



# RF

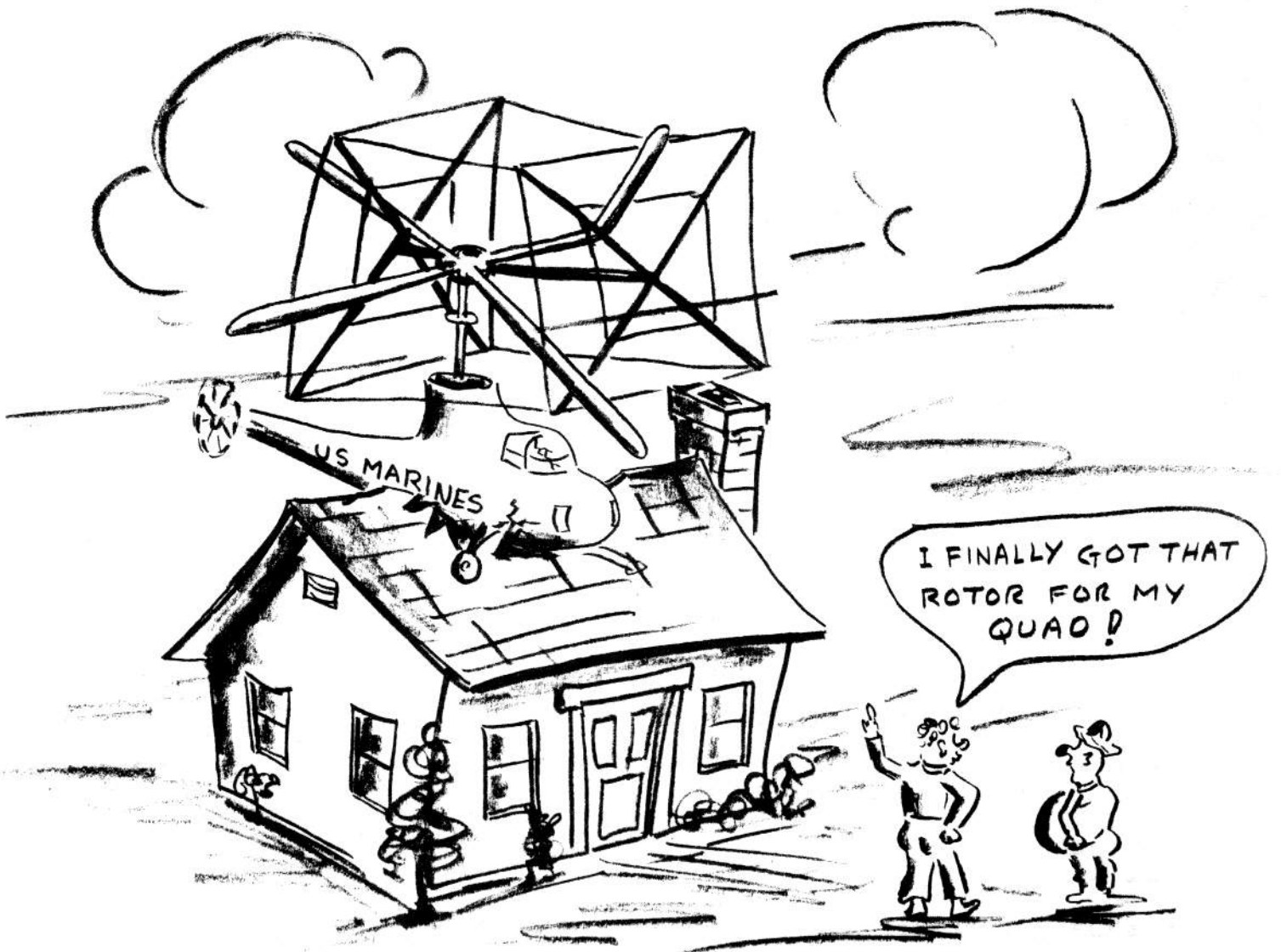


ORANGE COUNTY AMATEUR RADIO CLUB

VOLUME X NO. 3

P.O. BOX 95, ORANGE, CALIF. 92668

MARCH 1969



PRES: JERRY, WA6ROF  
 V. PRES. DAVE, WB6RVM  
 SECY: FRANK, WB6TBU  
 TREAS: BILL, WB6CQR

MEMBERS AT LARGE  
 DAVE, W6COJ  
 JACK, WB6UDC

ACTIVITIES: JOHN, W6BNX  
 PUB. REL. : KEN, W6HHC  
 MEMBERSHIP: BILL, WB6WOO  
 TVI : DAVE, W6GPR

\*\*\*\*\*

"The Prez Sez"

I was pleased to see the large turnout at our February meeting. Looks like "Mr RF" really attracted some of you long unseen members. Keep cumin' cuz we love to see ya.

Quite a number of OCARC members were responsible for a successful Orange County Heart Fund Drive on Heart Sunday, February 23rd. Those of you who were out in the mobiles amidst the rain and mud are to be applauded. This type of activity well demonstrates the service that we can perform to the public and the Orange County Heart Association has high appreciation to "you hams."

How do you like those articles on transistor amplifiers our Editor has been writing? Our club is fortunate to have such fine technical talent. In fact, there are others of you who are experts in your own field of endeavors but we never hear from ya. How about doing some hen scratching and put some of those ideas down on paper and send it along to W6HHC. After all, this is your club, your paper, and we want to hear from you.

Don't forget to pay your dues by the March meeting so you don't miss any issues of "RF." Are you a member of ARRL? This is an affiliated club and we urge your support to the League. Applications for ARRL membership or renewals should be made through our Treasurer, WB6CQR. The club gets 50% for each ARRL membership or renewal so don't hesitate to join through our club. See WB6CQR for membership applications. ARRL yearly membership dues are \$6.50 which includes QST and all voting privileges.

Getting set for Field Day? It's not too far away. We're scouting around for a new site this year. Our Activities Chairman, W6BNX, is spearheading the effort. Irvine Park is a good possibility. Any others?

Don't miss the March meeting. The "Apollo 8" film is one of NASA's best.

73, Jerry, WA6ROF  
 President

\*\*\*\*\*

THIS MONTH'S MEETING

The next meeting will be held Friday, March 21 at 7:30 PM in the LINCOLN Savings and Loan Co. Building at Seventeenth and Bristol, Santa Ana.

Jerry tells me the main feature of the program will be the showing of "DEBRIEF: APOLLO 8" from the NASA film library. The film reflects the total significance of the APOLLO 8 flight with actual pictures taken inside and external to the spacecraft. It sounds like a real interesting program and I'm sure no one will want to miss it.

It's also getting very close to field day, so let's have a good turnout at the meeting to get the problems discussed and get the ball rolling towards our club's victory in the Orange County Field Day Contest. If we try hard enough, I'm sure we can even take top honors in the state.

MINUTES OF THE LAST MEETING-- February 21,1969

The meeting was called to order by WA6ROF at 1948 hours. The officers of the club were introduced by WB6TBU. The winners of our new "Greeter System" were Mildred W6PJU, and Dave WB6NRK.

WA6ROF introduced our speaker of the evening, Bill, WB6CQR. Bill is Commander of the Orange County Civil Air Patrol Senior Squadron 29. His talk accompanied by a movie showing a simulated plane crash and rescue mission, was very interesting. Visitors to the club were introduced at this time.

WB6TBU was requested to draft a rebutal to the Los Angeles Times and U.P.I., regarding the derogatory article which appeared in the Los Angeles Times concerning ham radio.

WB6RVM announced that members of the club would again have mobile units assisting in the Heart Fund collections on Sunday, February 23, 1969.

Treasurer's report was read. The bank balance as of this date is \$950.43.

WA6ROF announced that a film showing the Debrief: Apollo 8, will be shown at our next meeting. This film is narrated by film celebrity, Burgess Meridith.

\* \* \* \* \*

The Amateur Radio Course covering theory and code practice for Novice, General, and Advanced licenses at the Santa Ana College Begins April 8. The classes are held on Tuesday and Thursday evenings from 6:30 to 9:30 in Building H of the Santa Ana College Campus. The fee is \$5.00 and I'm told you can enrolle at the first session. For further information call Bill Robinson ,WB6W00, at 542-7958

\* \* \* \* \*

Don't forget "MR. RF" will be one of your friends at the next club meeting. Two of the people shaking his hand will win themselves a new OCARC badge or \$2.50.



## BASIC STEPS TO DESIGNING A TRANSISTOR AMPLIFIER

by  
W6HHC

There are many types of amplifiers : linear amplifiers, power amplifiers, RF amplifiers, DC amplifiers, etc. etc....!! Each one has its own design techniques. Since we can't possibly cover all types, let's just concentrate on the basic RC coupled audio amplifier. Most articles and handbooks show you designed amplifiers and tell how they work , but they don't tell how to design them yourself. This month I'll show you what you have to do to design aa single stage, next month I'll go on and complete a preamplifier for aVOM using this months techniques.

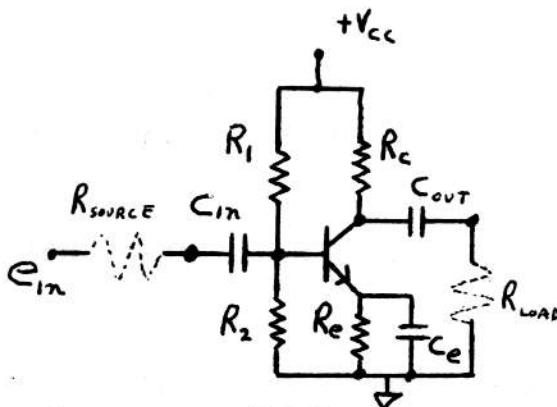
THE BASIC DESIGN

FIG 1  
A TYPICAL CLASS A AMPLIFIER

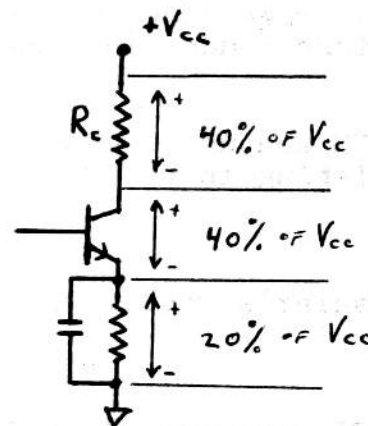


FIG. 2  
HOW DC VOLTAGES ARE DISTRIBUTED

Figure 1 shows the basic schematic of a CLASS A RC coupled transistor audio amplifier. Basically, resistor  $R_e$  and  $C_e$  are biasing components and serve the same purpose as the cathode resistor and capacitor did in the old vacuum tube days. The resistors,  $R_1$  and  $R_2$ , assist in biasing the transistor by supplying the DC base current. The collector resistor,  $R_c$ , provides a mean of developing an AC output voltage.  $C_{in}$  and  $C_{out}$  ARE coupling capacitors designed to block DC voltages from disturbing the bias of the transistor, yet look like a path for any AC signal.

Figure 2 shows the desired biasing of an AC amplifier with no AC signals applied. About 20% of the available battery voltage is used for the bias voltage across the emitter resistor,  $R_e$ . The rest of the battery voltage (80%) is equally divided between the transistor and the collector resistor,  $R_c$ . Now when an AC input signal causes the transistor to conduct heavy current, the voltage drop across  $R_e$  is almost 80% of  $V_{cc}$ . When the input signal causes the transistor to conduct current very lightly, there is almost no voltage drop across  $R_c$  and the voltage of the collector of the transistor is almost equal to  $V_{cc}$ . Thus the collector voltage is an amplified signal of the input signal. By capacitively coupling this signal out to a load, you can drive a speaker, voltmeter, etc...

The resistors  $R_1$  and  $R_2$  are calculated to deliver the necessary DC base current to get the transistor biased as shown in Figure 2.

BASIC STEPS TO DESIGNING A TRANSISTOR AMPLIFIER  
(continued)

DETERMINING COMPONENT VALUES

- 1) The first step is to determine how much battery voltage is needed. A good rule of thumb is:

$$V_{cc} = (1.25) (2 \times 1.414) (E_{outs\ rms}) \text{ or } V_{cc} = (3.5)(E_{out\ rms})$$

Thus if you need a maximum of 3  $V_{rms}$  out, then  $V_{cc}$  must be greater than 10.5V. A 12V battery would perform nicely.

- 2) Next determine the value of  $R_c$  or determine what collector current you need. If you need an output impedance of 1K, then make  $R_c = 1K$ . Since 40 percent of the battery will nominally drop across  $R_c$ , in our case  $R_c$  drops 4.8 volts and  $I_c$  (DC) is equal to  $\frac{4.8V}{1K} = 4.8\text{ ma}$ .
- $$I_c = \frac{V_{rc}}{R_c} = \frac{4.8V}{1K} = 4.8\text{ ma}$$

- 3) Now determine value of  $R_e$  and  $C_e$ .

We have already determined the DC collector current. This current must also flow through the emitter resistor and drop 2.4 volts across it (20% of  $V_{cc}$ ). Therefore,  $R_e = \frac{V_e}{I_c} = \frac{2.4V}{4.8\text{ ma}} = 500\Omega$ . The impedance  $C_e$  should be less than 10% of  $R_e$  at the lowest frequency of interest. So, for  $R_e = 500\Omega$  and  $f_c = 30\text{ cps}$  then

$$X_{ce} = \frac{1}{2\pi f C_e} = 50\Omega, C_e = \frac{1}{(6.28)(30\text{ cps})(50\Omega)} = 1000\mu F$$

- 4) Now determine the DC base current required to sustain 4.8 ma of collector current. If the transistor has a gain ( $\beta$ ) of 50 then the base current needed is  $I_b = \frac{I_c}{\beta} = \frac{4.8\text{ ma}}{50} = .1\text{ ma}$ . The base resistors,  $R_1$  and  $R_2$  can

be found as follows:

- a) The base voltage of the transistor,  $V_b$ , should be about 0.6V higher than the emitter for silicon transistors. So,  $V_b = 2.4V + 0.6 = 3V$ .

- b) Set  $I_2$  equal to nine times the base current (see Figure 3)

$$I_2 = (9) (.1\text{ ma}) = .9\text{ ma}$$

$$R_2 = \frac{V_b}{I_2} = \frac{3V}{.9\text{ ma}} = 3.3K$$

BASIC STEPS TO DESIGNING A TRANSISTOR AMPLIFIER (cont.)

c) Set  $I_1$  equal to ten times the base current.

$$I_1 = (10)(.1 \text{ ma}) = 1 \text{ ma}$$

$$R_1 = \frac{V_{cc} - V_b}{I_1} = \frac{(12-3)V}{1 \text{ ma}} = 9K$$

5) Now all that remains is to select  $C_{in}$  and  $C_{out}$ . Like  $C_e$ , make  $C_{in}$  small with respect to the source resistance and make  $C_{out}$  small to the load. For example, (using the formula in STEP 3) if  $R_s$  and  $R_1$  are both 15K, make  $C_{in}$  and  $C_{out}$  equal to 33MFD.

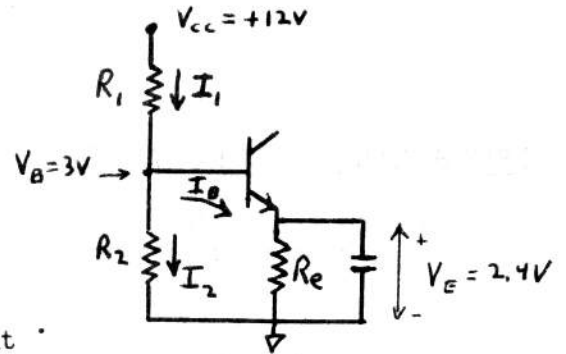
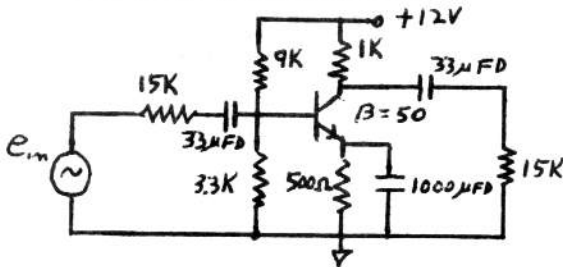
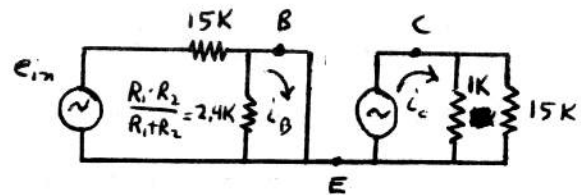


FIGURE 3

THE FINISHED AMPLIFIER



SCHEMATIC



AC MODEL

CAN YOU DETERMINE THE DIFFERENT AMPLIFIER GAINS FROM LAST MONTHS ARTICLE?

\* \* \* \* \*

Worked Seven KA Districts Award.



Worked 25 KA Stations Award.



Worked Five KA Stations Award.

Far East Auxiliary Radio League—Available Awards

**The Worked Five KA Station Award:** Requirements: Work 5 KA Stations.

**The Worked All KA Districts Award:** Requirements: Confirmed 3 KA2s and one each from each remaining district, which are KA5, KA7, KA8 and KA9.

**The Worked Twenty Five KA Station Award:** Requirements: Confirmed 25 KA Stations, endorsements—all on one band; all on phone; all on c.w.; mixed hands and mode.

**The Seven KA District Award:** This award can no longer be achieved as there are only 5 KA districts in being. However in the event that QSLs were accumulated during the period when there were seven or more KA districts, a certificate is available. Any seven of the following districts will satisfy the requirements: KA2, KA3, KA4, KA5, KA6, KA8, KA9 and KA0.

To obtain any of these FEARL certificates; forward to the Awards Manager, either the QSL cards or a list of confirmed QSLs certified either by a Notary Public, Radio Club Official or two General or higher class amateurs as witnesses, stating QSLs have been confirmed. Send to: Far East Auxiliary Radio League (M), C/O Awards Manager, Box 189, APO San Francisco 96525 (USA).

VIA SIGNAL REPORT



## THE AMERICAN RADIO RELAY LEAGUE, INC.

ADMINISTRATIVE HEADQUARTERS NEWINGTON, CONNECTICUT, U. S. A. 08111

ROBERT W. DENNISTON  
W0DX, PRESIDENT  
WAYLAND M. GROVES  
W5NW, FIRST VICE PRES.  
ROEMER O. BEST  
W5QKF, VICE PRES.  
P. L. ANDERSON, JR.  
W4WVW, VICE PRES.  
DAVID H. HOUGHTON  
TREASURER  
JOHN HUNTOON  
W1LVQ, SEC. & GEN. MGR.

**QST**  
OFFICIAL ORGAN

From: John R. Griggs, W6KW  
DIRECTOR, SOUTHWESTERN DIVISION  
11422 ZELZAH AVENUE,  
GRANADA HILLS, CALIF. 91344

February 18, 1969

Atten: Club Secretary - Please read this letter to the members of your club at the earliest opportunity. Any suggestions produced by your club membership for ARRL Board action must be returned to me before March 22, 1969.

John R. Griggs, W6KW  
Director, S-W Div. ARRL

To all Club Members:

Now is the time when you should present to your fellow club members any ideas you may have regarding changes in rules, regulations, frequency allocations or ARRL policy matters. These ideas should be discussed by your fellow club members to insure that they are practical and workable, and - if approved by the membership - may be sent to me to include in my Membership Bulletin which I expect to mail to all ARRL members in the Southwestern Division about the last week of March.

In the meantime I will query all of the other Division Directors to determine what motions they expect to produce at the May 1st Board meeting. These will be included in the Membership Bulletin along with those generated within our own Division so that all voting members of the League will have an opportunity to know what is expected to be on the agenda and to let me have your opinions on all of them. This will give me a consensus of opinion that will help me to best represent you at the Board Meeting. This year, the ARRL Board meeting will be held in New Orleans, La. As is my policy, I expect to send all League members a full report on Board actions within a month after the Board meeting. In this way, I can keep you fully informed.

This is the first opportunity since the Director elections last fall for me to express my thanks to you who supported my bid for reelection. I appreciate your confidence. Our new Vice Director, Arnold Dahلمان, W6UEI, is proving to be very helpful in League matters.

*John R. Griggs*  
John R. Griggs, W6KW

ORANGE COUNTY AMATEUR RADIO CLUB, INC.

P.O. BOX 95

ORANGE, CAL. 92668

VOL. X NO. 3 DATED MARCH 1969

first class

DATED MATERIAL

\* \* \* \* \* HAMAD \* \* \* \* \* HAMAD \* \* \* \* \* HAMAD \* \* \* \* \* HAMAD \* \* \* \* \*

PERFECT NOVICE STATION... A Heathkit DX-60A transmitter, perfect for operation on 10-15-20- 40-80 meters with 90 watts on both CW and AM. Only \$35. Also the Heathkit SB-300 receiver with AM,SSB,and CW crystal filters included. The receiver is excellant condition, only \$195. May be seen in operation.

CONTACT JIM TRIPP WA6DIJ 7742072

TEST EQUIPMENT SELLOUT...The following EICO equipment: modil 147 SIGNAL TRACER \$24.95,MOD 232A AC VTVM--\$24.95, MOD 565 VOM--\$21.95,MOD 955 IN CIRCUIT CAPACITANCE CHECKER--\$17.95, also a HEATHKIT MOD IO-21 GENERAL PURPOSE 3 in. SCOPE--\$49.95, a REALISTIC MOD TK-1)) AUDIO AND RF GENERATOR--\$29.95, and a JOHNSON RANGER I for \$79.00 and a 6N2 for \$69.00 are available from:  
H. B. CORCORRAN WB6KTO 897-0862

Incidently, WB6KTO mentioned that any club member wishing an ad in the bullentin of the DOUGLAS AMATEUR RADIO CLUB may do so by writing c/e the club secretary; Vern Carlson, 6712 Stanford, Garden Grove, 92641.

FOR SALE.... A VIBROPLEX keyer paddle with gray wrinkle base, only \$12.

CONTACT: Jerry Ver Duft WA6ROF 524-5827