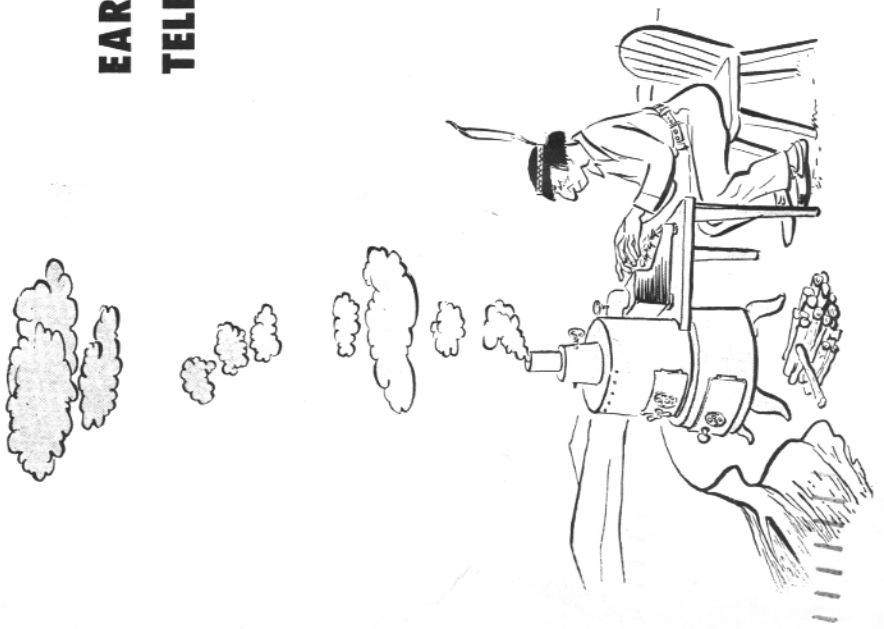
RTTY

NEWS OF AMATEUR RTTY

MAY 1955
25 Cents
Vol. 3, No. 5

EARLY MODEL TELEPRINTER?



HORSE TRADES

This page of the Bulletin is for use of amateurs who have RTTY EQUIPMENT FOR SALE OR TRADE and those looking for equipment to buy or trade. It is a free service and may be the means of getting someone on the air.

FOR SALE—Model 12 page printer complete, less keyboard with base, cover. Serial Nr. 3644, with distributor, motor type NSI-12-R. Also have spare motor with governor and strob lite ..... WØYNC

FOR SALE—15 with table, 14 non-typing reperf. W8BYB

FOR SALE—26 complete W9EKU

FOR SALE—14 complete W2EHW

FOR SALE—15 bases and keyboards only W6KGS

FOR SALE—12 complete and 26 complete W6III

FOR SALE—12 complete with power supply, 12 typing unit, less keyboard, 2-model 21-A strip printers KL7CK

FOR SALE—Model 14 ..... W2EHW

WANTED—Tape Perferator and Tape Keyer ..... Robert W. Muler, 2100 Demster St., Evanston, Ill.

WANTED—Series motor for Model 26 ..... W6III

FOR SALE—Model 26 Manual . . . . 75c from RTTY

RTTY, Inc.
3769 East Green Street
Pasadena 10, Calif.
Return Postage Guaranteed

A Matched Impedance RTTY Converter

By ELWIN O'BRIEN, W6LDG

A simple filter for RTTY signal conversion can be designed by using the impedance matching equations that are normally used for radio frequency. These networks, as modified, have an advantage over band pass filters; since no precise inductance values are required. Also, a voltage gain through the networks can be obtained because of the impedance step-up in the design.

Impedance Matching Equations

The standard impedance matching equations 1 for the circuit in Figure 1 are:

$$X_a = \pm j \frac{R_1 R_2 \sin B}{R_2 \cos B - \sqrt{R_1 R_2}}$$

$$X_b = \pm j \frac{R_1 R_2 \sin B}{R_1 \cos B - \sqrt{R_1 R_2}}$$

$$X_c = \pm j \sqrt{R_1 R_2} \sin B$$

where R1 and R2 are the terminating impedances and B is the phase shift across the network.

A requirement for impedance match is that any two of the reactance arms have the same sign. The filter configuration shown in Figure 2 was chosen to give grid and diode continuity. The use of high Q coils in the network simplifies the equations by allowing the resistance of the inductance coils to be neglected. A simple L type network can be used by making the Xb arm equal to infinity (open circuit).

Design Example

The filter from the plate of the voltage amplifier tube to the diode rectifier as shown in Figure 2 will be used to illustrate the design of the impedance match type network. The R1 diode load impedance can be calculated to be approximately 350K ohms when the rectification efficiency is estimated at 80%. The R2 source impedance will be the plate impedance of the tube and the 50K plate resistance in parallel, or approximately 30K ohms.

Then, using these values of R1 and R2 and setting the denominator of the equation (2) equal to zero,

$$\cos B = \sqrt{R_2/R_1} = .2925 \quad (4)$$

giving a phase shift across the network of B equal 70°, and Sin B = .9563. 1—Radio Engineer's Handbook, by F. E. Terman, page 212, first edition.

Substituting in Equations (2) and (3),

$$Xa = 106.3K \text{ ohms} \quad (5)$$

and

$$Xc = 98.K \text{ ohms} \quad (6)$$

For frequency equal to 2975 cycles, Cc and La have the following values:

$$Cc = 543 \text{ mmf} \quad (7)$$

and

$$La = 5.7 \text{ henries} \quad (8)$$

and for frequency equal to 2125 cycles, Cc and La have these values:

$$Cc = 765 \text{ mmf} \quad (9)$$

and

$$La = 8 \text{ henries} \quad (10)$$

Xa Modification

Since high Q coils with the exact values shown above may be difficult to obtain, the circuit can be modified as shown in Figure 3. The design value of Xa is maintained by using a lower value of inductance and stepping up the impedance with a capacitor in parallel. This method allows the use of any reasonable value of high Q inductance with the capacitor as the reactance adjustment.

The design equations are derived as follows:

Again neglecting the resistance of the coil which is possible for a Q of 20 or higher with small error,

$$jX = \frac{-jX_{ca} X_{1a}}{X_{ca} - X_{1a}} \quad (11)$$

or

$$X_{ca} = \frac{X_a X_{1a}}{X_a - X_{1a}} \quad (12)$$

Xa Example

Again, using an example with L equal to 1 henry with a Q of 50 at 1000 cycles for frequency equal to 2975 cycles,

$$X1 = 18.7K \text{ ohms} \quad (13)$$

$$Xca = 23.K \text{ ohms} \quad (14)$$

and

$$Ca = .00227 \text{ mfd} \quad (15)$$

and for frequency equal to 2125 cycles,

$$X1 = 13..35K \text{ ohms} \quad (16)$$

$$Xca = 15.4K \text{ ohms} \quad (17)$$

and

$$Ca = .00485 \text{ mfd} \quad (18)$$

These are the values shown on the schematic, Figure 2.

A second section is used between the transformer and tube grid with the terminating resistors equal to 220K ohms. These resistors not only serve to terminate the networks but to suppress transients.

The two sections of the network for each frequency are shown identical, although the one from the transformer to grid of the voltage amplifier is not rigorously correct. The values do make a practical filter that has proved satisfactory in actual use and which has the further advantage of using the same design values.

Voltage Gain of the Network

The theoretical maximum voltage step up of the network is obtained as follows:

From Figure 4, E2/E1 = jXa/ (Xa — Xc) = 12.8 (19)

This voltage amplification will only be closely approximated in the unit because of the resistance of the coils. There will also be a slight difference in gain for the two frequencies, approximately 10% lower for the 2125 cycles frequency. The tube gain can be adjusted to give the same voltage at the diodes for each channel if desirable.

Transient Response

Clean copy will be obtained only if the transient response of the converter is good. Therefore, a critical examination of the circuit should be made.

A recommended procedure for checking the transient response characteristics of the converter is to start at the transformer and follow through the circuit with a point-by-point look with a scope while keying the input with a repeating function produced by a circuit such as Figure 5.

The resistor on the transformer was adjusted, with the filter disconnected, to give the best town square wave output with short rise and fall time and a minimum overshoot and no trailing transient.

The diode detector, clipper tube, and keyer tube circuits are best checked by feeding the output of the loaded transformer directly to the diode without a filter and one of the voltage amplifier channels disabled with the dioded input switch.

The wave form at the clipper tube and keyer tube should be a source wave envelope of the tone sqaure wave input.

The wave form at the cathode of the keyer tube is essentially a square wave with a small damped overshoot at the leading edge. The best wave form is produced when the 1.5K resistor is used in series with the relay coil. The 5K resistor across the relay coil is to suppress the inductive kickback. The orientation range was found to be approximately 65 to 100, and the cathode current, 12.5 ma, with the relay coil connected in series. A higher current will be required if the series resistor is omitted.

Final Check

The final check on the complete converter is with the filters in the circuit. The wave form at the diodes will have a greater rise and fall time with no transients. The range may be reduced some but will still be satisfactory. The transients are the important thing, since they may give false signals.

Only one pair of filters from the plates of the voltage amplifier to the diodes has been used in a converter with remarkable results and is highly recommended for AFSK and other cases where extreme selectivity and non-critical receiver tuning is desired, such as the two meter band and commercial signals.

Experimental Results

The frequency response of the individual channels as measured at the diode input is shown in Figure 6. The curve shows that the networks are not peaked at the correct frequency and should have the values of the tuning capacitors changed. The actual printing on RTTY signals indicates that the mistuning is not serious.

Under operating conditions, with clean two tone signals, printing requires .1 volt minimum at the input terminals and will handle a maximum of 10 to 15 volts. The input sensitivity can be increased considerably by removing the 1K signal input attenuator resistors.

Because of the small value of network coupling capacitance, the tuning capacitance will be close to the resonant value of the LC circuit. The network can, therefore, be given a preliminary check by using an oscillator connected to the input of the circuit shown in Figure 4 and the voltage across the coil measured on a vacuum tube voltmeter.

Inductance values as low as 100 millihenries were checked with the above voltmeter circuit. The test showed low gains of 2 and 1.2 for the 2975 and 2125 cycle channels, indicating that additional tube gain would be required with these low values of inductance.

The selectivity of the networks appeared satisfactory, and tjhe principle objection to the low values of inductance is the increased circuit losses.

Diagrams on pages 5, 6 and 7

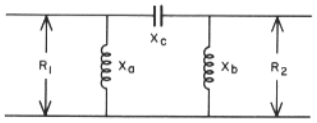


FIGURE 1

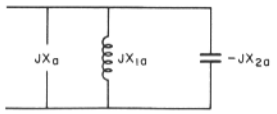


FIGURE 3

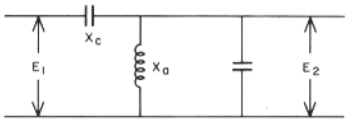


FIGURE 4

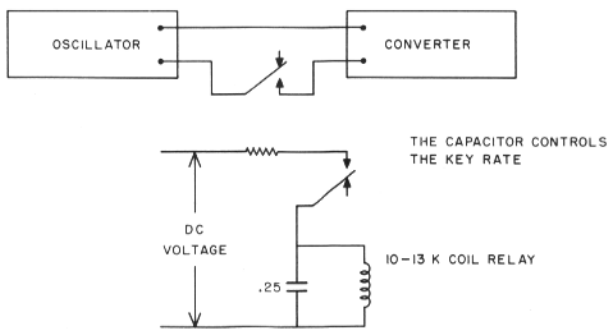


FIGURE 5

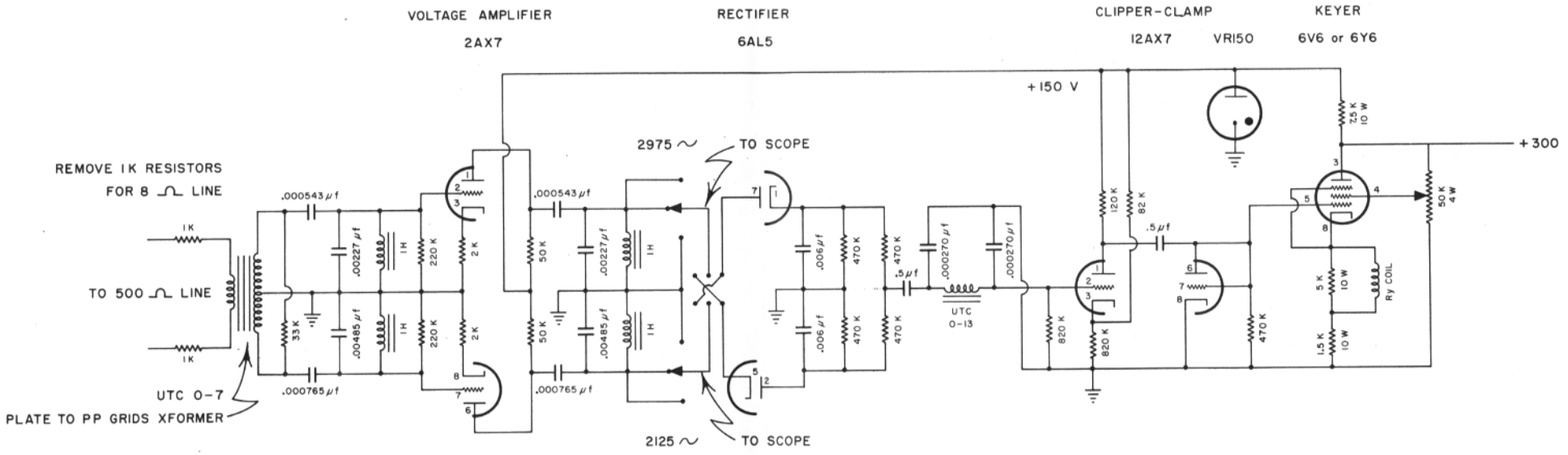


FIGURE 2

ADJUST .00227 TO PEAK AT 2975 ~

ADJUST .00485 TO PEAK AT 2125 ~

"The next project here will be either an AFSK converter using two oscillators spotted at 2100 and 2950 with nul networks following and with the oscillators pulled into sync by the incoming 2125-2975 signal, permitting the nul networks to pass the signals alternately—or a converter to translate Morse code into 5-unit printer code and then print it. Either job should be quite interesting—the biggest obstacle is the necessary appropriation of the necessary funds. Hi."

—73 Bruce, WØHZR

(More power to you Bruce.)

RYRYRYRYRY

"Was in a 5-way RTTY QSO this afternoon with W2BDI, W2PBG, W4ZPZ, and W9TCJ with land line copy all way round. During this QSO Ed, W2BDI said that he had talked to you on 40 meters last night and that I am to send your demonstration TU to him when I have finished with it. Will see that it is shipped sometime towards the end of next week as want to give it another try. A million thanks for letting me try it out and can truthfully say that mine works almost as well as yours, for which I am thankful."

—73 Fred, W3KYR"

(FB Fred . . .)

RYRYRYRYRY

"I recently talked to Frank White at his home in Silver Springs, Md., and he advised me to send to you for all of the back issues of RTTY."

—W4LAV

(We have all issues if 1954 except Jan.)

"It gave me a surprise when you said you worked for United, until I realized that you didn't mean the same Nnited. I work for United too only it is United Airlines. Hi."

—73 Reg, W6JUE

(Your Editor works for United Geophysical Corp., Hi.)

RYRYRYRYRY

"Maybe I am bourgeois, but I would like to see your Horse Trades include prices. I suppose you have some reason for this, but it is inconvenient for us who are isolated . . . "

(RTTY is non-commercial and as such does not include prices, sorry Ed.)

RYRYRYRYRY

"As usual conditions have not been too good on 40 during the vening but we manage to get through to W1BGW, Jack Berman at Boston on 7140 every Sunday morning almost without fail. I seem to be about the only active radioteletyper up here at the moment but hope the other fellows will get cracking again soon."

—Lou VE2ATC

RYRYRYRYRYRY

"We copy you here on occasions, I will enclose some copy if I can find it. We have been on the air only a few days but my meager 25 watts has contacted five states. It appears that I am the only North Carolina RTTY so the other states shouldn't be too difficult. Hi, Hi.

—73 Neal, W4ZPZ

. . . Say, Bill, a friend of mine noticed the ad in QST advertising for IBM technicians. I know that you work for IBM so thought you could give him some dope about the job. So back to you. W6VIH El Monte de W6CG Temple city. AR K.

* * * *

. . . W6CG de W6VIH El Monte. Yes Bud, we are looking for good men. The job briefly, is installing, maintaining, and trouble shooting on electro-mechanical and electronic business machines. It is very interesting work and the company has excellent benefits and security. As to qualifications, Bud, most hams have the electrical and electronic background we need. Our teletype friends have the added knowledge of mechanics and maintentance that is very good experience.

* * * *

. . . NR 10 KL7CK 579 Alaska. How say if you work W3MHD. I am hearing him here now. W6OWP de KL7CK KN.

* * * *

. . . WIBDI de W9BP. Fine bizzness Ed. QRM has hardly been this bad since I used to live down the street from Hiram Percy Maxim and tried to tune out his broad spark set at the original 1AW. My paper is tearing so better stop and fix it. Cu agn Ed. 73 W1BDI de W9BP Rockford, Ill SK.

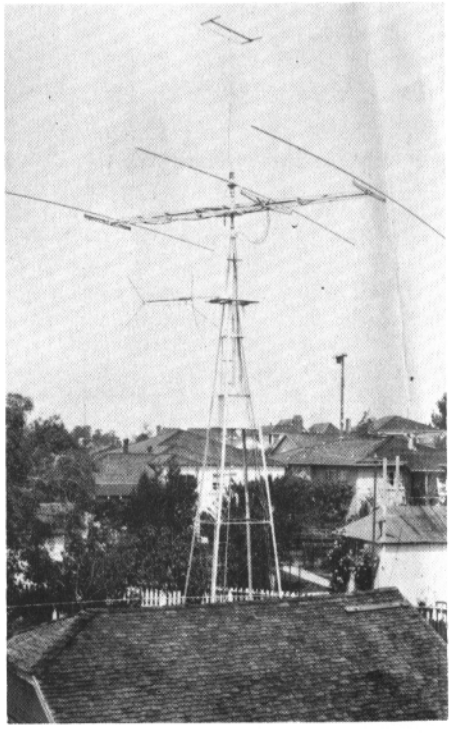
. . . W60GG de K6BWH. Gess I shud have gave you the RYs first Dennis. But forgot. Hi. Ur sigs very FB hr. 599 rpt 599 also copy is solid except both times when U mentioned Ur QTH I got a pile-up and all I got was rolling Hi than it pile up. Is it supposed to be rolling Hill or is that a lousy gess. Rig hr is just a small Heathkit running 25 watts and the VFO is also a Heathkit. I got the circuit for the reactance modulator that I put in out of one of the issues of QST. But can't quite remember which. The converter circuit I also got out of QST January 1953. You are probably familiar with the circuit. It's not the best converter there is but it is doing a pretty good job. I added a few of my own ideas to it Hi. I haven't been on RTTY too long Dennis. You are really my first contact outside of SF. But I have only tried a few times and that was when the band was pretty busy and my small power was doing to good cutting thru. So gess shoot it back to you. Think I had it long enuff. So pse rpt ur QTH all I got was Rolling Hills near LA. So hr she cums. W6OGG de K6BWH San Francisco AR K

* * * *

. . .W1AW de W9BP Roger on your number 16. Have heard W1AW on for many years but have not worked W1AW since the original "Old Man" was at the key. Used to live down the street from Hiram Percy Maxim and it was a job NOT to tune in 1AW when he had that old spark set. Used to operate Old Betsy in self defense as no QRM then. Hi!! Well Murray how is that printing? W1AW de W9BP K.

* * * *

. . . Roger your number thirty FB BEEP and if only ole Mason and Kruse could see us now Hi. Terrific interfence came on from couple of stations slitely off side but it didn't make you misprint a snigle character. Skip right and raise my report to a full S eight OM. TNX Vy 73 and BC u agn I hope. Good luck Beep. W9BP de W1BDI.



W6MZO

LEE MARKS—Redwood City, Calif.

The equipment is a BC610 on RTTY, usually have it on the low tap, have a 32V2 as a standby; also a 250 watt Tempco which is not on the air yet. The receiver is an HRO 50T, and a BC312 standby and of course the model 26 printer. My converter is by Bart W6-ØWP that was in Feb. 1954 RTTY. Have a three element beam on twenty, the picture shows a four element beam for two meters, which turns independently of the twenty meter beam. Am using a long wire on forty. Have a 522 for two meters in the shack and a portable job for the car.

Traffic Net News

By EMILE DUVAL, W6FLW

The RTTY Society of Southern California Net operates every Tuesday evening at 8:00 p. m. on 147.85 mc.

ACTIVITY FOR THE MONTH OF APRIL, 1955

April 5—W6CND, N. C.—26 Checkins

W6AEE	W6FNW
W6AFX	W6IAL
K6BTK	W6IIV
K6BXX	W6IZJ
W6CAP	W6JAU
W6CG	W6JJP
W6CKS	W6NV
W6CL	W6PSW
W6CMQ	W6RCM
W6DNJ	W6RL
W6EGZ	W6SCQ
W6EV	W6TZA
W6FLW	W6WYH

April 12—W6IZJ, N. C.—24 Checkins

K6BTK	W6KMT
K6BXX	W6LGO
W6CAP	W6NWM
W6CG	W6OZO
W6CKS	W6RL
W6CMQ	W6SCK
W6CND	W6SCQ
W6DNJ	W6TRX
W6EGZ	W6TRX
W6HQR	W6TZA
W6IAL	W6ZBV
W6IZJ	W6EV
W6JAU	W6FLW

March 19—W6FLW, N. C.—30 Checkins

W6AEE	W6KMT
W6AFX	W6NCP
K6BTK	W6NWM
W6BWQ	W6OZO
W6CAP	W6SCQ
W6CG	W6ZBV
W6CMQ	W6TZA
W6CND	K6BXX
W6DNJ	W6EGZ
W6EV	W6LGO
W6FLW	W6CKS
W6IAL	W6EFE
W6IIV	W6IEU
W6IZJ	W6FXF
W6JAU	W6VAD

April 26—W6EGZ, N. C.—28 Checkins

W6AEE	W6LGO
W6BWQ	W6NWM
W6CAP	W6SCK
W6CG	W6SCQ
W6CKS	W6TRX
W6CMQ	W6TRX
W6CND	W6VAD
W6DNJ	W6TZA
W6EGZ	W6ZBV
W6IAL	W6ZCC
W6IZJ	W6EV
W6JAU	W6AFX
W6JFZ	W6FLW
W6KMT	W6PSW

East Coast Traffic Net

The East Coast RTNET meets regularly on Wednesdays at 8:00 p. m. on 3620 kcs. At present approximately twelve to fifteen have been checking in and taking part in the handling of traffic.

The Mid Western RTNET also meets on Wednesday at 7:00 p. m. on 3630 kcs. from information received by RTTY. 10 to 15 stations have reported in during the last few weeks.

Arrangements have been made between W3PYW and W9TCJ to take care of any traffic originating in either RTNET with destination in the other RTNET. In half an hour after start of RTNET work, contact will be made between W3PYW and W9TCJ in respect to traffic on hand and then will relay on any traffic afterwards into their respective RTNETS.

Suggestions and ideas will be greatly appreciated and adopted if found worthwhile towards improvement of RTNET work.

Subscription Rate $2.50 Per Year

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RTTY Society of Southern California

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For Information Regarding the Society Contact the Following:

W6CLW—Ed Simmons
W6AEE—Merrill Swan
W6SCQ—Lewis Rogerson

For Traffic Net Information:
W6FLW W6IZJ

For "RTTY" Information:
W6CL W6DEO W6AEE