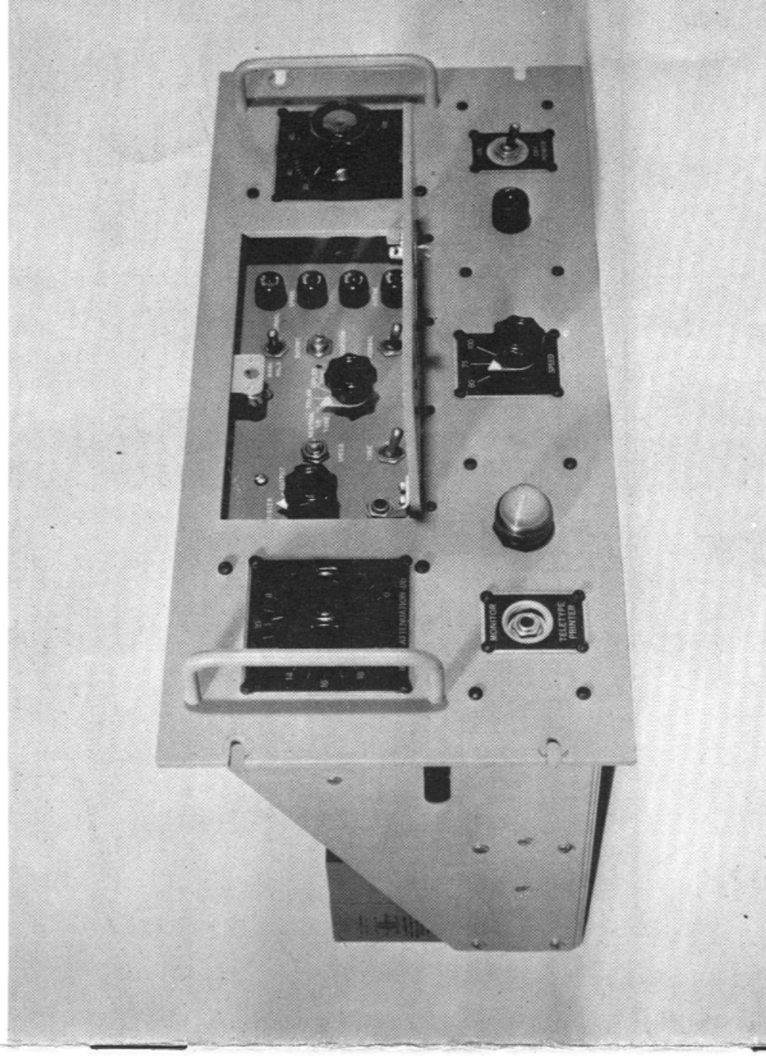
RTTY



THE TT-63/A REPEATER

RYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRY

NEWS OF AMATEUR RTTY

APRIL, 1964
30 Cents
Vol. 12, No. 4

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 14 typing reperf or will trade. Also have AN/FRR3A receiver set-up, trade or sell. W3LST, 228 Plummer, Oil City, Pa.

WANTED: Model 12 in repairable condition. It must be real cheap. WA2YSH, 1576 Van Allen Road, Wyoming, New York 14591.

FOR TRADE: My electronic equipment ánd parts, for your coin collection. Send dime or SASE and your list of coins, for my list. Also for sale, Collins 51-J-3, Technical Manuals for RTTY and other electronic equipment. Wanted: CV-182 FSK converter. K8BBW, Box 3, Pavonia, Ohio 44863.

FOR SALE: Model 26 and 15 motors, excellent condition, $10.00. W0DTY, 2305 W. 28th Avenue, Denver, Colorado 80211

FOR SALE: Model 26A printer with table, in mint condition. Auto-Mate LF and CR. Comm palletts. Will not ship. $75.00. A. L. Morrison, 3616 NE 137th Avenue, Portland, Oregon 97230.

FOR SALE: 88 or 44 mhy toroids, 60¢ each, five for $2.50. 800 microampere meters, Weston model 1021, $2.00. Please add 35¢ postage. W5EJV, 804 Shady Lane, Dallas, Texas 75208.

FOR SALE: 255 polar relay and socket $2.00 postpaid USA. W7DQT, R.R. 2, Box 160, Lebanon, Oregon.

WANTED: Boehme Keyer for CW Tapes. WA6FBL, 1320 Pelem Court, Stockton 3, California.

FOR SALE: Excellent condx; R-390A/URR with book at $750.00. KWS-1 with RTTY and book at $700.00. Model 14 typing reperf at $100.00. CV-116A/URR IF converter, dual channel for diversity, with auto freq control, a real beauty with book, at $250.00. WANT: SX73 and R-278B/GR. W1LWV, 99 Water Street, Millinocket, Maine.

FOR SALE: AN/FGC-1 radio Teletype converters $75.00 each or two for $100.00. Heavy duty (25 amp) Teletype power supplies PEC-260 $75.00. Standard 19"x72" Relay Racks $60.00 value for $22.50. Send for free list. Gulf Electro-Sales, 7031 Burkett, Houston, Texas 77021.

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AIR MAIL

REVISED BRAILLE KEYBOARD

Ray E. Morrison, W9GRW

To make the braille teleprinter keyboard, described in the December, 1963 RTTY, compatible with the code used by the American Printing House for the Blind, the following changes are required.

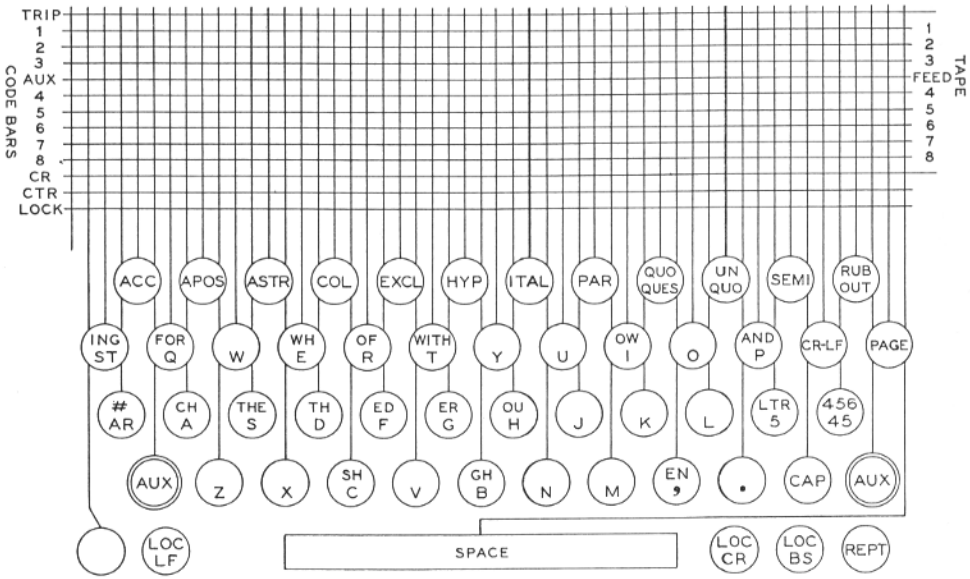
Function	*Position*	*Code*
CR-LF	47	1, 8
PAGE	51	1, 2, 7, 8
SPACE	52	7, 8

It is also necessary to interchange cams 7 and 8 of the selector cam on the monitor printer since level 8 is used for control purposes instead of level 7 used in the standard 8 level printer. Level 7 is used for redundancy or parity check in the A.P.H. Code and is not used in the monitor printer.

The cover diagram illustrates the revised keyboard layout. The key levers in the spacebar row are for local control of the monitor printer except for the left "blank" key lever which transmits a blank character on the line. The "local backspace" key, in addition to backspacing the monitor printer, backspaces the nontyping reperforator in the ASR setup so that an error in the tape can be "rubbed out" and the correct character perforated.

The live drawings in this and the December article were made by Bill Price, W9UXS.

Coming in the next issue—Braille Amateur RTTY.



THE TT-63/A REPEATER

IRVIN M. HOFF
K8DKC
1733 WEST HURON RIVER DRIVE
ANN ARBOR, MICHIGAN 48103

In recent months ads have appeared in various amateur magazines telling about a surplus government item called a regenerative repeater for teletypewriters. This unit was made for the Navy and is called the TT-63A/FGC. They have been selling for slightly under $40, and a great number have been sold—unfortunately not very many manuals have been available (these items were part of a set called the AN/FGC-7A which used eight repeaters, and this would indicate some of the reason that manuals are scarce!).

What Is It?

A regenerative repeater can correct for extremely biased signals, and since it only samples a very small portion of the pulse (one millisecond versus about five milliseconds for the model 15 printer for example), this sample can be easily varied from the beginning of the pulse to the end of the pulse, by the operator. (Actually from 2-20 milliseconds.) This sample is then used internally by the repeater to trigger multivibrator circuits that "restore" the complete pulse once more as a perfect signal. Thus the repeater can be easily adjusted to counter-act a biased signal without needing to correctly set the printer's range control—which is often difficult to get at. Another advantage of correcting the bias in the repeater circuit rather than at the printer is in the case you have several printers; or a printer and a reperforator in the same circuit. With the repeater, the output will be an excellent reconstructed perfect pulse; and all machines on the output of the repeater will print identically if they are adjusted to print well on a local loop.

WA9IBB (Jim Haynes) has pointed out that a "well-adjusted" printer in itself works as a regenerative reperater, and in this case a repeater has little to offer. This is correct, of course, but the repeater has several other functions available that add to its versatility. In the first place a "well-adjusted" printer is at times hard to come by. If your printer runs from maybe 15 to 100 points or so on a local loop and prints well between those extremes, it could be considered "well-adjusted." It should print well on nearly any RTTY signal that is not horribly biased, with no further adjustment. By varying the range setting intentionally, you can move the five millisecond sampling area from the middle of the 22-millisecond pulse toward the beginning or the end to help counteract marking or spacing bias on the incoming signal. However, the chances that you will do this are remote. Instead you will probably just tell the fellow that you cannot copy him. On the other hand, the repeater has a range adjusting knob right on the front in a prominent position and can be quickly used not only to counteract for bias, but also to FIND AND DETERMINE BIAS.

So among other things, the repeater works as a form of bias meter; if the range knob is to the left (around zero) and the printer stops accurately printing, the bias is spacing, which is most usually the case.

If the knob is toward the right (100), the bias is marking. An excellent signal will print correctly from 0-100, representing 2-20-milliseconds. As you can imagine, not many signals will print the entire range perfectly. One need not send any special characters or at any special speed to determine the type or presence of bias. This unit will not measure HOW MUCH bias directly, but you can get an idea if it is a small amount, medium amount or lots of bias by how nearly you approach 0 or 100, etc.

Another feature that will appeal to some is the false start gate. It is difficult to explain how this works, so we will tackle that later, but for now it is enough to say that it will take at least a 10 millisecond start pulse to trigger the unit. So on short bursts of impulse noise or static, this unit will not respond. The printer probably would if not used in conjunction with a repeater.

Another feature of interest is the mark-hold circuit. In the event you walk away and turn the receiver down, the mark-hold takes over and the printer remains idle. In conjunction with VHF, etc., (where the squelch blocks off the receiver output in the absence of any signal) this makes a rather effective autostart system.

Another feature is the unique manner by which the sampling is taken. Since this triggers a multi-vibrator circuit, if the signal happens to be a continuous space signal, then after printing one blank key, the printer again locks up until a transition occurs to again trigger the multi-vibrator. Essentially, this gives you "mark-lock" even on a constant space signal, after the first blank letter was printed. Thus if a station sends its CW ID on NFSK on mark or space either one, the

printer will tend to stay in idle. (This assumes the NFSK was narrow enough to stay in the mark or space filter during the ID.)

There are many other features which enable this unit to be used in other manners. Since it has character-recognition circuits in it already, it could probably be used in connection with a series of binary counters for autostart on lower frequencies such as 80m. It can be used to key transmitters directly; one fellow is using it to trip a "sounder" for CW as he copies that better than MAB CW; and last but not least it *can* be used as a converter, directly. For this purpose, it would take a very narrow IF position on the receiver for copying only the mark signal or space signal alone, plus a loop circuit in the output to drive the printer. Fairly narrow audio filters such as the FL-8 tone filter have been used with this unit as a converter. However, it should be pointed out that this gives only moderately good copy unless the signal is quite strong. This would work in a similar manner to other normal converters being used on Mark only or Space only copy—sort of marginal on MAB—it was for this reason, mostly, that the two-tone converters are being developed.

All in all, this unit enhances the station of the serious amateur, particularly the traffic man who likes to reperf incoming material. With this unit, the reperf and the printer will both print the same.

Hooking the Unit Up

There are 3 inputs on the rear of the TT-63/A. One for direct audio (AC); one for low-impedance DC neutral keyed (on and off) and one for DC polar keyed (plus and minus). For the most convenient use, none of these are best to the average amateur. If you already have a converter with a keyer tube circuit, this unit can be readily adapted so that you can use either the repeater or the keyer tube.

The first three stages are only concerned with the audio input, which in all likelihood you will never use.

What we really need is a high-impedance polar-keyed input. This can be quickly and easily obtained with a simple modification. First find tube V-4—they are clearly marked on the top of the chassis. Then turn the unit over and remove the bottom plate.

Again find V-4 inside the unit. Remove the two green wires from pin 4 and tape them (separately is ok) for possible future use. Now run a wire from pin 4 to the terminal strip on the rear—to one of the "spare" contacts.

You now have modified the unit to high-impedance, and a normal polar-keyed signal such as is normally gotten from the output of a flip-flop stage or a Schmitt trigger (or a DC amplifier stage giving a large plus and minus swing from mark to space), will work ok.

Figure One shows a typical 6W6 output stage in a converter.

We have all the ingredients right here to now use the converter with no other part needed except one more resistor which will drop the same voltage as the keyer tube, which we can replace readily.

Get an octal male plug with cover—wire it as shown in Figure 2. You are then finished when you connect those wires to the terminals of the repeater. In some converters such as the Electrocom, the keyer tube is located inside the converter and not easy to remove. We have a circuit worked out for that purpose if anyone is interested, but please send a large-sized self-addressed, stamped envelope in that event. With this method, you can use the repeater on various converters easily and quickly; or change back-and-forth on any regular converter to note the effect. We can't include circuits for every configuration in a simple article, but probably you can integrate one into your present station easily enough.

Just remember that the output on the repeater is merely a mercury-wetted relay that opens and closes. It will be closed for mark and open for space. There are many ways it can be used, and only one has been presented here to accommodate the majority of converters.

It should be clear from Figure 2 that the 6W6 is removed from the tube socket and the repeater plugged in. No other adjustments should be necessary and the loop current should remain the same. The 1200 resistor was computed for a 30 ma. loop, and if you do not have the same current with the repeater you had with the tube, try a different sized resistor.

The Repeater as a Converter

With a simple input filter, the repeater CAN BE used as a simple MAB (*M*ake-*A*nd-*B*reak) converter. However this is far from satisfactory and W8SDZ has worked out a simple linear discriminator with axis restorer for use in front of these converters. See Fig. 3. This circuit was adapted from the balanced bridge linear discriminator used in the Dyna-Kit FM tuner, and requires no limiting for satsfactory performance. It takes only one toroid, and has been modified to allow narrow-shift reception as well as wide shift. A band-pass input filter ahead of this unit would have some merit; otherwise use the sharpest IF selectivity in the receiver that allows both mark and space to pass. This combination is not intended to be the "ultimate" in RTTY reception, but the axis retorer does allow good copy automatically on mark only or space only, and thus a considerable latitude in mis-tuning can be tolerated. As a result no tuning indicator is included in this simple presentation. This circuit includes a low-pass filter, of a simple type which is quite effective in helping to achieve a more narrow bandwidth. This circuit gives sur-

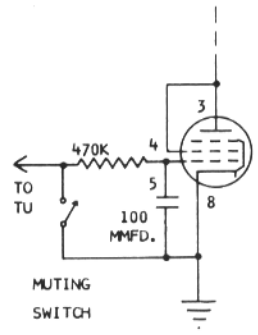
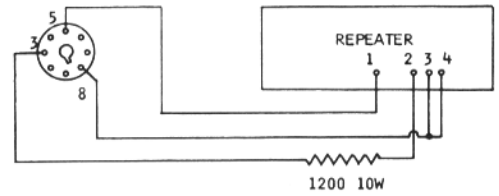


FIG. 1

EASY METHOD OF CONNECTING REGENERATIVE REPEATER TO PRESENT CONVERTER, MAKING NO CHANGES IN PRESENT STATION WIRING.

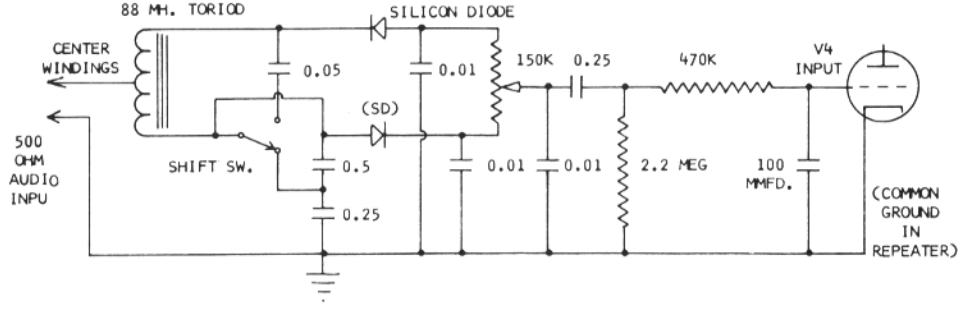


1. SPARE (TO GRID OF V4 AS MODIFIED)
2. OUTPUT CONTACT (9 FROM RIGHT END)
3. OUTPUT CONTACT (8 FROM RIGHT END)
4. GROUND CONTACT (7 FROM RIGHT END)

K8DKC

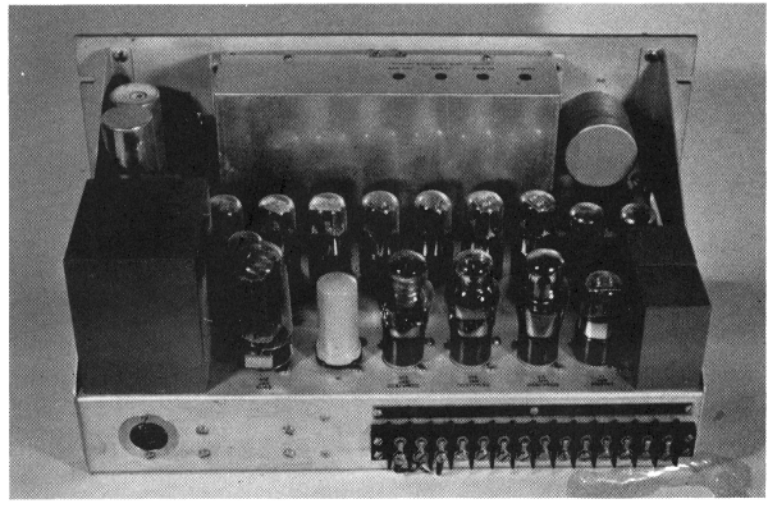
FIG. 2

SIMPLE LINEAR DISCRIMINATOR WITH AXIS RESTORER FOR USE WITH TT-63/A



THE SHIFT SWITCH IS SHOWN IN THE NORMAL WIDE POSITION FOR UP TO 850 SHIFT THROWING IT OTHER WAY PROVIDES NARROW SHIFT COPY. THE OUTPUT CONTACTS OF THE REPEATER WILL GO IN SERIES WITH A LOCAL LOOP-PRINTER CIRCUIT. THE OUTPUT CIRCUIT IS CLOSED ON MARK AND OPEN ON SPACE. THE POT IS SET ABOUT MID POINT AND ADJUSTED FOR EQUAL PLUS AND MINUS SWING ON MARK AND SPACE.

FIG. 3



prisingly good copy, and in fact does better than many expensive circuits under many conditions of selective fade, etc.

Theory of Operation

To really understand the action of the various stages (there are 14 tubes; a rectifier and a mercury-wetted relay!) one should really study the manual which has an excellent discussion. However, a quick run-down can be made at this time. The first three tubes are used only if one is using low-impedance audio single-tone input. In this case, the tone signal is amplified by the first section; limited by the second section; and again amplified by the first section of the second tube. This is rectified in V3 and fed to the trigger tube, V4.

Normal DC input is fed into V4 which is a direct-coupled flip-flop stage. This flip-flop generates a uniform square wave voltage which is essential for best operation of the following sampling pulse generating circuits and gating circuits.

Output from ths tube is used to trigger a one-shot multi-vibrator lag tube V5. This output is "differentiated" and applied to a false start gate. This sample may be varied by the range control on the front from 2-20 milliseconds from the beginning of the start pulse. Normally it would be in the middle of this range.

There is a switch for 60, 75 and 100 wpm so that operation of this RANGE CONTROL is about the same for any standard speed.

Output from V4 also operates V8 which is the false start gate. This tube is biased off so that an output from V4 causes it to conduct, and depending on the position of the RANGE CONTROL, a noise burst of less than 11 milliseconds will allow this tube to again be cut-off, and it will not trigger V6. In this case no output can result.

This is one of the more important features of the repeater. Perhaps we could state this another way. If the RANGE CONTROL is set at normal mid-range, then it would take a start signal of at least 11 milliseconds to keep V8 conducting so that the sampling pip through V5 would trigger V6. This of course can be varied with the RANGE CONTROL so that start pulses from 2-20 milliseconds would be required for the repeater to operate on that particular start pulse. However, if one delays the RANGE CONTROL too far to guard against noise bursts, then you stand the chance of missing the start pulse entirely if it might be distorted, and it is possible that you could trip off on the first mark-to-space transition instead; which would disrupt synchronization for several characters.

If the start pulse was a good TTY signal then the output of V5 is applied to V8, which in turn triggers V6, which is another one-shot multi-vibrator and runs for 143 milliseconds—Since a character is 163 milliseconds in duration, then you see this "timing" runs out in the middle of the stop pulse. Depending on the setting of the RANGE CONTROL, this will be either toward the beginning of the stop pulse, or toward the end.

Once V6 is "fired" then it in turn turns on a third multi-vibrator tube, V7. This output fires every 22 milliseconds and the output differentiated into 1 millisecond samples; one for each of the six 22 milliseconds pulses and for the stop mark.

These sampling pulses are applied to both sections of coincidence gate tube V9, which operates in a similar manner to false start gate V8.

From here on, the action goes through phase reversal sections in order to operate the bistable trigger tube V10, which in turn drives the cathode follower tube V11 which drives the output mercury-wetted relay.

A feature of this converter which is very nice on autostart, etc., is that by use of the MARK-HOLD switch, a pulse from the V6 gate tube triggers the bistable trigger tube V10 to mark at the end of each gate cycle. Thus the output will return to mark EVEN IF THE INPUT GOES TO STEADY SPACE. For instance, if a CW station got on your space frequency, it could trigger the printer for one cycle—(which would print a "blank" key in all probability) and then the printer would lock up. The printer would also have a tendency to remain locked up if the CW station were on MARK frequency, depending on the position of the RANGE CONTROL, and the speed of the CW station, etc.

Summary

If your printer is in top-notch condition, then you will notice little if any improvement in the copy during periods of normal conditions. However, the repeater will "cover up" very nicely for a machine which is in other than good adjustment. It will easily allow one to copy signals that are badly distorted either mark (up to 45%) or space (up to 45% also).

It acts as a rather nice indication of what type of bias a transmitting station has, and approximately the amount, with no special letters being needed.

It offers some protection against noise accidentally tripping the printer; and offers some protection against CW stations with the mark-hold, etc. If a station identifies on CW with a space frequency, it will lock up the printer and remain locked up.

Probably the best reason one would have for using such a device is in copying other signals onto tape equipment, as all machines in the station will then print the same, since this machine puts out a perfect "regenerated" 22 ms. square wave pulse. All machines will print the same errors, so tape copy and printer copy will coincide.

A few fellows "retransmit" onto other

ARMED FORCES OFFER ONCE A YEAR OPPORTUNITY–16 MAY 1964

The United States Military is ever mindful of the unique communications potential inherent in the amateur radio fraternity. Each of the services has a firm and long standing policy of encouragement and support for amateur radio activity. As a tangible demonstration of their active amateur radio programs the separate military departments join each year in conducting the Armed Forces Day Communication Tests.

The tests are open to amateurs everywhere, and this event is the only time in the year that amateurs may legally work cross-band with the designated military stations. The plans for the program are a joint effort of the three MARS Chiefs for their respective services. The operating program is accomplished by the active duty personnel and guest operators at the participating military stations.

Last year military stations established 7366 individual contacts with amateurs throughout the world. It is planned to again have stations available for contact purposes, and amateurs everywhere are invited to use this event as a means of demonstrating their skills and operating proficiencies. Once again all modes of emissions will be utilized, and it is hoped that every amateur will be able to work a station.

The theme for this Fifteenth Armed Forces Day will be Power for Peace. An outstanding number of contacts will demonstrate to the world that there is indeed Power for Peace in the communication freedom enjoyed by the U. S. amateur, and that the close partnership with the military can be a healthy and mutually beneficial relationship in our free society.

On 16 May 1964, you may qualify for the one time only QSL card from each of the military stations. Further, you may demonstrate your operating abilities and technical skills by receiving a certificate for perfect copy of the CW and/or RTTY message(s) from the Secretary of Defense.

QSL cards can only be awarded to those licensed amateurs who establish a two-way contact with a station. Interception by Short Way Listeners (SWL) will not qualify for a QSL card. However, anyone that has the equipment and abilities may copy the Secretary of Defense messages and receive a certificate.

Elements of the Program:

A military-to-amateur transmitting and receiving test for licensed amateur radio operators. The military stations will transmit crossband on spot frequencies outside the amateur bands and establish radio contacts with amateurs in the appropriate sections of the amateur bands. This is a test of crossband operations, and contacts will consist of a brief exchange of locations and signal reports. No traffic handling will be permitted.

A CW receiving contest will be conducted for any person capable of copying International Morse Code at 25 words per minute (WPM). The CW broadcast will consist of a special Armed Forces Day message from the Secretary of Defense addressed to all radio amateurs and other participants.

A radioteletypewriter (RATT) receiving contest will be conducted for any licensed amateur, individual or station that possesses the required equipment. This is a test of the operator's technical skill in aligning and adjusting his equipment, and serves to demonstrate the growing number of amateurs that are becoming skilled in this method of rapid communications. The RATT broadcast will be transmitted at 60 words per minute and will consist of a special Armed Forces Day message from the Secretary of Defense to all radioteletypewriter enthusiasts.

Operating Schedules and Competition Procedures are as follows:

Each transmission for the CW and RATT receiving contests will commence at the indicated times with a ten minute CQ and identification call to permit the participants to select their station and frequency and to adjust their equipment.

The ten minute CQ call will be followed immediately by the appropriate competition instructions and the Secretary of Defense message. The message will be transmitted by all stations simultaneously and one time only. It is not necessary to copy more than one station and no extra credit will be given for so doing.

Transcriptions should be submitted "as received". No attempt should be made to correct possible transmission errors.

TIME, FREQUENCY AND CALL SIGN OF THE STATION COPIED AS WELL AS THE NAME, CALL SIGN (if any), AND ADDRESS OF THE INDIVIDUAL SUBMITTING THE ENTRY MUST BE INDICATED ON THE PAGE CONTAINING THE TEXT. Each year there are a large number of perfect copies that do not receive the certificates because the above information was not submitted.

Competition entries should be submitted to the Armed Forces Day Contest, Room 5B960, the Pentagon, Washington, D.C. and postmarked not later than 31 May.

CW Receiving Contest

Time	Transmitting Station	Frequencies
16 May 1964		
170300 GMT (162300 EDST)	WAR/NSS/AIR (Army, Navy & Air Force Radio Wash, D.C.)	3347, 3385, 4015, 5200, 6970, 6992.5, 7301, 7680, 13995, 14405
170300 GMT (161900 PST)	A6USA (Army Radio, San Francisco, Calif.)	6997.5
	NPG (Navy Radio, San Francisco, Calif.)	4005, 7301.5, 13920
	AG6AA (Hamilton AFB, Calif.)	7832.5

RATT Receiving Contest

Time	Transmitting Station	Frequencies — kcs.
16 May 1964		
170335 GMT (162335 EDST)	WAR/NSS/AIR (Army, Navy & Air Force Radio Wash, D.C.)	14480, 3347, 4012.5, 6992.5, 7305, 7380, 14405
170335 GMT (162135 CST)	A5USA (Ft. Sam Houston, Texas)	4025
	AG4AA (Randolph AFB, Texas)	4455
170335 GMT (161935 PST)	A6USA (Army Radio, San Francisco, Calif.)	6997.5
170335 GMT (161935 PST)	A6GAA (Hamilton AFB, Calif.)	7832.5
	NPG (Navy Radio, San Francisco, Calif.)	4001.5, 7455, 13895

Military-to-Amateur Tests

Military stations WAR, NSS, and AIR will be on the air from 161400 GMT (1000 EDST – 0600 PST) to 170245 GMT (2245 EDST – 1845 PST). NPG will be on the air from 161800 GMT (1000 PST) to 170800 GMT (170000 PST).

Amateur contacts from NPG will be discontinued from 170245 GMT (161845 PST) to 170400 GMT (162000 PST) to allow the Armed Forces Day CW and RATT Broadcast completion as scheduled above.

Station	Military Frequencies		Appropriate Amateur Bands (Mcs)
WAR (Army Radio Wash, D.C.)	4001.5	(CW)	3.5 to 3.8
	*4020	(AM)	3.8 to 4.0
	6992.5	(CW)	7.0 to 7.2
	*7325	(CW)	7.2 to 7.3
	*14405	(Upper SSB)	14.2 to 14.35
NSS (Navy Radio Wash, D.C.)	3365	(CW)	3.5 to 3.65
	4015	(CW)	3.65 to 3.8
	6970	(CW)	7.0 to 7.1
	7301	(CW)	7.1 to 7.2
	(To be announced)	(CW)	14.0 to 14.2
	*4040	(AM)	3.8 to 4.0
			7.2 to 7.3
	14385	(SSB)	14.2 to 14.35
	4012.5	(RATT)	3.5 to 3.8
	7380	(RATT)	7.0 to 7.2
	14480	(RATT)	14.0 to 14.2
NPG (Navy Radio San Francisco, Calif.)	3357	(CW)	3.5 to 3.65
	4005	(CW)	3.65 to 3.8
	6835	(CW)	7.0 to 7.1
	7301.5	(CW)	7.1 to 7.2
	13920	(CW)	14.0 to 14.2
	*4045	(AM)	3.8 to 4.0
	13975.5	(SSB)	14.2 to 14.35
	4001.5	(RATT)	3.5 to 3.8
	7375	(RATT)	7.0 to 7.2
	13547	(RATT)	14.0 to 14.2
AIR (Air Force Radio, Wash, D.C.)	3397.5	(CW)	3.5 to 3.8
	6997.5	(CW)	7.0 to 7.2
	13995	(CW)	14.0 to 14.2
	20994	(CW)	21.0 to 21.25
	7305	(Lower SSB)	7.2 to 7.3
	14397	(Upper SSB)	14.2 to 14.35
	7332	(RATT)	7.0 to 7.2

*Operators transmitting on these frequencies will listen for AM and SSB signals within the appropriate bands.

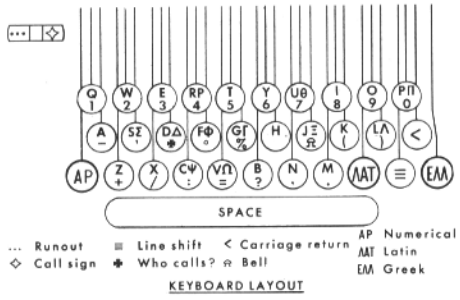
IDEAS IN THE NEWS

• **IT'S ALL GREEK** (optionally) to a new teletype designed for use in communications networks where messages must be transmitted or received both in Latin and Greek characters. The teletype is a member of a family of two-alphabet designs that also will include one model for handling Latin and Cyrillic characters.

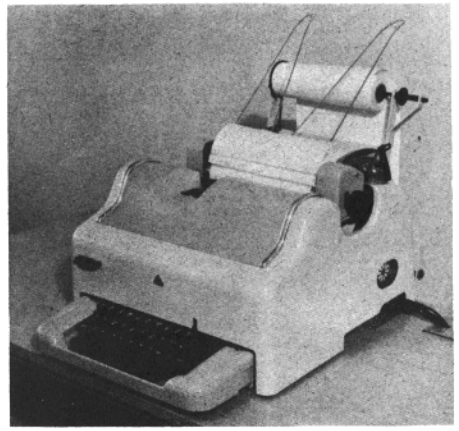
The keyboard basically corresponds to the familiar "qwertyuiop" pattern, except that each key carries three symbols instead of two. The lower-case position accommodates letters, punctuation marks and communication signals, such as a signal bell and a query "Who is calling?" for multistation traffic. Most of the upper-case positions are occupied by both Latin and Greek characters. Functional identities like "F" and "Φ" are paired consistently. Signs having no exact equivalent in the opposite alphabet, like "V" in Latin or "Ω" in Greek, are paired arbitrarily.

Each typebar head has three characters, one above the other: Latin (top), numerical and punctuation (center) and Greek (bottom). Changeover between the three sets of characters is accomplished by three keys that are not occupied by characters in the No. 2 international telegraphy alphabet. Use of the standard teletype code makes two-alphabet transmission fully compatible with normal equipment.

The T63-GRI teletype transmits 400 characters per minute at 40 ±15 ma signal strength. It is a product of VEB Geratewerk, Karl-Marx-Stadt German Democratic Republic. A similar model operating in both Latin and Cyrillic alphabets forms part of the "hot line" teletype facilities between Moscow and Washington. **R.F.S.**



KEYBOARD LAYOUT



SYMBOLS

	Latin	Greek	Numbers	1	2	3	4	5
1	A	A	–	●	●			
2	B	B	?	●			●	●
3	C	Ψ	:		●	●	●	
4	D	Δ	✤	●			●	
5	E	E	3	●				
6	F	Φ	°	●		●	●	
7	G	Γ	%		●		●	●
8	H	H	▫			●		●
9	I	I	8		●	●		
10	J	Ξ	Bell	●	●		●	
11	K	K	(	●	●	●	●	
12	L	Λ	)		●			●
13	M	M	.			●	●	●
14	N	N	,			●	●	
15	O	O	9				●	●
16	P	π	0		●	●		●
17	Q	∘	1	●	●	●		●
18	R	P	4		●		●	
19	S	Σ	'	●		●		
20	T	T	5					●
21	U	θ	7	●	●	●		
22	V	Ω	=		●	●	●	●
23	W	▫	2	●	●			●
24	X	X	/	●		●	●	●
25	Y	Y	6	●		●		●
26	Z	Z	+	●				●
27	< Carriage return						●	
28	= Line shift				●			
29	AAT Latin			●	●	●	●	●
30	AP Numerical space			●	●		●	●
31	EAA Greek					●		
32	Bell							

✤ Who calls? ▫ Internal traffic

ASSIGNMENT TABLE *for correlation between international teletype code signals and Greco-Latin symbols.*

—————O—————

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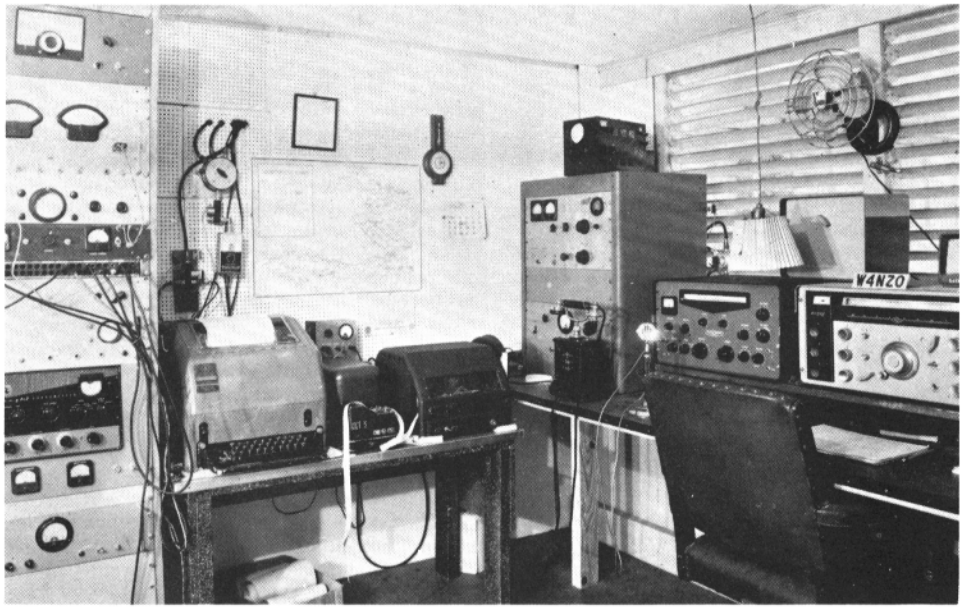
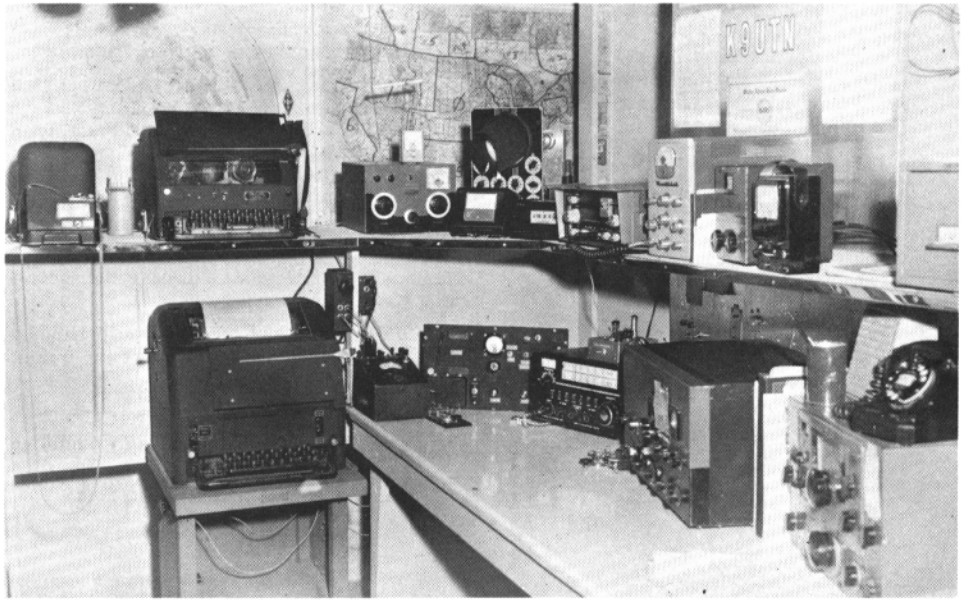


W4NZO FORT LAUDERDALE, FLA.



K9UTN VIROQUA, WISCONSIN

PAN-AMERICAN I.A.R.U. MEETING IN MEXICO CITY

Muy estimados señores y queridos colegas nuestros:

Mucho nos complace anunciar a ustedes la celebración del Primer Congreso Panamericano de Radio Aficionados, que se efectuará en esta Ciudad de México durante los días 15, 16, 17 y 18 del próximo mes de abril. En esta forma confirmamos la información contenida en el Boletín "Calendar" de la International Amateur Radio Union, en el que se exhorta a todos los países de América, miembros de esa Organización para que envíen delegados a nuestra Convención.

Uno de los temas más importantes que se tratarán durante la mencionada reunión, es el relativo a la integración de la zona número 2, de la International Amateur Radio Union, cuya consecuencia inmediata será el mayor acercamiento entre los Radio Clubes de América y la protección de las bandas de aficionados, asunto que indudablemente será discutido durante la próxima reunión de la International Telecommunications Union, que se celebrará en Ginebra, Suiza.

Toda vez que ésta es la primera reunión de su tipo en América, consideramos que es de gran importancia el que ustedes asistan a ella para exponer sus ideas, plantear sus problemas, mencionar sus sugerencias y discutir los temas que afectan a todos los radio aficionados de nuestro hemisferio. Es por esta razón por la que no dudamos que nombrarán ustedes la comisión que los represente en nuestra reunión y nos harán saber, a la brevedad posible, el número de personas que la formen.

Pronto enviaremos a ustedes el temario general de esta reunión, para que les sea posible proceder a preparar las sugerencias y ponencias que presentarán.

También enviaremos publicidad para ser dirigida a los radio aficionados de su país y esperamos que sea distribuída con la mayor pro fusión que les sea posible para lograr que un gran número de radio aficionados nos acompañe en este Congreso al que han sido invitados, como ustedes, todos los países de América y que con el contingente de personas que envíen, tendrá la brillantez que todos esperamos.

Con nuestros mejores deseos de encontrarnos personalmente y con saludos personales del suscrito.

73
Antonio Pita — XE1CCP
Presidente de la Comisión Organizadora

Gentlemen and Dear Colleagues:

It gives us great pleasure to announce to you the celebration of the First Pan-American Congress of Radio Amateurs that will take place in Mexico City during the days of April 15th through the 18th. In this manner we confirm the information contained in the "calendar" of the Bulletin of the International Amateur Radio Union in which it encourages all the member countries of America of that organization to send delegates to our Convention.

One of the most important items to be discussed during the mentioned reunion is regarding the integration of Zone No. 2 of the International Amateur Radio Union, whose immediate consequence will be the closeness between the Radio Clubs of America and the protection of the amateur bands, a matter which will undoubtedly be discussed during the next meeting of the International Telecommunications Union, which will be held in Geneva, Switzerland.

Inasmuch as this is the first meeting of its type in America we consider it of great importance that you attend in order to present your ideas and problems, to make suggestions and discuss the themes that effect all radio amateurs of our hemisphere. It is for this reason that we do not doubt that you will name the commission to represent you at our reunion, and will let us know as soon as possible the number of persons attending.

Also, we will send publicity to be directed to the radio amateurs of your country and we hope that it will be distributed generously in order that it will be possible to have a great number of radio amateurs accompany us at this Congress to which they have been invited, as yourselves and all the countries of America, and that with the contingent of persons that they send, will have the success that we desire.

With our hopes of meeting you personally and with best personal regards of the writer,

73
Antonio Pita, XE1CCP
President of the Organizing Committee

THE TT-63/A REPEATER . . .

circuits and other transmitters, etc., and this system will offer optimum range to those other circuits.

All in all, to the serious enthusiast, the $40 price for this item seems to be well worth investigating, and for the station just starting, with the circuits included, one can make a decent converter for around $50 or less which can then be used later in conjunction with other equipment constructed, since the repeater is normally used behind a regular converter.

MODIFICATION TO AN/URA8

R. K. Margeson, W1SBC 4
31 State Street, Charleston, S.C. 29401

The following is a collection of modifications and hints on the Converter-Comparator Group AN/URA-8 which may interest you. It was originally worked up by the U. S. Navy to support a field change for the AN/URA-8, Rectifier PP-1010, and Patch Panel TT-23. The field change was never issued because of the rapid replacement of the AN/URA-8 with the AN/URA-17. The ideas contained do have merit, however; especially if one is plagued with low loop current when using the AN/URA-8.

The modifications and hints apply equally to the converter or the comparator, depending upon which one you are actually using to key your loop.

The usual AN/URA-8 breakdown is as follows:

	AN/URA-8	AN/URA-8A	AN/URA-8B
Converter	CV-60	CV-89	CV-89A
Comparator	CM-14	CM-22	CM-22A

The circuit designations which follow refer to the converter. The comparator designations are in parenthesis.

A. The easiest improvement in operation is obtained by using only type 6AQ5 tubes for V-207/208 (U-708/709). Do *not* use type 6005, the "ruggedized" counterpart of the 6AQ5. The E_b - I_b curves are such that a significantly lower (4 ma for each tube) loop current results from using the 6005. Again, use only the type 6AQ5 tube.

B. The second improvement involves a slight modification to the "Electronic Relay" section of the converter (comparator).

1. Short the screen voltage dropping resistor R-234 (R-719) on Terminal Board E-201 (E-719) by soldering a small piece of hook-up wire across the resistor terminals.
2. Check to be sure that R-207 (R-730) on Terminal Board E-201 (E-701) is 33 KΩ, 2 watt and *not* 10 KΩ.
3. Add a 56 KΩ, 1 watt, ±10% resistor on to Terminal Board E-201 (E-701) from the junction of resistors R-206 and R-207 (R-729 and R-730) to the grounded end of R-213 (R-739).
4. Remove the four machine screws holding Terminal Board E-201 (E-701) and swing it out of the way.
5. Unsolder the wire connection to Pin 1 of V-202 (V-710). Unsolder the other end of this wire from the junction of resistors R-206 and R-207 (R-729 and R-730) on the underside of Terminal Board E-201 (E-701). Clip back and tape this wire at both ends where it enters the wiring harness .
6. Using hook-up wire, connect a lead between Pin 1 or 5 of V-202 (V-710) and Pin 6 of V-207 (V-708).
7. Reinstall Terminal Board E-201 (E-701).

And that is that. The only real changes are that (1) the audio oscillator may drift in tone slightly (no great consequence to the average amateur who doesn't use this circuit anyway!) and (2) the "Electronic" Relay is now better able to key the TTY loop. This modification increases the loop current on MARK, while practically eliminating loop current flow on SPACE. (In one case, space loop current went from 6 ma to below 10 microamperes following this modification!) Surely a most desirable state of affairs.

Thank you and keep up the excellent articles – especially "Two-Tone" and other advanced niformation.

Sincerely W1JBC/K1RUG/4

TWO NEW BOOKS FROM HOWARD W. SAMS & CO.

Practical Ham Radio Projects, by Charles Caringella, W6NJV, will be of value to every ham who enjoys building his own gear. Each chapter contains complete data for constructing a unique, useful piece of equipment; chassis layout diagrams, schematics, photos, and parts lists provide necessary guidelines for building each unit. Where appropriate, tuning and alignment procedures, operating instructions, and other pertinent details are included.

All of the units are original designs built and air-tested—none are commercially available at any price. Some can be built for as little as $10; most for $25 to $50. The most expensive unit, the all-band 500-watt linear amplifier, can be built for around $75 — far less than you'd pay for a kit. Standard, readily available parts are used throughout, and no expensive or elaborate test equipment is required. A standard VOM and grid-dip meter, in most cases, are the only instruments needed.

Projects described in this book include: all-band 500-watt linear amplifier; 2-meter SSB mixer and linear amplifier; all-band 500-watt antenna tuner; electronic automatic keyer; deluxe 6-meter mobile transmitter; universal transistor mobile modulator and power supply; transistor 2-meter superhet receiver; VFO for 6, 2, and 1.25 meters; transistor dip oscillator; 2-meter transceiver for mobile or fixed station; transistor 6-meter handie-talkie; and monitor scope for SSB and AM. In other words, the reader can construct just about everything needed for a complete ham shack right from this book.

The newly revised and updated edition of Howard W. Sams *Transistor Substitution Handbook* lists direct substitutes for 4,762 transistor types. Substitutes were selected by comparing all operating parameters on an electronic computer. Additionally, all the major-line general-replacement types are listed in accordance with manufacturer recommendations. Other information identifies manufacturers, NPN and PNP polarities, germanium and silicon types, and basing diagram styles.

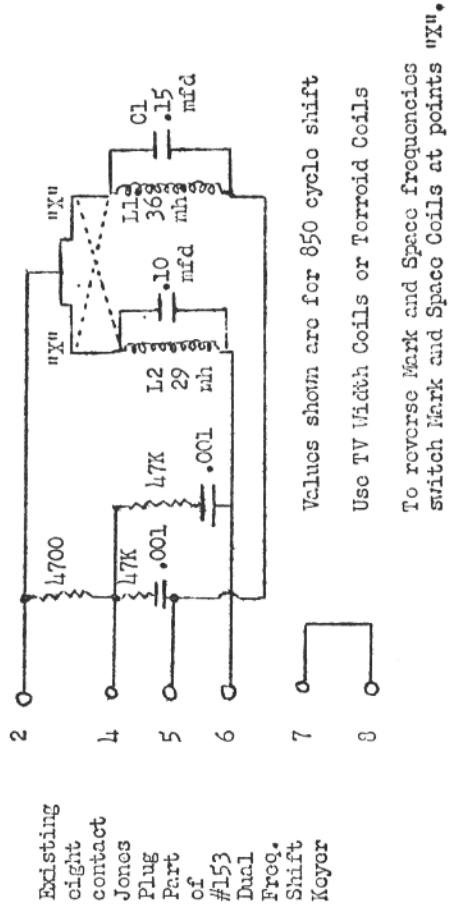
Also included is a section listing suitable replacements for foreign transistors, plus a semiconductor diode cross-reference directory. Accompanying text sections explain why transistor substitution is possible, when substitution is appropriate and when it is not, how to choose substitutes, and what precautions should be observed when using substitute types.

Both of these books are available from your favorite Radio Store.

PLUG IN FILTERS FOR NORTHERN RADIO TYPE 153 MOD 2.

Frequency determining elements to be plugged into, or made a part of NORTHERN RADIO COMPANY DUAL FREQUENCY SHIFT TONE KEYER Type 153, Mod 2. This unit plugs into the eight contact Jones Plug which is a part of the Tone Keyer. Input and Output connection of keyer remain same as in Tone Keyer manual.

If other than 850 cycle shift is desired, C-1 and C-2 can be substituted with other values of capacitance. Or use a gang switch to several capacitors for various amounts of frequency shift, or use one half of Dual Tone Keyer on 850 cycle shift, and other half at the other desired frequency shift. Submitted by AF7DVK, Montana State MARS Director.



DX-RTTY

Bud Schultz, W6CG
5226 N. Willmonte Ave.
Temple City, Calif. 91780

Howdy Gang:

All propagation predictions to the contrary – the past month has been above average for DX activity. The mail here shows a remarkable number of DX contacts being made with most signals above average. For the first time in many moons the European typers are starting to break through out here on the West Coast with excellent signals. During the first Saturday of the month this reporter logged three European stations making excellent copy on 14 MCs around 2000 GMT. The three stations in question were DL3IR, G3NAE, and F8KI. I tried all three and managed to come up with a good contact with Jean, F8KI, so my batting average is about .300. Honors for the first U. S. contact with SM6CSC go to K1CPX in Lexington. Congrats, Mike!! K1CPX says that SM6CSC operates every day around 1600 GMT in the ten KCs above 14,100 and is running about 500 watts. Others who have worked Ingemar are K3GIF and W7LPM. K1CPX enclosed a foto of a QSL card confirming his "first" with Sweden. Ed, K3GIF, was heard here keeping his skeds with ZS1FD and G2HIO on several occasions. Ed also reports that his contacts with 5A5TR in Libya are continuing and that he has noted a marked increase of activity from Britain in the past month. Ed also says that F8KR and DL9EX are coming across with fine signals from the Continent. Bruno, I1RIF, took time off this month to take a holiday in Monaco to rest up for his contemplated trip to the USA in April. According to K3GIF Bruno expects to visit NYC and Washington and many of the DX'ers in that area are looking forward to meeting the "DX Champ" in person.

Regular readers of this column will recall that last October I1RIF announced that he had made arrangements with the Olivetti Company to award one of their Model 32 Lettera typewriters to the winner of the World-Wide SS Contest. The awarding of this fine trophy became quite complicated when the results of the contest showed that I1RIF himself had ended up in first place! When all the logs had been tabulated I wrote to Bruno congratulating him on his fine victory and advised him that he had indeed won the Olivetti Trophy. You cannot imagine my surprise to wake up one morning last month to find the Lettera 32 waiting on my doorstep with a message from Bruno which read: "After much consideration I have decided to award the Olivetti to Bud, W6CG, the DX Editor for his efforts in handling the SS Contest, the logs and the results." It is no attempt at modesty or self effacement that I state, although the SS Contest did take considerable time and effort, my efforts were certainly not deserving of such a generous tribute. On behalf of myself and "RTTY" I would like to publicly thank Bruno, I1RIF, and the Olivetti Company for their thoughtfulness.

South and Central American activity continues to increase every month. FG7XT has an outstanding signal on all bands and is very active. Irv, K8DKC, reports working W8BZB/HC2 on eighty meters along with FG7XT. Many stations have reported working or logging YV5AVW on eighty, also. Horacio, LU1AA, is still waiting for his African confirmation to complete his WAC on FSK. YV1EM says that Jack Pitts, W6CQK, is asking for permission to set up an RTTY expedition to the Island of Aruba this Spring. If it comes off this one should really stir up things a bit!! Pierre, XE1YJ, is heard on all bands now with good signals. This last item reminds me to once more call your attention to the Pan American Radio Congress being held April 15-18 at the Alameda Hotel in Mexico City. This is a very important meeting and will feature the creation of Region II of the IARU. Herb Hoover, W6ZH, president of the ARRL and members of his staff will be present and a special RTTY meeting is being planned by XE1YJ. All RTTY'ers are invited and a wonderful time is planned for your entertainment.

W7CTK advises me that he has had several good RTTY contacts with HL9KP on 14 Mcs. He says HL9KP has a tremendous signal and makes fine solid copy. Dale also reports that he worked WAØICS/M who is running a 12 watt mobile and has a "chauffeur" so he can operate while in motion. Wonder if this will start a trend?

It was a big thrill to receive a fine letter from Eric, VK3KF, who is recovering from a heart attack. Eric writes that he is allowed "up" for thirty minutes a day and he misses his regular RTTY stints on week-ends. If any of you have a few minutes to spare please drop Eric a line. Your effort along this line would be greatly appreciated.

Several of you have asked who is the top DX'er based on the number of countries worked. I am sorry I cannot give a positive answer to this one but I am willing to tabulate the score if some of you DX hounds will let me know how many you have under your belts. To the best of my knowledge K3GIF, with 40 countries worked on two-way RTTY is the top dog but there may be others with at least that many. I am sure W7LPM and W7ESN must be pretty high on the list. I'm ashamed to admit that your DX Editor is stuck at Nr 30 and my prospects of catching the leaders seem very dim!

Well, it's time to write "30" on this one but will be back at the same old stand next month.

73
Bud, W6CG

P.S.—Just received a piece of copy from Martin, OY7ML, of a QSO that he copied from K3GIF while Ed was working SM6CSC. Evidently OY7ML is now active on RTTY so keep your ears open for him.

HORSE TRADES

FOR SALE: TT-63A regenerative repeater. Brand new government surplus, $39.95 F.O.B. San Francisco. Telemethods, Intl., 3075 East 123 Street, Cleveland 20, Ohio.

FOR SALE: REC-12 power supply for model 15 teletypewriter like new, 10.00 each. Sync motor Teletype like new 10.00 ea., with fan and base. Filter, low pass part of AN/URA-8-A equipment, 600 ohms input; 1500 ohms output, new 3.50. Send for list. Atlantic Surplus Sales, 181 Sackett Street, Brooklyn 31, N. Y.

FOR SALE: BC-773 filters (90 and 150 cycles) used by W6AEE in his TU, see December 1952 CQ magazine. L. R. Electronics, 3529 East Colorado Blvd., East Pasadena, California.

WANTED: Pair selector magnets for model 15 printer (holding type). End-of-line indicator mechanism for a model 14 typing reperf. W7ZSB, 3853 South 9th East, Salt Lake City, Utah.

FOR SALE: Parts for model 15 and 28. Filters for converters. Send for list. W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94610.

WANTED: Model 10-A Teletype mfgd. by Western Electric, for collection. WA9IBB, 966 Chestnut Street, Deerfield, Illinois 60015.

FOR SALE: Model 14 typing reperfs with kybds, base, cover and works, 75 points range, $70.00. 14 typing reperf, high base (no kybds) with stand and cover, holding magnet and 80 point range, $60.00. All above are 60 speed and have governed motors. Will ship F.O.B. WA4OCY, 1810 Inspiration Lane, S.E., Huntsville, Alabama.

WANTED: Western Electric Telegraph distortion test set Model 164-C, can be used but no abused. Have new FRXD, sync motor and 60 WPM gears to trade in deal. W4MGT, 334 Grosvenor Avenue, Lexington, Kentucky.

FOR SALE: Polar relays 255A, two for $2.85. W3WUX, 1712 Woodmere Way, Havertown, Pa. 19083.

SWAP: MXD, dual head TD with space for third head. Magnetic clutches. Also has free wheeling tape sprocket to allow backing tape up for re-run without taking tape out of head. Sync motor, and 60 WPM. TRADE for FRXD reperf-TD or a model 14 typing reperf with keyboard. W7LYY, P.O. Box 144, Prospect, Oregon.

FOR SALE: Two WE KS5928 L4 Power Supply, $15.00 each. One 400 cycle oscillator with pwr supply, $12.00. Three new TT-63A/FGC Teletypewriter Repeaters, $35.00 each. Two model 19 tables, $15.00 ea. Three 14TD with sync motors. One two head 14TD, $65.00. One model 14 receive only typing reperf, $65.00. Three Model 15 TTY machines, sync motors, $100.00 each. All packing and shipping extra. K1PAX, 264 East Main Street, Fall River, Mass.

DX RTTY . . .

THIRTEENTH ANNUAL DAYTONA HAMVENTION

The 13th annual Dayton Hamvention will be held at the Dayton Biltmore Hotel Saturday, April 25, 1964. This fine convention has been growing bigger and better each year, making it one which you as an active amateur, should not miss. There will be something for each of you, ragardless of your particular interest, SSB, CW or RTTY. Doings for the XYL, contest of all types, so why not mark your calendar now and plan to attend.

W8DPW

FOR A STAMP: Xerox copies of the model 15 wiring diagrams, WD-1976 which show machines with polar relay, and WD-1620 without polar relay. W5IFH, 1802 Edgehill, Pasadena, Texas 77502.

FOR SALE: Model 14 typing-reperf base with keyboard, in excellent like-new condition, $20.00 F.O.B. 14 reperf cover free with base. W9YVP, 11001 South Pulaski, Chicago, Ill. 60655.

Subscription Rate $3.00 Per Year
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For "RTTY" Information:
W6DEO W6CG W6TPJ W6AEE