAHdit	Charlie	2	• • — — —	didiDAHDAHDAH
D	— • •	DAHdidit	Dog	3	• • • — —	dididiDAHDAH
E	•	dit	Easy	4	• • • • —	dididididAH
F	• • — •	didiDAHdit	Fox	5	• • • • •	dididididit
G	— — •	DAHDAHdit	George	6	— • • • •	DAHdididididit
H	• • • •	dididididit	How	7	— — • • •	DAHDAHdididit
I	• •	didit	Item	8	— — — • •	DAHDAHDAHdidit
J	• — — —	diDAHDAHDAH	John	9	— — — — •	DAHDAHDAHDAHdit
K	— • —	DAHdiDAH	King	Ø	— — — — —	DAHDAHDAHDAHDAH
L	• — • •	diDAHdidit	Love			
M	— —	DAHDAH	Mike			
N	— •	DAHdit	Nan			
O	— — —	DAHDAHDAH	Oboe			
P	• — — •	diDAHDAHdit	Peter	Period (.)	• — • — • —	diDAHdiDAHdiDAH
Q	— — • —	DAHDAHdiDAH	Queen	Comma (,)	— — • • — —	DAHDAHdididiDAHDAH
R	• — •	diDAHdit	Roger	Question mark (?)	• • — — • •	didiDAHDAHdidit
S	• • •	dididit	Sugar	Double dash (—)	— • • • —	DAHdididiDAH
T	—	DAH	Tare	Fraction bar (/)	— • • — •	DAHdidiDAHdit
U	• • —	didiDAH	Uncle	Invitation to transmit	— • —	DAHdiDAH
V	• • • —	dididiDAH	Victor	Error	• • • • • • • •	dididididididit
W	• — —	diDAHDAH	William	Wait	• — • • •	diDAHdididit
X	— • • —	DAHdidiDAH	X-ray	End of message	• — • — •	diDAHdiDAHdit
Y	— • — —	DAHdiDAHDAH	Young	End of work	• • • — • —	dididiDAHdiDAH
Z	— — • •	DAHDAHdidit	Zebra			

the transmitting operator's hand, turns the RF signal on and off according to the Continental (International Morse) Code. The transmitting antenna sends radio waves out "over the air" in short and long bursts, according to the way the transmitter is keyed. A short burst represents a •, and a long burst a —. The receiving antenna picks up a part of all the transmitted signals present where it is located. The receiver selects the desired signal, changes it to an audio-frequency (AF) signal of a single musical tone, and converts it to sound through its speaker or earphones. This code message sounds like short and long bursts of a single musical note.

LEARNING THE CODE

In order to become a radio amateur, you must know the code. However, you cannot operate a transmitter until you obtain your radio amateur's license from the U.S. government — therefore you must use another means to learn to send code. This is why the KNIGHT Transistor Code Practice Oscillator was developed.

Learning the code can be easy if you approach it properly—that is, if you think of the code only as sounds, not as dots and dashes. When you see a • in the Code Chart think of it as a sharp, stacatto "dit." When you see a —, call it a "DAH", accented and slightly drawn out. Do not memorize the code alphabetically. Learn it in some random order. By this method you will soon be able to make up short words and even sentences. As you advance, concentrate on the harder letters, and then the numerals and punctuation marks. Do not use the chart for long study —pick out a few letters and then put it aside while you practice saying them in "diDAH" language. When you are ready, go back to the chart for a few more letters. While learning the new letters mix in plenty of those you already know so you won't forget them.

The best way to develop code ability is for two people to learn together. Send and speak letters to each other. As soon as you know enough letters, send words to one another. By taking turns you will pick up the code very rapidly. A very good aspect of the "team" method of learning the code is that it enables both persons to send good, clean code because the one who is receiving will be quick to criticize indistinct and uneven sending.

When sending, sit comfortably at the table. Make sure the key knob is back far enough so your entire forearm rests on the table. Grasp the knob lightly with your thumb and first two fingers. Your arm should be relaxed when working the key.

Practice only a few minutes at a time. Six 10 minute practice sessions are much more effective than one 60 minute period. Since the KNIGHT Transistor Code Practice Oscillator is battery operated you can use it anywhere and thus make use of spare moments that otherwise would be wasted.

The Federal Communications Commission requires that applicants for the Novice and Technician licenses be able to send and receive at the rate of five words per minute, and for the General and Conditional licenses 13 words per minute. The requirement for the Amateur Extra license is 20 words per minute, however, since a person must hold a General license for two years prior to applying for the Amateur Extra license, this is of little interest to the beginner. You should be able to receive somewhat faster than the required rate before taking the exam since there is a tendency among persons taking a time limit exam to slow down a bit.

ALLIED'S SERVICE FACILITIES

Should your KNIGHT Transistor Code Practice Oscillator fail to operate properly when you have it assembled, go back and check each step. You may have forgotten or incorrectly completed one of the steps. It has been our observation over the past years that most difficulties arise from incorrect wiring.

If your kit still does not operate properly, we recommend the following:

Please write our Kit Department giving the stock number and date of purchase of the kit. Also, describe fully what appears to be wrong. Details as to which controls or sections of the circuit do not function properly will help us analyze the problem. We may be able to determine a wiring error or a defective part.

This wired KNIGHT kit may be returned for inspection within 1 year after purchase for a special service charge of $1.00. Parts within the standard EIA 90-day warranty period will be replaced without charge for the parts. A charge will be made for parts damaged in construction or because of a wiring error, or for parts which are beyond the 90-day warranty period. After the one year period service charges are based on the length of time required to repair the unit plus the cost of any new parts that may be required.

PLEASE NOTE: KITS SOLDERED WITH ACID CORE SOLDER, ACID FLUX, OR WITH IRONS CLEANED ON A SAL AMMONIAC BLOCK ARE NOT ELIGIBLE FOR REPAIR OR SERVICE AND WILL BE RETURNED NOT REPAIRED AT YOUR EXPENSE.

Allied's service facilities are intended primarily for inspection and troubleshooting. Kits not completed, which require extensive work, will be returned collect with a letter of explanation.

If you return this kit, pack it well. Use the original carton and use cushioning material around the front panel. Send the kit prepaid and insured. We will return the repaired kit to you C.O.D. as soon as repairs are completed. If you wish to save C.O.D. fees, your advance remittance may be enclosed for standard repair charges plus transportation costs. Any excess remittance will be refunded.

ALLIED'S GUARANTEE ON KNIGHT KITS

Allied extends these firm guarantees on KNIGHT kits:

We guarantee that the circuits on all KNIGHT kits have been carefully engineered and tested.

We guarantee that only high-quality components are supplied. All parts are covered by the standard EIA 90-day warranty. Any faulty components will be replaced prepaid and without charge if reported to us within the warranty period. We reserve the right to request the return of defective parts.

If your kit was shipped by parcel post and is received in a damaged condition, please write us at once describing the state in which the shipment was received. If your kit was part of a Railway Express shipment that was damaged in transit, please notify your Railway Express agent at once and then write us.

The designs and components for KNIGHT kits represent over a quarter of a century of experience in kit development. KNIGHT kits are easy to assemble, even for beginners. The instructions are complete, panels are drilled, the chassis is punched and formed, and every part is included as listed.

The efficiently engineered KNIGHT kits are moderately priced. When you buy a KNIGHT kit you get the best in design, quality, and value. Recommend KNIGHT kits to your friends.

PARTS LIST

Symbol Number	Description	Part No.
B-1	Battery, 1½-volt penlite, Burgess type Z	450013
C-1	Capacitor, cer. disc, .01 MFD 500 V 20%	276015
J-1	Jack, dual phone	502229
J-2	Jack, key	441201

Note: When ordering resistors give complete description and part number.

R-1	Resistor, 15,000 ohms ⅓ watt	300153
R-2	Resistor, 220,000 ohms ½ watt	300224
T-1	Transformer	103201
TR-1	Transistor, general purpose, p-n-p	660003

Description	Quantity	Part No.
Case	1	701001
Clamp, battery	1	534007
Holder, battery	1	534001
Lug, solder	1	553002
Manual, instruction	1	750050
Nut, large (6-32 thread)	1	570340
Nut, small (4-36 thread)	6	570230
Panel	1	462605
Screw, 6-32 x ¼"	1	560342
Screw, 4-36 x ⅜"	6	560234
Screw, 4-36 x ¼"	4	560232
Solder, rosin core, 10" length	1	930001
Strip, terminal	1	440401
Washer, shouldered fiber	1	591300
Wire, 4" yellow	1	801004

ACCESSORIES AND TOOLS NEEDED

Allied Stock No.	Description	Price*
59J110	Headset	$2.00
76P053	Key	2.25
46N852	Soldering iron	5.26
50N132	6" long-nose pliers	1.54
50N133	5" diagonal cutters	1.34
45N796	6" screwdriver	.72

*** Prices subject to change.**

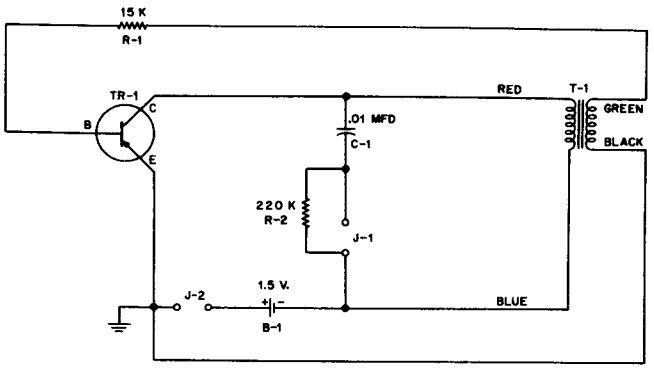
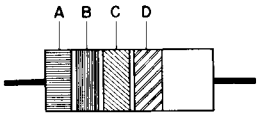


FIGURE 10. SCHEMATIC DIAGRAM, KNIGHT TRANSISTOR CODE PRACTICE OSCILLATOR

CAPACITOR AND RESISTOR COLOR CODE

RESISTOR-MICA CAPACITOR COLOR CODE				
Color	Significant Figures	Multiplier	Tolerance %	Voltage Rating*
Black	0	1	±20*	—
Brown	1	10	±1*	100
Red	2	100	±2*	200
Orange	3	1,000	±3*	300
Yellow	4	10,000	±4*	400
Green	5	100,000	±5*	500
Blue	6	1,000,000	±6*	600
Violet	7	10,000,000	±7*	700
Gray	8	100,000,000	±8*	800
White	9	—	±9*	900
Gold	—	.1	±5	1,000
Silver	—	.01	±10	2,000
None	—	—	±20	500

*Applies to capacitors only



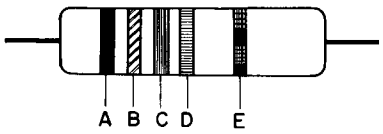
HOW TO DETERMINE THE VALUE OF A RESISTOR

A — First significant figure (digit) of resistance in ohms.
B — Second significant figure.
C — Decimal multiplier (number of zeros to be added).
D — Tolerance of resistor in percent. No color is 20%.

EXAMPLE:

A resistor has the following color bands: A, yellow; B, violet; C, yellow; and D, silver. The significant figures are 4 and 7 (47) and the multiplier is 10,000. The value of resistance is 470,000 ohms and the tolerance is ±10%.

TUBULAR PAPER CAPACITOR COLOR CODE				
Color	Significant Figures	Decimal Multiplier	Tolerance %	Voltage Rating (v d-c)
Black	0	1	±20	—
Brown	1	10	—	100
Red	2	100	—	200
Orange	3	1,000	±30	300
Yellow	4	10,000	—	400
Green	5	—	—	500
Blue	6	—	—	600
Violet	7	—	—	700
Gray	8	—	—	800
White	9	—	—	900
Gold	—	—	—	1,000
Silver	—	—	±10	—

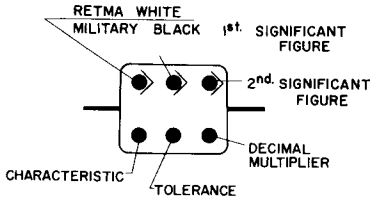


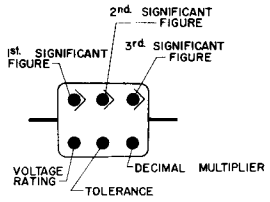
HOW TO DETERMINE THE VALUE OF A PAPER TUBULAR CAPACITOR

A — First significant figure (digit) of capacitance in $\mu\mu$f.
B — Second significant figure.
C — Decimal multiplier (number of zeros to be added).
D — Tolerance of capacitor in percent.
E — Voltage rating.

EXAMPLE:

A paper tubular capacitor has the following color bands: A, brown; B, green; C, orange; D, black; and E, yellow. The significant figures are 1 and 5 (15) and the decimal multiplier is 1,000. The value of capacitance is 15,000 $\mu\mu$f. The tolerance is ±20%. The voltage rating is 400 V DC.





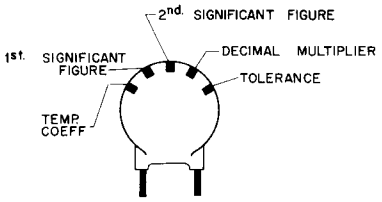
HOW TO DETERMINE THE VALUE OF A MICA CAPACITOR

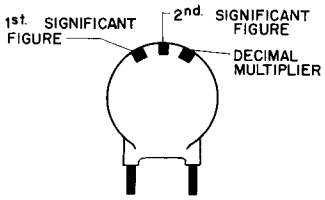
EXAMPLES:

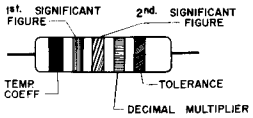
A capacitor with a 6 dot code (new RETMA standard REC-115A and military MIL-C-5A) has the following markings. Top row, left to right, white, green, brown; bottom row, right to left, brown, red, red. The first color white indicates mica. The significant figures are 5 and 1 (51), and the decimal multiplier is 10. So the capacitance is 510 $\mu\mu$f. Tolerance is ±2%. For most general applications the characteristic can be ignored.

A capacitor with a 6 dot code has the following markings: Top row, left to right, brown, orange, red; bottom row, right to left, brown, red, green. Since the first dot is neither black or white, this is the obsolete RETMA code. The significant figures are 1, 3, and 2 (132), and the decimal multiplier is 10. So the capacitance is 1320 $\mu\mu$f. Tolerance is ±2%. Voltage rating is 500 V DC.

CERAMIC CAPACITOR COLOR CODE					
			Tolerance		Temp. Coef. (Parts per million per °C.)
Color	Significant Figures	Decimal Figures	10 $\mu\mu$f or less ($\mu\mu$f)	Over 10 $\mu\mu$f (%)	
Black	0	1	±2.0	±20	0
Brown	1	10	±0.1	±1	−33
Red	2	100	—	±2	−75
Orange	3	1,000	—	±2.5	−150
Yellow	4	10,000	—	—	−220
Green	5	—	±0.5	±5	−330
Blue	6	—	—	—	−470
Violet	7	—	—	—	−750
Gray	8	0.01	±0.25	—	+150 to −1500
White	9	0.1	±1.0	±10	+100 to −750
Gold	—	—	—	—	—







HOW TO DETERMINE THE VALUE OF A CERAMIC CAPACITOR

EXAMPLES:

A ceramic tubular capacitor has the following color bands: Black, red, red, red, green. The significant figures are 2 and 2 (22), and the decimal multiplier is 100. The capacitance is, therefore, 2200 $\mu\mu$f. Tolerance is ±5%. Temperature coefficient is 0. Voltage rating is always 500 V.

A ceramic disc capacitor has the following 5-dot code: Red, brown, green, red, green. The significant figures are 1 and 5 (15), and the decimal multiplier is 100. The capacitance is, therefore, 1500 $\mu\mu$f. The tolerance is ±5%. The temperature coefficients — 75. Voltage rating is always 500 V.

A ceramic disc capacitor has the following 3-dot code: Green, brown, brown. The significant figures are 5 and 1 (51), and the decimal multiplier is 10. Therefore, the capacity is 510 $\mu\mu$f. Voltage rating is always 500 V and the tolerance is always — 0.

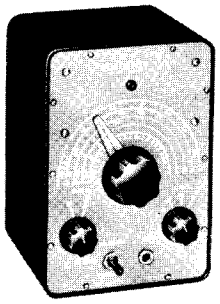
Other Famous **knight-kits** For the **AMATEUR**

knight-kit
50-WATT TRANSMITTER
83YX255

Whether you're looking for a low-cost transmitter to put you "on-the-air"; or, a dependable stand-by rig—you'll do well to check through all of the many desirable features of the KNIGHT-KIT transmitter.

The KNIGHT-KIT transmitter is a complete, self-contained, bandswitching cw transmitter kit that can be operated crystal controlled or with external VFO.

With all parts, tubes, pre-cut wire, solder, and step-by-step instructions.



knight-kit
VFO
83Y725

The KNIGHT-KIT VFO offers high-quality performance at incomparably low cost. Look over its array of outstanding features and you'll see that it includes everything desirable in VFO design. It's a completed VFO with built-in transformer-type power supply. Features extremely high stability, excellent oscillator keying characteristic for fast break-in operation, highly effective TVI suppression, easy tuning and ultra-compact construction.

Exceptional frequency stability is assured by careful circuit design and rigid mechanical construction. Drift free, series-tuned Clapp oscillator employs 1% silver mica capacitors. Oscillator tank coil is wound on heavy ceramic form. Excellent voltage regulation maintains stable output, unaffected by changes in line voltage. Rugged mechanical construction—oscillator chassis is flange-welded for rigidity; bandswitch is heavy ceramic. Has Calibrate-Standby-Transmit switch for "no-swish" tuning. Extra switch contacts are connected to a terminal strip on rear of chassis for control of external equipment.

Complete with all parts, tubes, pre-cut wire, solder, and step-by-step instructions.

SPECIFICATIONS

Output Frequencies: 3.5 — 4 mc
7.0 — 7.3 mc
14.0 — 14.3 mc
21.0 — 21.5 mc
27.0 — 27.2 mc
28.0 — 29.7 mc

Power Input To Final Amplifier: 50 watts minimum on all bands.

Frequency Control: Quartz crystal or external VFO.

Output Circuit: Pi-network, capable of matching unbalanced loads between 50 and 1200 ohms. Will tune out large amounts of reactance. Connection to the output is through an SO-239 type coaxial connector.

Tubes: 6AG7 crystal oscillator-multiplier (buffer-multiplier when VFO used), 807 power amplifier, 5U4G rectifier.

Modulation: Provision is made for the connection of an external modulator.

VFO Operation: The KNIGHT 50-Watt Amateur Transmitter may be controlled by any VFO supplying 8 to 10 volts across 22,000 ohms, and delivering output in the 160, 80, or 40 meter bands. The KNIGHT VFO is ideally suited.

TVI Reduction: The transmitter is completely shielded by its cabinet, with firm metal-to-metal seals provided at all metal junctions. The copper finished chassis is well bonded to both front and rear of the cabinet, thus assuring minimum harmonic radiation. Filtering and bypassing of AC and keying leads is provided, and generous bypassing of the meter and heater circuits is included.

Size: 10½ x 8½ x 8¼".

Shipping Weight: 18 lbs.

SPECIFICATIONS

Frequency Coverage: 80, 40, 20, 15, 11, and 10 meter bands.

RF Output: 40 volt output on 80 meters; 20 volt output on 40 meters. Dial calibrated on all bands.

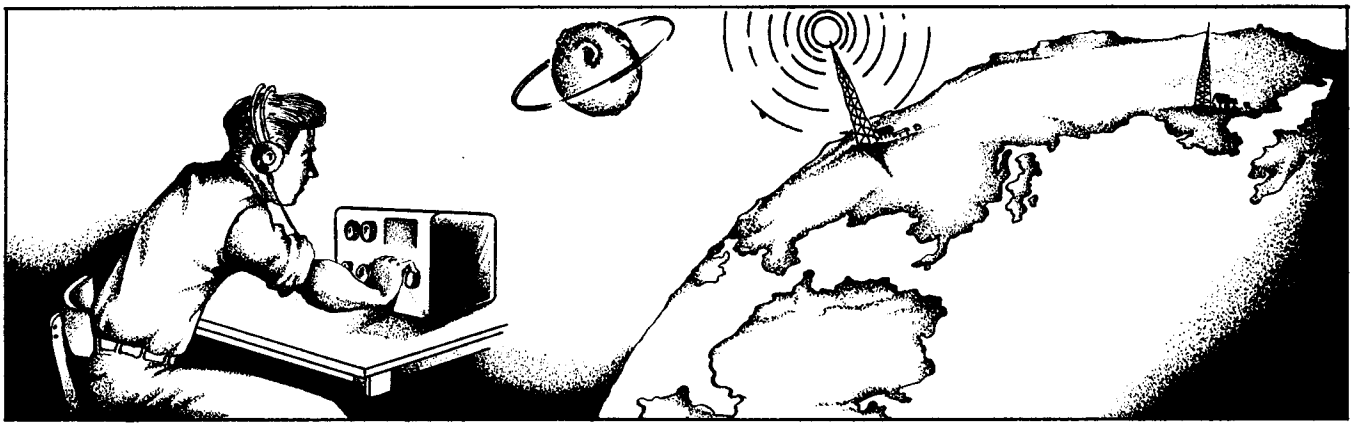
Tubes: 6BH6 Clapp oscillator, 6BH6 buffer-doubler, 6X4 rectifier, and OA2 voltage regulator.

Power Source: 110 to 120 volts, 50 to 60 cycles.

Size: 8¾ x 6 x 6".

Shipping Weight: 8 lbs.

Popular **knight-kits** For **SHORTWAVE**



knight-kit "Space Spanner" Receiver Kit
Thrilling Shortwave And Broadcast Reception

83 Y 249

- **Built-in PM Speaker**
- **Sensitive Regenerative Circuit**
- **Standard and Short Wave Bands**
- **Convenient Bandswitching**

Sensitive 2-band receiver in easy-to-build kit form. Short wave band covers 6 to 18 megacycles — pulls in exciting foreign broadcasts from many parts of the world, plus Amateur, aircraft, police and marine radio. Specially designed regenerative circuit also provides highly sensitive reception on broadcast band. Broadcast band or short wave is selected simply by turning the bandswitch knob.

Built-in 4" PM speaker and beam-power output tube for plenty of volume. Headphone connectors on rear panel allow private, quiet listening; slide switch cuts out speaker. Sensitive circuit employs 12AT7 regenerative detector and audio amplifier; 50C5 power output; 35W4 rectifier. 6 controls allow precise, accurate tuning; Bandspread, Main Tuning, Antenna Trimmer, Bandswitch, Regeneration, and Volume. Panel is finished in attractive gray; has black knobs. Detailed, step-by-step instructions include pictorial and schematic diagrams. With all parts, punched chassis and tubes. Smart pyroxylin-covered, wood cabinet. Size, 7 x 10½ x 6". For 110-220 v., 50-60 cycle AC or DC. Shpg wt., 6½ lbs.

knight-kit "Ocean Hopper" Receiver Kit
Broadcast, Long Wave & Short Wave Reception

83 Y 749

- **High Sensitivity**
- **Full Frequency Coverage**
- **From 155 kc to 35 mc**
- **Step-By-Step Instructions**

An easy-to-put-together, top-performing receiver kit truly worthy of its name! Employs a highly sensitive, regenerative-type circuit for excellent performance. Excellent headphone reception; may also be used with any 3-4 ohm PM speaker on strong broadcast band stations. The "Ocean Hopper" is supplied with plug-in coil for covering standard broadcast band; covers long wave and popular short wave bands with coils listed below.

All controls are mounted on the front panel: Main Tuning, Bandspread, Antenna Tuning, and Off-On-Regeneration. Tubes: 12AT6 detector and 50C5 audio output; 35W4 rectifier. Gray panel and clearly marked lucite main tuning knob. Size, 6 x 9½ x 5". With all parts, cabinet, and instructions; less extra coils, headphones and speaker. Instructions include easy-to-follow pictorial and schematic diagrams. For 110-120 volts, 50-60 cycle AC or DC. Shpg. wt., 6½ lbs.

PLUG-IN COILS. Additional coils for greater frequency coverage. Shpg. wt., each, 3 oz.

Allied Stock No. 8 Y 741—Long Wave. 155-470 kc.
Allied Stock No. 83 Y 742—Short Wave. 1.65-4.1 mc.
Allied Stock No. 83 Y 743—Short Wave. 2.9-7.3 mc.
Allied Stock No. 83 Y 745—Short Wave. 7-17.5 mc.
Allied Stock No. 83 Y 744—Short Wave. 15.5-35 mc.

See your latest catalog for current prices.