

TELETYPE AND CIVIL DEFENSE

By Dr. W. R. Hendrickson, W6TRX

The first known Civil Defense teletype net, owned by the City of Pasadena and operated by RACES hams for the seven cities of Area C in Region 9 of the State of California, was tested on December 18, 1954. The initial contacts were on 146.96 Mc between Pasadena, San Gabriel, and San Marino with W6TRX, W6DMK, and W6CND at the keyboards.

This trial culminated four months of buying and building by Dr. Walter R. Hendrickson, (W6TRX) who with Mr. Ted R. Smith, the Area C Coordinator and Pasadena's Director of Civil Defense, instigated and carried the project through. All the equipment was bought in the open market and no "Ham" was deprived of teletype equipment. Seven Model No. 26 teletypes and 14A transmitter heads were purchased. The model No. 26 distributors were modified to sense so that tape can be used. All modifications and the converters were built by W6TRX as it was felt that all installations should be uniform. The converters use the new Gates filters and follow the October 1954 design. Auto-start is incorporated, and audio FSK used throughout the system as an asset to net stand-by duty. The net will eventually be operated on 53.60 Mc as soon as all the seven cities procure transmitters and receivers for that band.

It is hoped that all the cities of Area C will purchase, under matching Federal Civil Defense funds, their individual new perforators since a complete net using tape would provide a most efficient inter-city communications net for Civil Defense.

KL7CK TERMINAL UNIT

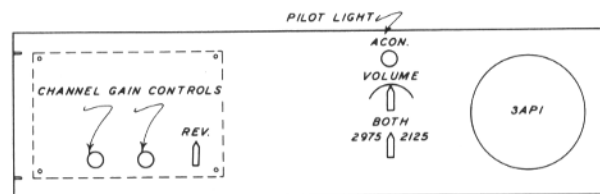
By Jerry McKinley, Juneau, Alaska

The tuning unit is as follows, one half of a 6SL7 used as an audio amplifier driven by a voice coil to plate transformer. The voice coil side is connected to the speaker output of the receiver so as to step the voltage up. A volume control is provided to adjust the input level to the 6SL7. The output of the amplifier is fed through a .001 and a .005 mfd to the input of the first section of the filters, the output of the filters feeding the two grids of a second 6SL7. Then a second section of filters connect from the plates of this 6SL7 to a pair of balancing potentiometers and reversing switch into another 6SL7 connects as diodes to provide the DC signal which contains the selected code signal. From the Detector outputs, the signal is filtered by two RC type low pass filter sections, and then is fed into the Clipper and Clamp circuit. The "Mark-Hold circuit" is similar to that which Bill Gates used in his TU. (October 1954 RTTY) A 6V6 is used for the output DC amplifier and has its screen and plate regulated by use of a VR-150 tube. The printer magnets are placed in the cathode circuit. The Scope indicators high voltage is taken from the transmitter in order to simplify the circuit. A separate DC high voltage supply could be used if desired.

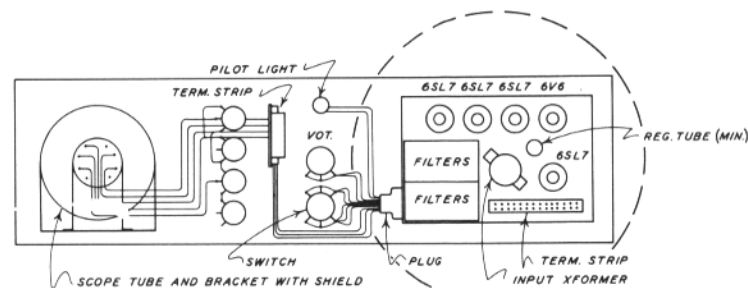
I have found that the coupling capacitors between the filters should be held down to .001 for the 2975 cycle filter, but can be increased to .005 for the 2125 cycle channel. Larger capacitors tend to effect the tuning of the toroids. The coils used in this TU are from a Telephone loading coil "pot." By their selves, they tune to 2125 cycles with .07 mfd, and to 2975 with .027 mfd. Other values of inductance can be used. Only changes being the value of capacity used to tune the two frequencies.

Layout on page 3

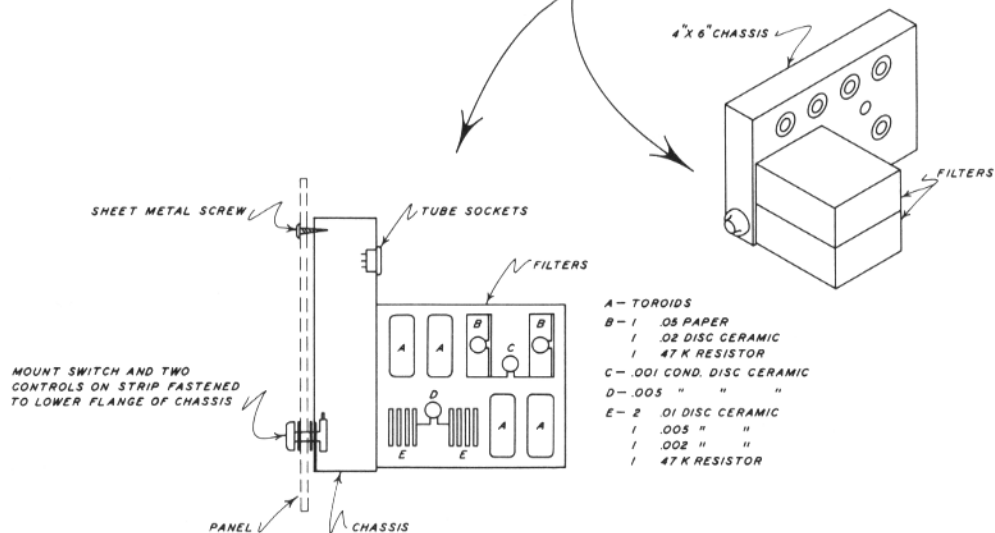
Circuit Diagram on pages 8 and 9



5 1/2" X 19" PANEL



4" X 6" CHASSIS



- A - TOROIDS
 B - 1 .05 PAPER
 1 .02 DISC CERAMIC
 1 47 K RESISTOR
 C - .001 COND. DISC CERAMIC
 D - .005 " " "
 E - 2 .01 DISC CERAMIC
 1 .005 " "
 1 .002 " "
 1 47 K RESISTOR

YOU TOO, CAN DO IT

By DAVE ABLOWICH, Jr., WØDW

In work with RTTY and other amateur activities we often face AF or RF filter problems which, for solution, obviously require "good" coils. While we all know that high quality coils employing specially engineered iron cores and other effective design features are available, few of us know where they may be obtained. Perhaps fewer, are inclined to pay the price when a source is known.

I have always felt that if the "dough" requirements were in the professional class, the activity ceased to be amateur. I have, therefore, made the needed components, or "made do" with whatever was available, if I could possibly accomplish the desired end. This practice has led to construction of coils which have proved satisfactory for most applications.

The time honored inductance formula found in various publications and noted in "Terman's Radio Engineer's Handbook" at the bottom of page 62 (First Edition) together with the table for possible turns in Random Wound Coils, on page 103, has been the basis of simply produced practical coils.

Anyone can do it. The section containing the formula, and the graph on page 61 indicate that multiple layer short solenoids with conformation of Fig. 1 (Terman's Fig. 27) will produce maximum inductance for a given length of wire when the cross section is square and approximately equal to 2/3 the mean coil radius; i.e., $b = c = 2/3 a$. Roughly, the best coil of this shape can be wound

on a spool where the side of the square slot is $1/4$ the spool diameter.

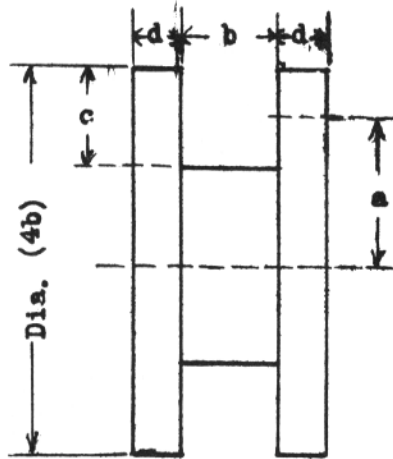


FIG. 1—COIL AND SPOOL CONFORMATION

The starting place is usually required value of inductance, but often space is limited, so suppose there is clearance for a form of 2" diameter for a 30 mh coil. $b = c = 1/2"$. $a = 3/4"$. $L = 30,000$ uh.

$$\text{The formula: } \frac{.8 a^2 n^2}{6a + 9b + 10c} = L \text{ becomes}$$

$$30,000 = \frac{.8 (.5625) n^2}{4.5 + 4.5 + 5.0} = \frac{45 n^2}{14} \text{ from which}$$

$$.45 n^2 = 420,000. \quad n^2 = \frac{420,000}{.45} \quad n = \sqrt{\frac{420,000}{.45}} =$$

$$\sqrt{933,333} = 966 \text{ Turns.}$$

Therefore 966 turns must be wound in a slot $1/2"$ square or in $1/4$ sq. inch, or in the ratio of 3864 turns per square inch. The mentioned wire table shows that

3891 turns of #27 enameled may be "random wound" in a square inch (or 973 turns in $1/4$ sq. inch. The spool may be secured to the chuck of a vice held speed drill and the slot filled about level full of #27. If you want to count the turns, OK, but level full is likely close enough. Place the coil in position in the circuit with the required value of capacitors. (This may be determined with a simple checker). If the result doesn't suit you,—with the desired frequency applied, remove or add a few turns of wire or a small amount of capacitance to bring the circuit on the nose to the cycle. Sounds easy—and it is.

Suppose, however, that this coil is not quite "good" enough for your job. Make room some way and figure on doubling the cross section. This will enlarge the dimensions about .4 times. A good figure is $3/4"$ for b and c , which makes " a ," $1-1/8"$. The slot is then .5625 sq. in. The new coil and spool are 1.5 times as large as the original. $\sqrt{1.5} = 1.225$. $966 / 1.225 = 789$ or approximate turns in the new coil. (If you work the formula again the value comes out 802. This is approximately 1400 turns per sq. in. Referring to the table (p. 103, Terman) #22 is 1255 and #23 is 1525 turns per sq. in. Wound with #22 the slot would be nearly 100 turns short; with #23, about 60 turns over, level full. Use your own judgement.

Perhaps the only wire you can find is #30 enamel, and you want the best 30 mh coil you can make with it. Twice as much #30 can be wound in the same space as #27 (table again), so a 2" diameter spool would be 120 mh. The size of the spool must be reduced. Since in-

ductance varies roughly as the square root of the coil or wire dimensions and the wire is $1/8$ the area of #27, $\sqrt{2} = 1.414" =$ diameter. This spool would have a slot .353" square. A close figure that we can measure easily is $3/8"$. If you use a slot $3/8"$ square (1.5" dia. spool) and wind it full of the #30, the inductance will be very close to 29 mh.

About spools—In general, the bigger the spool and wire for a given inductance, the better the coil. In order to hold their shape, the dimension " d " should be at least $1/8 b$ in small coils, perhaps equal to or greater than " b " where large coils of #24 or heavier wire are indicated. If a lathe is handy they can be turned easily to dimension from any hard wood. If not, a round of the proper size may be cut to length and slabs secured to the ends with waterproof glue. (LePage's Plastic Resin,

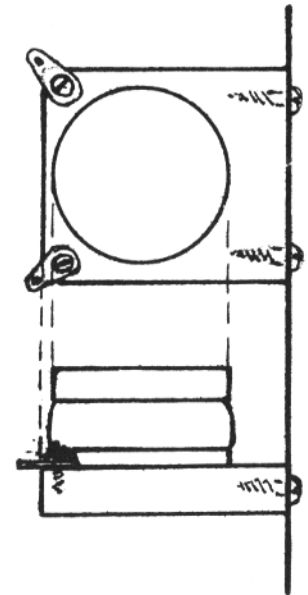


FIGURE 2

29c for 3½ oz. at the dime store is excellent). Let the spool set in a C clamp for at least 4 hours before winding.

The spool winds easier if the ends are round. If one of the sides is made larger and trimmed to leave square faces something like Fig. 2, you have means of mounting the coil to a chassis with wood

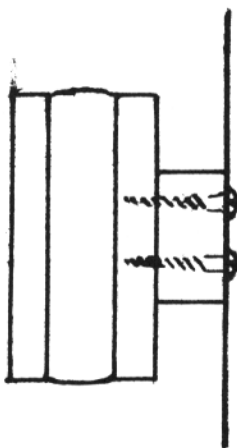


FIGURE 3

or machine screws. Clearance should at least equal b (or c) Fig. 1. A round spool may be mounted as in Fig. 3 with clearance at least equal "a". The wood screws should not extend into the center of the coil. Trimming should be checked with the coil in its final position.

Before mounting permanently, the finished coil may be boiled in a mixture of 4 parts of paraffin wax to one of beeswax, by volume, until bubbling from the wood about stops. Excessive temperature will cook the wood. A strip of masking tape around the finished coil will protect the exposed turns.

How "good" are the coils? The Heath-kit "Q" meter doesn't provide for frequencies below 150 kc or values above 10 mh—so performance was the answer I got. In a TU circuit similar to the W2-PAT job (Jan 1953, QST) coils wound with available wire gave performance much better than any of several TV linearity or width coils with similar values of inductance. A spare coil, 75 mh, removed from an unused audio filter in a sideband exciter worked satisfactorily in the phase shift circuit for a scope "tuning and deviation" unit. (WØHZR, RTTY, Nov. '54). Some years ago a small coil in a series circuit tuned with stock condensers, placed across the primary of a transformer, 6J5 Plate to line, dropped the 10 kc beat between adjacent channel broadcast stations 26 db in a knife edge slot. This coil had a Q of 50 at 50 kc. (Old Boonton Q Meter).

While it is recognized that they are far from the best coils in the world, in sizes from a few uh to about 1 henry, they are good, and mighty easy to produce to practical tolerances.

IN THE NEXT ISSUE

RESULTS OF THE SWEEPSTAKES CONTEST

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 FEBRUARY, 1955

Feb. 1—W6FLW, N. C.—26 Checkins

W6AEE	W6EGZ
W6BWQ	W6NWM
W6CAP	W6MQP
W6CG	W6RL
W6CKS	W6SCQ
W6CLW	W6TZA
W6CMQ	W6WYH
W6EV	W6JFZ
W6FLW	W6IAL
W6IIV	W6JAU
W6IZJ	W6NV
W6KJO	W6NCP
W6NAT	W6FNW

Feb. 8—W6EV, N. C.—25 Checkins

W6AEE	W6LGO
W6BWQ	W6NAT
W6CAP	W6NWM
W6CG	W6SCK
W6CLW	W6SCQ
W6CMQ	W6TZA
W6CYR	W6ZBV
W6EGZ	W6OZO
W6FLW	W6IAL
W6IZJ	W6IIV
W6JFZ	W6EV
W6KJO	K6BXX
W6KMT	

Feb. 15—W6EGZ, N. C.—27 Checkins

W6AEE	W6IZJ
W6BWQ	W6JAU
K6BXX	W6JFZ
W6CAP	W6KMT
W6CG	W6MQP
W6CKS	W6NAT
W6CLW	W6NWM
W6CMQ	W6NV
W6EV	W6OZO
W6EGZ	W6RL
W6FLW	W6SCQ
W6FNW	W6WYH
W6IAL	W6TZA
W6IIV	

Feb. 22—W6FLW, N. C.—23 Checkins

W6BTK	W6IZJ
W6BWQ	W6JAU
K6BXX	W6KMT
W6CG	W6NAT
W6CKS	W6NWM
W6CLW	W6PSW
W6CMQ	W6RL
W6FNW	W6SCQ
W6EGZ	W6TZA
W6EV	W6WYH
W6FLW	W6ZBV
W6IAL	

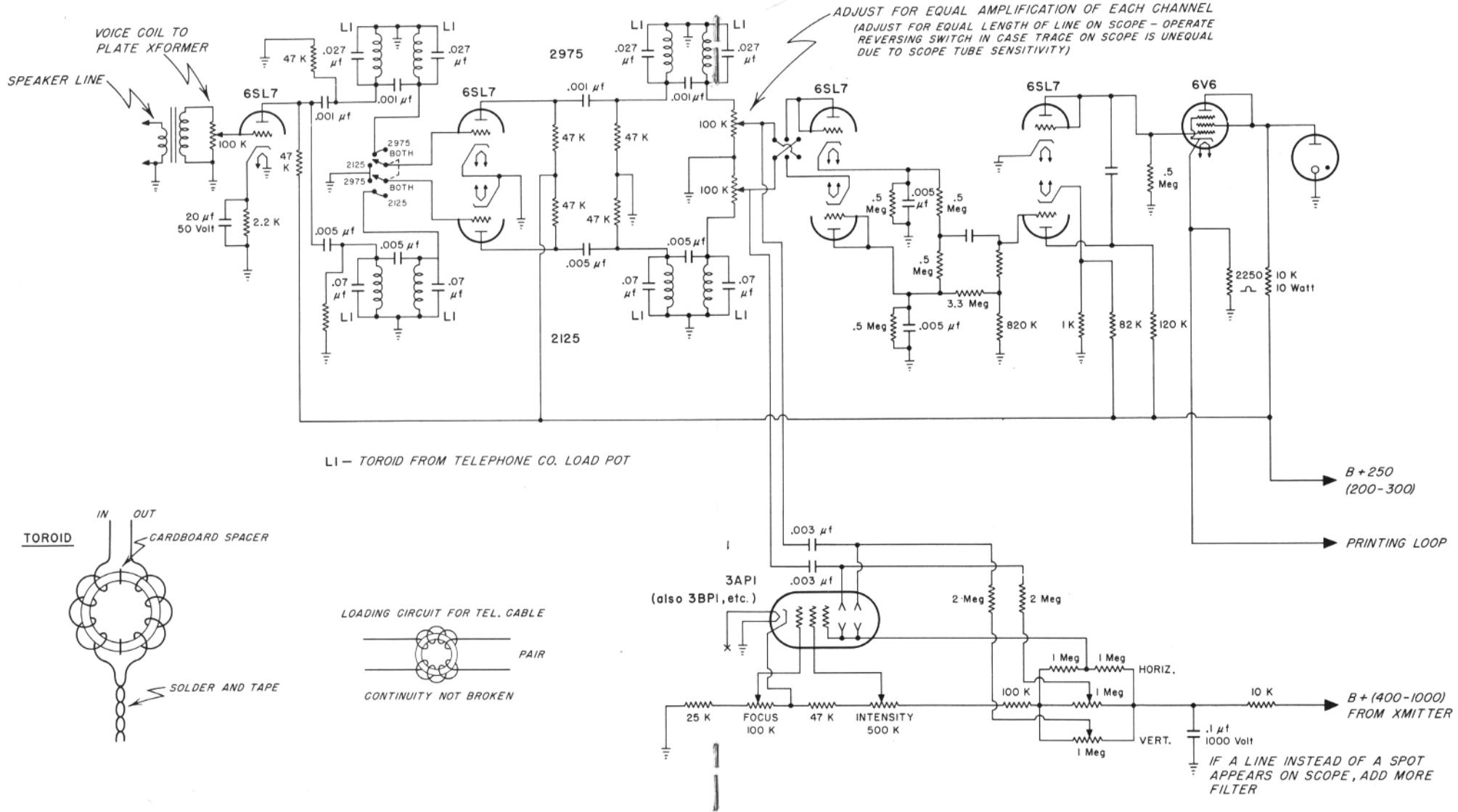
East Coast Traffic Net

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.

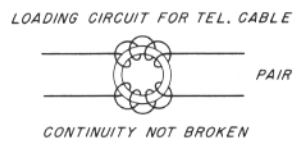
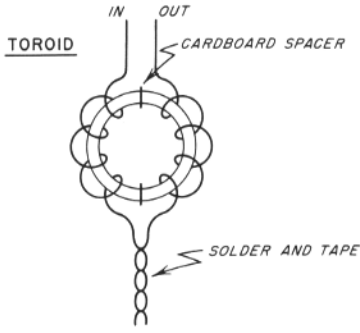
The Mid Western RTNET also meets on Wednesday at 7:00 p. m. on 3630 kcs. from information received by RTTY. 10 to 15 stations have reported in during the last few weeks.

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.



LI - TOROID FROM TELEPHONE CO. LOAD POT



IF A LINE INSTEAD OF A SPOT APPEARS ON SCOPE, ADD MORE FILTER

FILTER DATA

By Boyd Phelps, W9BP, WØBP, WRRR, Rockford, Ill.
(Measurements made by Boyd Phelps, Rockford, Ill., 12-8-64)

Measurements Made on Thordarson Band Pass Filters

Use: Input to Teletype Terminal Unit (Passes both "mark" and "space").
Source and catalogue description: Radio Surplus division of Capitol Commodities Co., Inc., 1229 W. Washington Blvd., Chicago 7, Ill. "Stock No. 5897. 600 ohms to 600 ohms. 1700 cycles to 3300 cycles. Attenuation 25 DB at 1450 cycles or 50 DB at 4880 cycles. Size: 6" x 6 5/8" x 5". Net each \$8.00".

Cycles	Dec. '54 Unit from above source DB down from peak	Old Unit obtained elsewhere, '53
800	-64.6	-63
900	-60	-58.2
1000	-56.3	1040 -55.2
1100	-54.5	1140 -60
1150	-55.5	minor peak
1200	-59.2	minor dip
1250	minor notch	-40
1300	-43.2	-33.8
1350	-38.6	-30
1400	-33.7	-25.4
1450	-25.6	-14.8
1500	-16.7	-7.1
1600	-5.7	-3.9
1700	-4.3	-3.3
1800	-3.9	-2.4
1900	-2.7	-1.0
2000	-1.15	-0.1
2100	-0.1	2045 ZERO
2160	ZERO	2200 -0.7
2300	-0.9	-1.1
2400	-1.7	-1.8
2500	-2.3	-2.1
2600	-2.8	-2.4
2700	-3.2	-2.6
2800	-3.4	-2.6
2900	-3.7	-2.8
3000	-3.9	-2.9
3100	-4.4	-3.8
3200	-4.7	-4.3
3300	-5.5	-5.3
3400	-6.6	-6.9
3500	-7.9	-8.4
3600	-9.2	-10.2
3700	-10	-12.9
3800	-11	-18.4
3900	-14.2	-20
4000	-20	-21.3
4200	-28.4	-23.8
4500	-34.8	-33.5
5000	-54	-55.8
5500	minor notch	-64
6000	minor peak	5200 -58
7000	-58	5750 -62
ETC		8000 -66

See Fig. 1 Curve, next page

Measurements Made on "Low Pass" Filters Available from Surplus

Use: Amateur Speech Amplifiers to eliminate wide Side Bands, reduce interference, and for edge of band operation.
Source: Two types are available from Radio Surplus division of Capitol Commodities Co., Inc., 1229 W. Washington Blvd., Chicago 7, Ill.

- (1) "U.T.C. Low Pass Filter. Stock No. 6197. A low pass filter with a cutoff frequency of 2500 C.P.S. at less than 4 D.B. loss. Attenuation at 400 C.P.S. "(4,000?)" is 30 DB or more. 100M ohm impedance, operating at 10 volts. U.T.C. No. 52804. Sig. Corps No. 2C4179-C/F2. Used with BC-197C. Net each \$3.50." (Believe "400 CPS" should read "4,000 CPS".) Cat. error?
- (2) "Low Pass Filter. Stock No. 6413. 500 ohm. 200 to 2000 cycles. Sig. Corps No. 3Z1891-1.2 P/O R/19A-TRC-1. Each \$1.50" (Mfr: Lear, Inc., Grand Rapids, Mich.)

Freq. In C.P.S	U.T.C. \$3.50 No. 6197	Lear \$1.50 No. 6413
30	ZERO	
50	-0.2 DB	
100	-0.9	
200	-1.4	
300	-1.7	ZERO
500	-1.1	-0.1 DB
1000	-1.2	-0.9
1500	-1.8	-1.4
2000	-2.6	-1.6
2500	-3.5	-2.4
2750		-6.4
3000	-5.3	-17.1
3250		-26.1
3500	-9.2	
3450-3700	flat curve at	-32.6
4000	-28.0	-36.1
4500	-23.8	-41
4900	null	null or dip
	-36.6	
	minor peak	
5000		-39 rise
6000	-40	-36
6600		minor peak
10000		-39
15000		-44
20000	-48	

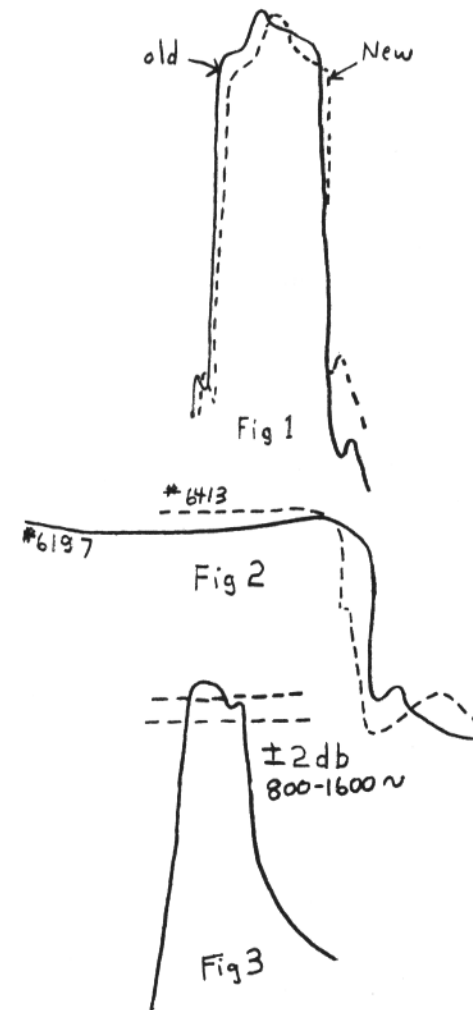
See Fig. 2 Curve, next page

Measurements Made on Medium Frequency Thordarson Band Pass Filter T-48500

Use: Teletype Terminal Unit for "Make and Break" system, about 850 cycles.

Source and catalogue description: Radio Surplus division of Capitol Commodities Co., Inc., 1229 W. Washington Blvd., Chicago 7, Ill. "Thordarson Audio Pass Filters. Stock No. T48500. Band pass 800 to 1200 cycles. Input 1000 ohms. Level 10 DB. Net each \$5.00".

Freq. Cycles	DB down from peak
300	-65
400	-56
500	-44
600	-33.4
700	-20
750	-12.1
800	-4.0
825	-1.6
850	-0.9
900	-0.2
915	ZERO
1000	-1.0
1045	-1.5 slight dip
1090	-1.3 slight peak
1150	-3.8
1200	-9.7
1250	-14.4
1300	-18.8
1350	-22
1400	-25
1450	-27.6
1500	-30.5
1600	-34.2
1700	-37.5
1800	-40
2000	-43
2500	-47.4
3000	-49.5
ETC	



While full use of FSK is generally considered superior to MAB in commercial service, there are often cases in amateur practice when a strong interfering signal may be almost exactly the frequency of either the M or S carrier which will blank out printing. Intelligence is contained in either the M or S frequency. The one having the strong interference may be tuned to below 300 cycles where the interference is attenuated over 65 DB and with the other teletype carrier producing a beat note around 900 cycles, practically perfect copy may be obtained with the above filter unit. A M-S reversal switch on the relay contacts should be used, and excessive limiting avoided so as to retain the advantages of this filter (a.v.c. perhaps being preferable).

See Fig. 3 Curve



"It is with deep regret that RTTY reports the death of our Printers (W6DEO) dad's passing.

"For a converter I have built the one described in Jan. 1953 QST. It seems to operate quite well. I can get near perfect copy most of the time until the spark noise takes over. Hence the inquiry on the 26's."

—73 Ed WØZVV

RYRYRYRYRY

"I built up the Gates Version of a terminal unit described in October RTTY Suggest VR tube be changed to a VR-150 and the 10 K 10 Watt resistor be changed to a 5 K, otherwise the converter works very nice."

—73 Roger W6FDJ

RYRYRYRYRY

"Any one interested in the low frequency RTTY meeting at the NYC IRE Convention on Monday March 21, 1955, write or contact W2BDI Ed Clammer 1951 Hillcrest, Merchantville, New Jersey. A RTTY forum a Rag Chew, followed by a full course dinner. Cost of the dinner which required advance registration is seven dollars. The committee consists of Bob Straub, W2PGB, Phil Catona, W2JAV, and Ed Clammer, W2BDI.

"Just a line by carrier pigeon to tell you that we copied you here tonight . . . Sunday. Also to tell you that you were my first ham copy. Was sure a surprise to see ur call coming thru, especially since I have been in communications thru the mails. I would like to take this opportunity to thank the RTTY Society for getting the machine for me. We went over to W6VPC and picked up the machine in Oakland and had quite a long chat with Buck."

—73 Reg W6JUE

RYRYRYRYRY

"Correction on name of W7OS page 5, RTTY November 1954, should have been Doc. Sorry . . . Ed."

RYRYRYRYRY

"Seems like it takes a contest to bring some of these guys on the air. Was really disappointed in condx the last contest."

—73 Roy W2KTO

RYRYRYRYRYRY

"I read the "Comments of the Friend of the Old Man" and tho I enjoyed it, I smell a faint trace of a hint that it might be aimed at me. Look, you old button pusher, I have been on the air with my Model 26. Have even called you on 3612, but no soap . . ."

"Forty has been in such bad shape that even the W6's don't get thru at night. Did work K5WAT and W7KWB in Phoenix (K5WAT was in Lubbock, Texas) on eighty one evening about midnight."

—Frank W3MHD

RYRYRYRYRY

"I recently had loaned to me a copy of CQ magazine, and have been very interested in your article on Radio Teletype. Unfortunately "hams" in Australia are not permitted to use RTTY and therefore little interest has been shown. However though transmitting is not permitted I am very interested in the receiving side."

Richard C. Hope VK3LQ

RYRYRYRYRY

"I would like to have information on receiving the RTTY Bulletin. I am just getting our MARS Station started on Teletype and would like it known that we are open for traffic 12 hours a day on all bands, phone CW and now Teletype. The station is located at Walter Reed Army Medical Center, Washington, D.C. Our ham call is K3WBJ. The MARS call is AA3WBJ."

—Hugh L. Green W3TLU

**"AWARD OF THE MONTH WINNER"
(Thimble full of chads)**

"Too many bugs in the old termite unit. Am rebuilding new deluxe T.V. that is years ahead of the times. Must leave now to finish it before next issue of RTTY comes out."

"W9TCJ sent me . . . hi. Enclosed is check for a one years subs. to RTTY."

—73 Royce W5UGY

"JUSTIFIABLE HOMICIDE DEPT"

"Yes darling, I know its after midnight but I want to make a few more RTTY contacts, so you go on to bed with the new heating pad I bought you for Xmas."

(Looking up from keyboard) "Say, what are those round green dots all over you?"

"JUSTIFIABLE GRIPE DEPT."

"Roger . . . you printing perfectly here in Minneapolis. Only thing is that my model twelve does not unshift on spaces and most of the copy is in numerals and symbols but am sure I got you ok. Wait a bit until I translate it from the keyboard."

W8ZM de WØBP

**Subscription Rate \$2.50 Per Year
RTTY is the Official Publication
of the
RTTY Society
of Southern California**

**and is published for the benefit of all
RTTY Amateurs and Experimenters
Permission to copy is granted
provided credit is given.**

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

