

**PACK RATS'**

**CHEESE**

**BITS**



**PACK RATS**

CLUB CALL: W3CCX

MT. AIRY VHF RADIO CLUB, INC.

MT. AIRY V.H.F. RADIO CLUB, INC., PHILA., PA.  
(50.2, 145.2, 221.4, 432.3 & 1296.3 MC)

AFFILIATED CLUB: AMERICAN RADIO RELAY LEAGUE

MEETINGS: THIRD WEDNESDAY OF EACH MONTH AT 8:00 P.M.

VOLUME IV

JULY, 1971

NUMBER 7

THE PREZ SEZ

Well gang this will be the last column I will write as your President.

Your new officers are listed on the second page. They are all competent people and I'm sure they will get the same kind of outstanding support you have given me.

If I were a good politician this would be the place to list the accomplishments of my year in office.

I will list some accomplishments, but they are yours. They belong to the club not its officers or directors.

1. Eleventh straight gavel January VHF contest  
(That's all the trophy case holds)
2. Attempt at a new 1296 record (although we didn't make it we showed that we had the capability to organize a safari)
3. The biggest and best Ladies Night ever!

I could go on and on but I'll mention only one more, and that is the recently completed June QSO Party. As near as I can determine, there was not one major equipment failure. There was more and better equipment out at Hilltown than I had ever seen. I don't know if we came in first, but if we didn't, it wasn't because of lack of effort or an error in preplanning. Power distribution for the first time in ten years was adequate. Not one variac in use.

CONTINUED ON PAGE 3

DEADLINE FOR ARTICLES IS THE GENERAL MEMBERSHIP MEETING.

EDITOR:

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AWARDS CHAIRMAN:

W3EIF, JOSEPH KILGORE  
#5 SUNNYBROOK COURT  
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DIRECTORS' MEETINGS ARE HELD ON THE SECOND WEDNESDAY OF EACH MONTH AT DESIGNATED LOCATIONS.

MONDAY NIGHT NETS:

145.2	-	7:30 P.M.
50.2	-	8:30 P.M.
221.4	-	9:00 P.M.
432.03	-	9:30 P.M.
1296.1	-	10:00 P.M.

OFFICERS - 1971-1972

PRESIDENT:	W3CJU, Don Hampton
VICE-PRES:	K3BPP, Walt Bohlman
TREASURER:	K3GAS, Doc Cutler
CORRES. SEC.:	W3SAO, Francis Brick
REC. SEC.:	WA3BIV, Carl Barish

DIRECTORS:

K3JJZ, Elliott Weisman
WA3AXV, Ron Whitsel
W3FQD, Dick Hunzinger
K3MXM, Lee Cohen
WA3LNH, Charles Benavides
K3CIV, Ralph Hersh
(Ex-Officio)

\*\*\*\*\*

PACK RATS' CHEESE BITS is a Publication of the Mt. Airy V.H.F. Radio Club, Inc., Philadelphia, Pa., and is published monthly.

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We operate on an exchange basis with other publications and anything that is printed in CHEESE BITS may be reprinted, unless so stated, as long as the proper credit is given.

\*\*\*\*\*

VISITORS AT THE JUNE MEETING:

WA3RCN, Lew Chern, Dresher, Pa.
WN7NMN, Lew Kimbel, Phoenix, Arizona
W3CLE, Lew Hamm, Nashville, Tenn

\*\*\*\*\*

ITEM OF INTEREST

Those that are interested in building gear may want to make note that a supply of copper clad circuit boards that are of glass-epoxy composition and are clad on both sides are available from Barrack's Electronic's. Their address appears in the business section of this edition.

# PACK RAT PICNIC

SUNDAY

AUGUST 8, 1971  
(RAIN DATE: AUGUST 15, 1971)

FORT WASHINGTON STATE PARK

FLOURTOWN, PA.

MOBILE TALK IN 50.2 & 145.2  
FOLLOW SIGNS FROM FT. WASHINGTON  
EXIT OF PENNSYLVANIA TURNPIKE

## DOOR PRIZES

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HAMS

XYL'S

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FRIENDS

of

MT. AIRY VHF RADIO CLUB, INC.

PHILA., PA.

"TO YOUR HEALTH"

Many people get sick. Some of those that get sick require a stay in the hospital. Lately an awful lot of hams have been laid up. Maybe you wonder if ham radio has anything to do with your health? There are many reports, some official, that expound on the dangers of many material things utilized in today's society. Cigarette smoking, tuna fish, produce, bread, even table salt have been suspect of causing such ailments as cancer, heart disease, and gout, to mention a few. Nobody, as yet, has delved into the effect of radio waves as applied to human health. Let's look and see what they may possibly find.

Few are those who have never tasted the bite of an R.F. burn. You do not necessarily have to touch the radiating element to receive an R.F. burn. When someone thinks about this, he may wonder what could be caused by R.F., but at a distance greater than that necessary to burn. Psoriasis, acne, corns; there are many skin irritations that are possible. Maybe the R.F. goes deeper and caused nosebleed or hemophilia or some other ailment that causes bleeding. You can possibly think up others yourself. Even some yet unknown disease (unknown publically, I'm sure a doctor can think of one) of the bone marrow will be attributed to the effects of R.F. Incidentally, you think that law passed recently in Princeton was silly? Maybe they know something we don't.

Pretty soon we will hear of R.F. pollution. Not the kind you hear on twenty meters, but the kind that makes the air poisonous. You can't live long breathing R.F. polluted air. Then the fun will start. No more radio and television. The telephone company will have a ball. Or will they. What of the radiation from the telephone lines. Pretty soon nothing will be deemed safe and everything but plain vocal cords will be outlawed.

Speaking of vocal cords, the U.S. Commission on . . . . .

WA3BIV

\*\*\*\*\*

OUR PREZ SEZ  
CONTINUED FROM PAGE 1

The next major effort will be the picnic. Please give the co-chairmen the best support you can muster.

And so with this writing, I revert back to editor. With this title goes the privilege of bugging the new President every month for something to put in this column.

"73, E1, K3JJZ"

NEW PRODUCTS OF INTEREST TO HAMS

1. Solid State Two Meter Transceiver CTR 144  
 This unit would solve the problem of the new operator on two meters who has not been able to decide between FM or AM. the CTR 144 covers the entire 144-148 Mc using both modes, with a built in VFO or 4 crystals. Power output is 6 watts on AM or FM. The receiver section is double conversion, with the first conversion being crystal controlled. Unit may be operated from internal AC supply or from any 12-18 VDC power source with 2 amps available. The receiver drain alone is 100 Ma. An interesting feature of this rig is that the VFO operates on 7-9 Mc and is mixed with a crystal stage on 65 Mc producing 72-74 Mc output which is doubled to 144-148 Mc. In this way VFO drift is multiplied 2 times rather than 18 times. More information can be obtained from -- Concraft Co. P.O. Box 266, Goleta, California 93017 PRICE: \$389.95
  
2. Digital Multimeter - Esterline Angus P.O. Box 24000 Indianapolis, Indiana 46224  
 This item appears to be a real bargain. It covers DC current 0-2A in 4 ranges, AC volts 0-700 in 4 ranges, AC current 0-2A in 4 ranges, and Ohms 0-2M in 5 ranges. Featuring 3 digit readout, compact construction 5 1/2" x 7" x 2 1/2", built in AC operation (7 watts), and automatically positioned decimal point. PRICE: \$195.50 (Model DM3550)
  
3. Solid State Dipper #90652 - James Millen Malden Mass.  
 Millen has redesigned their very popular Grid Dipper and it retains all the features of the tube version, and in addition, is self powered to be used at the top of antenna towers or out in the backyard for antenna experiments. Range covered remains 1/7 Mc to 300 Mc with 7 plug in coils. A taut band suspension type 0-1 Ma meter is used as a readout. PRICE: \$110.00 (with carrying case)

73,  
 W3NSI, Lyn Rowland

\*\*\*\*\*

CALENDAR OF COMING EVENTS  
 Syllabus by Lee, K3MXX

- July 14 Board of Directors Meeting - QTH - W3SAO, Frankie Brick, 821 W. Lindley Ave., Phila., Pa. 8:00 P.M. Directors and Interested Parties Invited!
- July 21 FIRST OUTDOOR MEETING OF THE SEASON \* \* WHITE ELEPHANT SALE \* \*  
 Here is your chance to clean up the shack - pack those goodies in a nice closed box, seal it, put a pretty ribbon on it and then after it is sold watch those expectant and long faces.

CONTINUED ON PAGE 9

THE BOOK RACK  
de Paul R. Behrmann K3WEU/Director AREA\*

Title: HOW TO REPAIR SOLID-STATE IMPORTS  
Author: Paul Lawrence  
Publisher: TAB Books No. 532  
Price: \$7.95 leatherette-covered; \$4.95 paperbound  
160 pages, plus 36-page schematic foldout section. 8½ x 11"

This brand-new guidebook is a large, diversified collection of schematics and service data representing the most popular foreign-made home-entertainment equipment, including TVs, radios, phonos, tape recorders, etc. Here are almost one hundred schematics covering currently popular imported brands - plus a wealth of service data revealing many troubleshooting secrets. Among this vast collection of hard-to-find schematics are such brand names as Allied, Automatic Radio, Peerless Telerad, Mercury, Lloyd's, Panasonic, Crown, Midland, Penncrest, Toshiba, Matsushita, RCA, and Emerson - representing the major foreign-made chassis distributed in the U. S. And to help locate sources for replacement parts, there is a list of importers and suppliers of Japanese consumer products, tape recorders, color and B & W TV, transistor radios, plus U.S. distributors of cassette tape players and recorders, and a list of U.S. Offices of Japanese electronic manufacturers.

The author begins with a general look at imports, how they differ from domestic brands, and how to obtain parts and service data. Chapter 2 delves into basic circuit descriptions - audio, RF, IF, converters, detectors, TV, tape recorders, etc. Chapter 3 describes many servicing tips that will help "unbend the kinks" which often get in the way. The author reveals many shortcuts: what to look for, how to find it, and how to fix it, thus making it easier to determine whether or not it is profitable to repair some of the less expensive units. There's also a chapter which offers help when a schematic is not available - numerous tips to help the service technician get the picture of what the circuits should and shouldn't be doing.

Truly unique among manuals of this type, Chapter 5 contains a host of schematics and service data for many imports. This information will be an invaluable guide in the many cases where schematics are otherwise unavailable. Schematics of AM radios, AM-FM radios, AM-FM tuners, AM-FM/steréo tuners; auto radios, tape recorders, and both color and B & W TV, enough so that even if you can't find the exact model, you're bound to come close!

CONTENTS: General Information - Basic Circuits - Servicing Procedures -  
Troubleshooting without a schematic - Typical Circuit Diagrams.  
Appendix of Importers and Suppliers.

###

\* Amateur Radio Editors Association

## DISCUSSION OF RF POWER MEASUREMENT

JACK POWER, W2AXU

There is much confusion among the amateur radio fraternity concerning the determination of peak envelop power (PEP) of a single sideband (SSB) transmitter. The subject has been discussed in the various publications and some of the writings have been good, others confusing. None have stated in basic terms how an every day "ham" with limited test equipment can determine what his PEP output power is. This paper is going to make an honest effort to do just that and at the same time, describe some of the methods used in measuring RF output power, average or PEP.

The accepted method of determining the PEP output of a SSB transmitter is by using two equal, in voltage, sine wave audio tones, separated in frequency such that they are not harmonically related, applied to the audio input of the transmitter. Any two tones will serve but a 3 to 5 frequency ratio will be the simplest to alleviate the harmonic relationship and the intermodulation products. Recommended frequencies are 1200 CPS and 2000 CPS.

The input voltage is adjusted such that the output of the transmitter, as observed on an oscilloscope, is not flat topping and the crossovers are clean X's. A review of the ARRL Handbook with regard to the two tone pattern expected is in order. Any flat topping indicates distortion and will not produce a valid indication. The peak of the two frequency envelop is limited to the same power rating as that for a single frequency tone. A single frequency tone can be a 1000 Hz audio tone, for example, on the reinserted carrier. Therefore, the PEP output is the same in either case (two tone or single tone) but the average power is less in the two tone case. The total average power in the two tone case is one-half the peak power.

There are a number of methods used to measure power output. These are:

1. The Calorimetric Method - This is the standard method for measuring power. The average power is dissipated in a load and is determined by the measurement of the temperature rise and rate of flow of the coolant with certain other known factors substituted in a formula. The accuracy of this method is dependent upon the accuracy of the factors involved.
2. The Current - Resistance Method - This method uses a thermocouple type ammeter in series with the RF load. The meter indicates rms current and is suitable for determining PEP using a two frequency test signal. Applying Ohms law,  $P=I^2R$  and multiplying by 2 will result in PEP. If a single frequency such as the reinserted carrier is used, the result is not multiplied by 2.

Continued on Page 7

3. The Voltage - Resistance Method - This method uses an RF VTVM to measure the voltage drop across the RF load resistance. The VTVM must read rms volts. Again Ohms law is used,  $P = \frac{E^2}{R}$ , for average power or multiply by two if two tones were used. The Hewlett Packard 410BVTVM is an instrument suitable for this measurement. It reads peak voltage but is calibrated in rms volts. Using the VTVM for PEP measurement with more than two tones is not recommended because the accuracy deteriorates with the number of tones. The kit-type VTVM's are not dependable.
4. The Directional Wattmeter Method - This is a convenient method to measure PEP. The directional wattmeter is a coaxial line instrument and is found in many of today's "ham shacks." There are a number of available commercial instruments at reasonable prices. (The SWR bridge is not suitable unless it has been calibrated in watts for the particular band of frequencies). Under single tone conditions, the power can be read directly. Using two audio tones, the directional wattmeter reads 40.5 per cent of the peak power and its reading should be multiplied by 2.45 to obtain PEP. If the instrument contains peaking capacitors, (capacitors in the metering circuit to lengthen the time constant of the meter which cause the meter to respond more nearly to the approximate PEP reading on voice signals) the multiplying factor does not hold on two tones unless the capacitor is removed for the two tone test. There is no effect using a single tone. The RF load used in methods 2, 3, and 4 must be a good non-reactive resistive load at the frequency of measurement.

A power amplifier loaded to 1 KW DC input with the reinserted carrier and switched to SSB will not produce 2 KW PEP input. If the amplifier is capable of 2 KW PEP input, it must be loaded to the 2 KW DC input level but not into the antenna and on the air. That is illegal. A dummy load should be used and the amplifier can be readjusted at a low level to take care of the antenna reactance.

It is obvious from the foregoing discussion that certain test equipment is a must if PEP output power is to be measured. Basically, a wattmeter and a dummy load are required. This can be a combination device or an inline directional wattmeter and a load. This will suffice for average power measurement using a single tone. The use of two-tones requires a distortion free two-tone generator, an oscilloscope, the load and either the directional wattmeter, a suitable VTVM or a thermocouple ammeter. (The ammeter method will not be too accurate in the VHF range).

There are other factors that must be considered if a true and accurate measurement of PEP is to be made but "Joe Ham" need not involve himself in these.



MT. AIRY V.H.F. RADIO CLUB, INC.



# CHEESE BITS

## RAT ADS

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### DISCUSSION OF RF POWER MEASUREMENT-CONTINUED

REPORTED BY JACK POWER, W2AXU

So, in summary, basically PEP output is equal to the single tone average power output of an amplifier. Using two equal tones, PEP is two times the average power as read on a suitable instrument.

#### REFERENCES:

1. FUNDAMENTALS OF SINGLE SIDE BAND, Collins Radio Co., Second Edition, 1 September, 1959
2. SINGLE SIDEBAND PRINCIPLES AND CIRCUITS, Pappeafus, Bruene and Schoenike, McGraw-Hill Publishing Co.
3. AMATEUR SINGLE SIDEBAND, Collins Radio Co.
4. THE RADIO AMATEUR'S HANDBOOK, ARRL, 1970 Edition

SWAP SHOP

CONDUCTED BY: W3ZRR, Ray Whitehead  
 7329 Shelborne Street  
 Philadelphia, Pa. 19111  
 215 RA 2-4786

FOR SALE:  
 Gonset, 2 meter communicator  
 Price: \$60.00

FOR SALE:  
 HW-32 (20 meter SSB transceiver with mike  
 and HP-32A [AC] power supply) Excellent  
 condition, \$100.00  
 CONTACT: Harry Brown, WA3NGK  
 584-4846

FOR SALE:  
 Gonset 2 meter linear (826 tube) with  
 four spare tubes.  
 Price: \$75.00

CONTACT: Carl Barish, WA3BIV  
 7948 Thouron Avenue  
 Phila., Pa.  
 LI 9-6486

\* \* \* \* \*

CALENDAR OF COMING EVENTS  
 CONTINUED FROM PAGE 4

- July 21 Cont. QTH - WA3EPS, Mort Mazer, 3200 Bruce Drive, Dresher, Pa.  
 8:00 P.M.  
 Talk up this meeting with your friends and radio contacts  
 and invite them along. This meeting is always a lot of fun and  
 laughs. An open meeting and other clubs and members are invited to  
 attend. Refreshments will be available.
- Aug. 8 PACK RAT PICNIC - Fort Washington State Park, Flourtown, Pa.  
 ALL DAY!!  
 Make your plans now for a full family day, food, drinks, games  
 prizes and special door prizes, something for everyone especially  
 the kiddies. Talk in frequencies will be operating. Each year  
 the picnic gets bigger and better and this year will be the best  
 yet!!!
- Aug. 11 Board of Directors Meeting - To be announced.
- Aug. 18 Second Outdoor Meeting QTH - K3IUW, Bert. Movies, pictures and  
 slide nite. XYL's and YL and BYL invited. Pictures of the  
 past and past past years will be shown. A good social evening for  
 all.
- Sept. 15 PACK RAT AUCTION - QTH - W3ZD, Dave Zimmerman

HAMFEST DATES

- Sept. 12 South Jersey Radio Club, Malaga, New Jersey
- Oct. 24 Gaithersburg.

### CAPACITIVE REACTANCE

$$X_C = \frac{1}{2\pi FC} \text{ OR LET } 2\pi = .159 \text{ AND } X_C = \frac{.159}{FC}$$

### INDUCTIVE REACTANCE

F = frequency in hz

$$X_L = 2\pi FL$$

C = capacity in farads

### RESONANT FREQUENCY

L = inductance in henrys

$$\text{FREQ.} = \frac{1}{2\pi\sqrt{LC}} \text{ OR } \frac{.159}{\sqrt{LC}}$$

### SPEED OF LIGHT

186,000 MILES PER SECOND

300,000,000 METERS PER SECOND

### SERIES INDUCTORS

$$L = L_1 + L_2 + L_3 + L_n$$

### TWO INDUCTORS IN PARALLEL

$$L = \frac{L_1 \cdot L_2}{L_1 + L_2}$$

### MORE THAN TWO INDUCTORS IN PARALLEL

$$L = \frac{1}{\frac{1}{L_1} + \frac{1}{L_2} + \frac{1}{L_3} + \frac{1}{L_n}}$$

### IMPEDANCE MATCHING

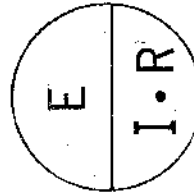
$$N = \sqrt{\frac{Z_p}{Z_s}}$$

N = TURNS RATIO, PRIMARY TO SECONDARY

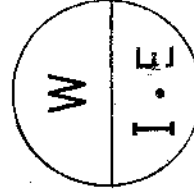
Z<sub>p</sub> = PRIMARY IMPEDANCE

Z<sub>s</sub> = SECONDARY IMPEDANCE

### OHM'S LAW



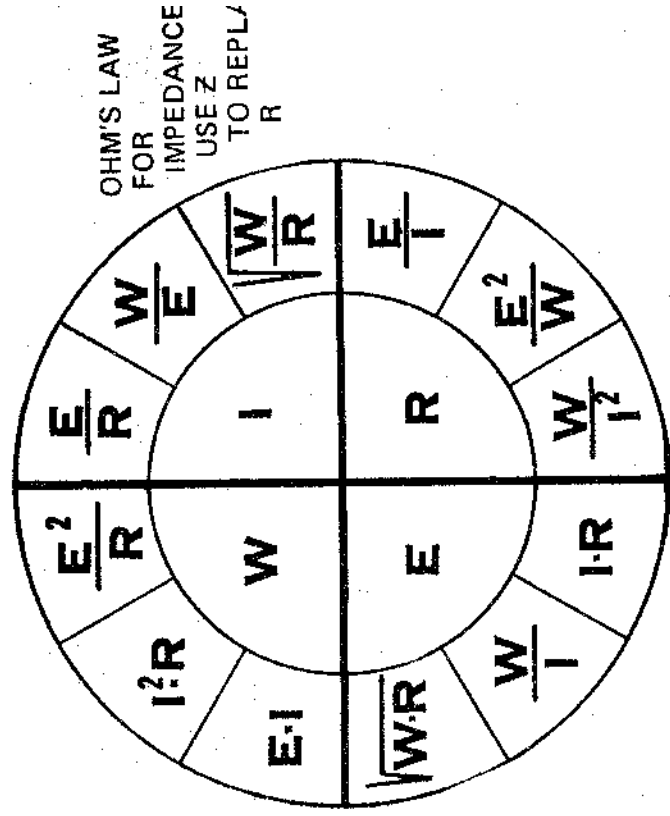
### POWER LAW



### ANTENNA LENGTH

$$L' = \frac{5540}{F \text{ Mhz}} = \frac{1}{2} \text{ WAVE IN INCHES}$$

$$L' = \frac{468}{F \text{ Mhz}} = \frac{1}{2} \text{ WAVE IN FEET}$$



*FROM THE AK-SAR - BEN RADIO CLUB, INC NEWS*

# SERIES RESISTORS

$$R = R_1 + R_2 + R_3 + R_n$$

TWO RESISTORS IN PARALLEL

$$R = \frac{R_1 \cdot R_2}{R_1 + R_2}$$

MORE THAN TWO RESISTORS IN PARALLEL

$$R = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_n}}$$

# PARALLEL CAPACITORS

$$C (\text{Total}) = C_1 + C_2 + C_3 + C_n$$

TWO CAPACITORS IN SERIES

$$C = \frac{C_1 \cdot C_2}{C_1 + C_2}$$

MORE THAN TWO CAPACITORS IN SERIES

$$C = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \frac{1}{C_n}}$$

# TIME CONSTANT

$$T = CR \quad T = \frac{L}{R}$$

T = TIME IN SECONDS

C = CAPACITANCE IN FARADS

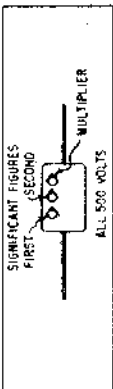
R = RESISTANCE IN OHMS

L = INDUCTANCE IN HENRYS

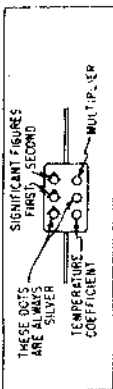
# RESISTOR AND CAPACITOR COLOR CODE

## CAPACITOR COLOR CODES

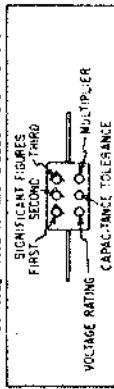
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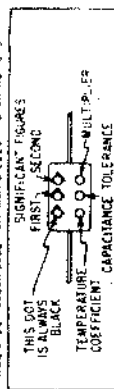
EIA 6-001 COLOR CODE FOR MICA DIELECTRIC CAPACITORS



EIA 6-002 COLOR CODE FOR MICA DIELECTRIC CAPACITORS



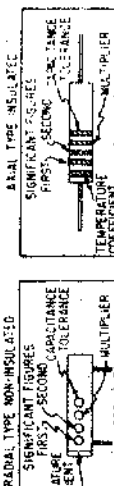
EIA 6-003 COLOR CODE FOR MICA DIELECTRIC CAPACITORS



EIA COLOR CODE FOR TUBULAR CERAMIC DIELECTRIC CAPACITORS

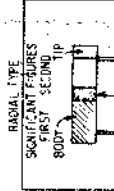


WIL COLOR CODE FOR FIXED CERAMIC DIELECTRIC CAPACITORS

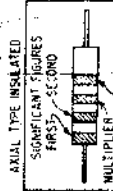


## RESISTOR COLOR CODES

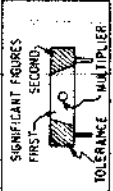
EIA COLOR CODE FOR FIXED COMPOSITION RESISTORS AXIAL TYPE



EIA COLOR CODE FOR FIXED COMPOSITION RESISTORS AXIAL TYPE INSULATED

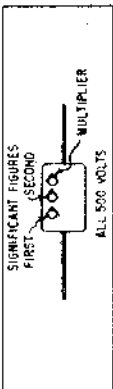


RADIAL TYPE NON-INSULATED

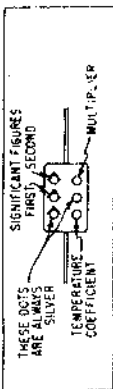


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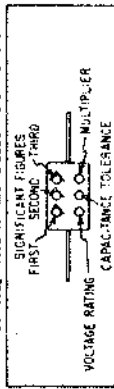
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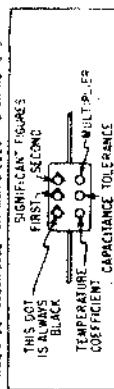
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EIA 6-003 COLOR CODE FOR MICA DIELECTRIC CAPACITORS



EIA COLOR CODE FOR TUBULAR CERAMIC DIELECTRIC CAPACITORS

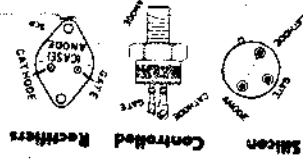
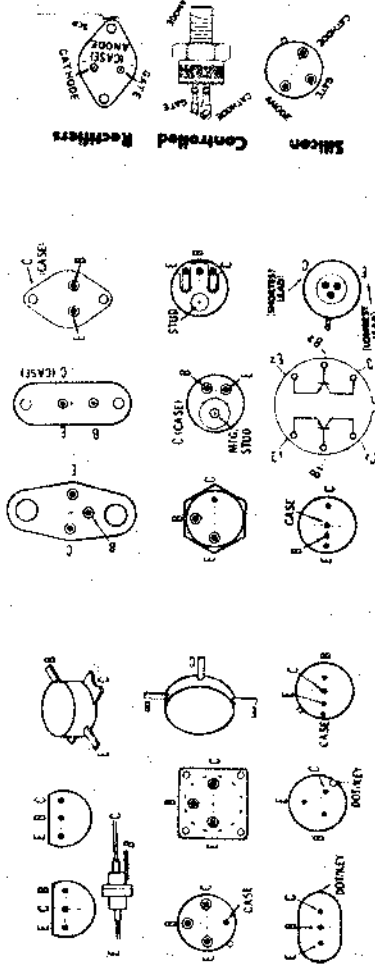


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2	100	BROWN	100
3	1,000	RED	1,000
4	10,000	ORANGE	10,000
5	100,000	YELLOW	100,000
6	1,000,000	GREEN	1,000,000
7	10,000,000	BLUE	10,000,000
8	100,000,000	VIOLET	100,000,000
9	1,000,000,000	GRAY	1,000,000,000
0	10,000,000,000	WHITE	10,000,000,000
10	100,000,000,000	GOLD	100,000,000,000
20	1,000,000,000,000	SILVER	1,000,000,000,000
		NO COLOR	NO COLOR

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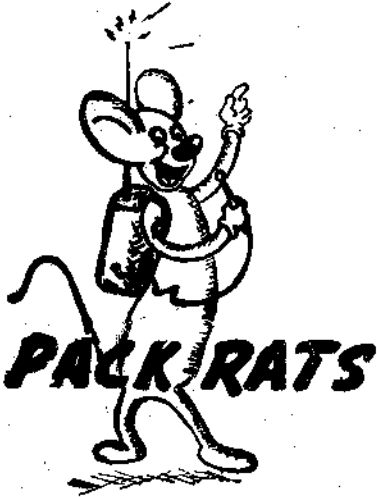
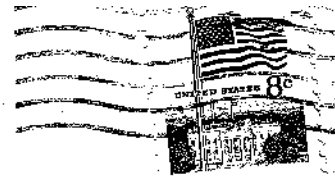
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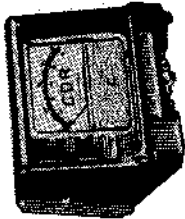
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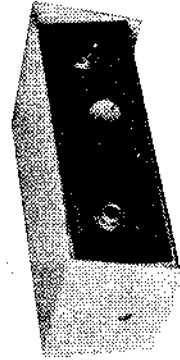
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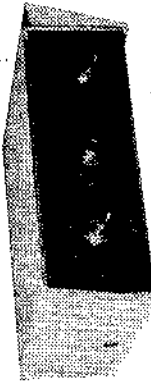
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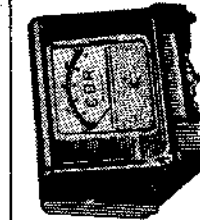
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