

AMATEUR RADIO REPTV JOURNAL

Vol. 15 No. 2 - 30¢

February - 1967

CLASSIFIED ADS. Rates \$1.00 - 30 Words. Additional words 2 cents. Closing date 10th of month.

TT83A REGENERATIVE REPEATER, helps receive biased, distorted signals, also serves as RTTY converter, complete with tubes, cable, and instructions for using the unit. Like new \$25. FOB Brooklyn. RTTY Dual Frequency Shift Tone Converter: Northern Radio type 152, each tone converter is self contained w/ power supply, tubes, conversion details and schematic, used good - \$32.00 each. Send us your RTTY requirements. Atlantic Surplus, 250 Columbia St, Brooklyn, N.Y. 11231

KEYBOARD and INSTRUCTION manual wanted for Mite TT299. Roy Brougher, W5HPB, 4002 Levonshire Dr, Houston, Texas 77025.

SWAP - 120 BASE ACCORDION, Wuritzer. Mother of pearl, for HQ-180 AX, SX115 or RTTY gear. John Woskowitz W2KPF, 541 Mercy Ave., Brooklyn, N.Y. 11206

WANTED - Model 28ASR with stunt box complete in excellent condition, send details to K7AWI Box 7307, Phoenix, Arizona 85011

BUY - 28 TYPING units, etc., and all parts. Sell 14s 15s 28KSR, 28ASR, parts. W4NYF, 405 NW 30th Ter., Ft. Lauderdale, Fla. 33311. phone 305-585-0340 after 9.

TYPEWRITER RIBBON REINKER, Hand operated model now only \$3.00. K575 or K764 Ink available at all National Cash Register Co. stores at 75¢ per tube. Walter Nettles W7ARS - 8355 Tanque Verde Rd. Tucson, Ariz, 85715.

RTTY CHANNEL FILTERS, octal mounted, 1275/2125 cps or 2125/2975 cps. \$5.95 pair. 88mh toroids, uncased, 5 for \$2.50 Herman Zachry, WA6JGI 3232 Selby Ave. Los Angeles, Calif. 90034

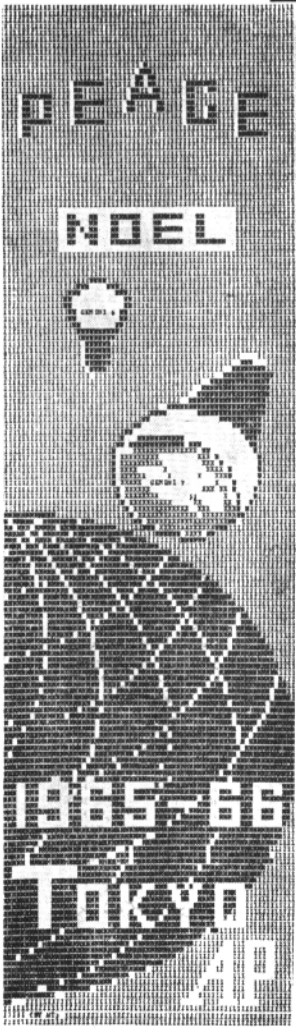
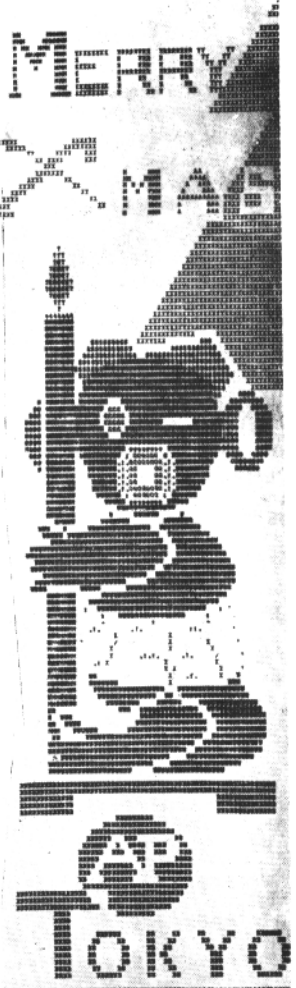


Nobutoshi Tsuruno

JA1UPI

The keyboard is his brush.

Story inside on page 2



SELL: FACSIMILE RECORDER RD92A/VX excellent condition with manual and reel paper. \$100. H. Napfel, 18 Panorama Dr. Huntington, N.Y. 11743. Phone (516) 421-3041.

HAVE QUIT COIN collecting, will trade full set of Lincoln or Mercury or Buffalo or other coins for Mobile SSB transceiver. Lew Holt, 2611 Liberty, North Bend, Oregon 97459

FOR SALE - Two-tone limiterless TU as described in August 1965 RTTY phenolic PC board \$3.50 postpaid, write Cashion Electronics, Box 7307, Phoenix, Ariz. 85011 for brochure.

WANTED - Tubes, type 75TH, RTTY Magazine January, March, April, May, July 1953. CQ Magazine Jan. Feb. 1946. Entire year 1945. Orville Magoon K6DZN 1941 Oakdell Dr. Menlo Park, Calif. 94025.

RTTY GEAR for sale. List issued monthly. 88 or 44 mhz toroids 5 for \$1.75 postpaid. Elliott Buchanan W6VPC, 1067 Mandana Blvd, Oakland Calif. 94610

TT63 REGENERATIVE REPEATER \$23.00 Model 14 TD (syno) \$35. - 14 Typing reperfr: RO \$40. KB \$55. Solid State 800 ma loop supply \$8. 2 copy page printer paper \$5.50 case. Tape \$3. box. Wanted Super-pro. NC300, Model 15 and/or 26. DM-35 Dynamotors. Stamp for list. W2DLT. 302 Passaic, Shrling, N.J. 07980

FOR SALE. Model 14 TDs. All with sync motors and end-of-tape - sensing pins. Two types- 65 wpm Western Union 7, unit compatible with 60 wpm equipment or 75 wpm Standard 7.42 unit. New \$40.00, good used condition \$18. Packing, shipping extra. Keith Petersen, W8SDZ 1418 Geneva Ave. Royal Oak, Mich. 48073. Phone Area (313) 585-4431.



1st CLASS MAIL

RTTY JOURNAL

Return Requested
P.O. Box 837
Royal Oak, Michigan 48068

The Keyboard is his Brush —

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Eight years ago Nobutoshi, a recent high school graduate arrived in the hustling capital of Tokyo in need of a job. Watching the classified ads for a job he noticed one for the Associated Press, a copy boy, no experience necessary. Nobutoshi hurried to the AP and landed the job. Within a few weeks the copy boy was a wire photo operator and shortly after a teletype maintenance man.

In accordance with a time honored custom, skillful traffic personnel in domestic and foreign bureaus help brighten a dull, on-duty Christmas Eve by transmitting holiday cards or greetings created on their machines after much preparation.

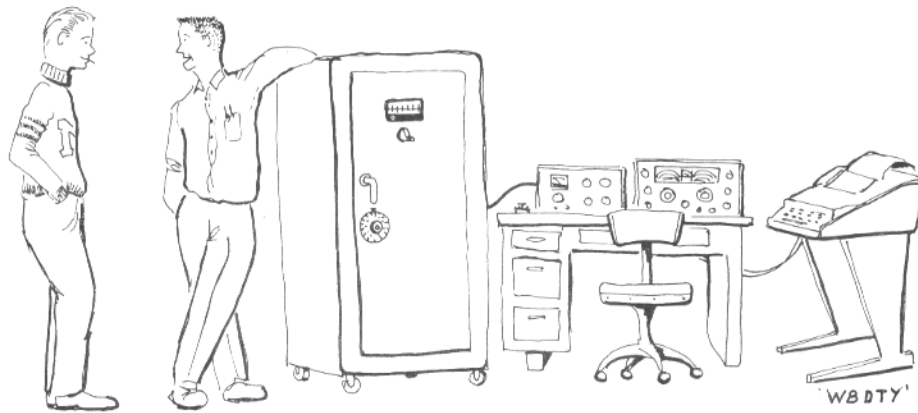
A teddybear-like doll winking from a perch in front of a Yule tree was sent in 1960 as Nobutoshi's first attempt at Teletype art.

He had heard of the "greeting card" custom and, as he remembers, "There was nobody in the office to do a picture 'and I wanted to try. The design proved a sensation. Nothing less than this have been the cards designed by Nobutoshi since. Widely regarded as masterpieces of typewriter art, the pictures have been carried over international wires of the AP every year.

Nobutoshi has no artistic training. He does however possess expert knowledge of his teleprinter, a knack for clever picture ideas and the patience to work them out in his leisure time. Although a "scene" usually takes several months he can do a "rush" job when necessary. Late in December when the Geminis 6 and 7 successfully rendezvoused he gave up months of work on another card and produced in time, a Christmas card celebrating the latest U.S. space advance: His picture shows the space craft circling the earth beneath the words "Peace" and "Noel".

After the plan is laid out and the designs are made, Nobutoshi carefully punches the design on tape. Some of the tapes run over 300 feet.

When off duty Nobutoshi spends most of his time at another international form of communication, "Ham Radio". I am making a rig now, says Nobutoshi, so I can communicate with hams in the United States. His call is JAI UPI. What a day for US hams if Japan permits RTTY operation and Nobutoshi gets on the keyboard. We don't know about machines in Japan but chances are AP could somehow dig one up. Let's hope so.



"You'd never guess how I licked the VFO stability problem for RTTY!"

Universal Frequency Shift Keying System—

R. J. Popkin—Clurman W2LNP
134 Wheatley Rd. Brookville
Glen Head, L.I. N.Y. 11545

This system takes advantage of the fact that most teletype power supplies are current sources and that there is generally a large difference in voltage in the loop circuit when the keyboard contacts are open as compared to when they are closed. To use this system, the local loop system should be grounded. The frequency shifter is the diode shifter of Irv. W6FFC, as shown in his Mainline articles. The diode is driven into hard conduction and highly biased off in the non-conduction state. This makes the characteristics of the diode itself relatively unimportant in this circuit. The voltages used to key the diode are usually much higher than those existing from RF voltages at the diode, either from the VFO tank or stray RF picked up around the shack. (This is why some stations have variable shift). The voltages are not critical nor do they have to be regulated. Possible existing wiring ar-

rangements are shown in figure 1. Note that a polar relay is not used or desirable. SET UP PROCEDURE:

1. Measure the voltage to ground from either terminal of the magnet coil in the printer (or at the keyboard contacts). The measurement should be made with the loop closed, (machine quiet). The voltage measured (note polarity) will either be in the order of less than 10 volts or 75 or more volts. The highest voltage found should be used. In measuring the voltage across the magnets, there will be a difference of about 6 volts in the overall reading.

2. Repeat the measurements with the break key depressed or the loop opened (machine chattering but not printing). The voltage will either be zero (wrong measuring point) or substantially higher - as much as 125 to 250 vts higher.

3. The voltage measured may be either positive or negative depending upon where the ground has been placed in the loop. If the voltage measured is positive, find a source of negative voltage. The voltage does not have to be regulated, but

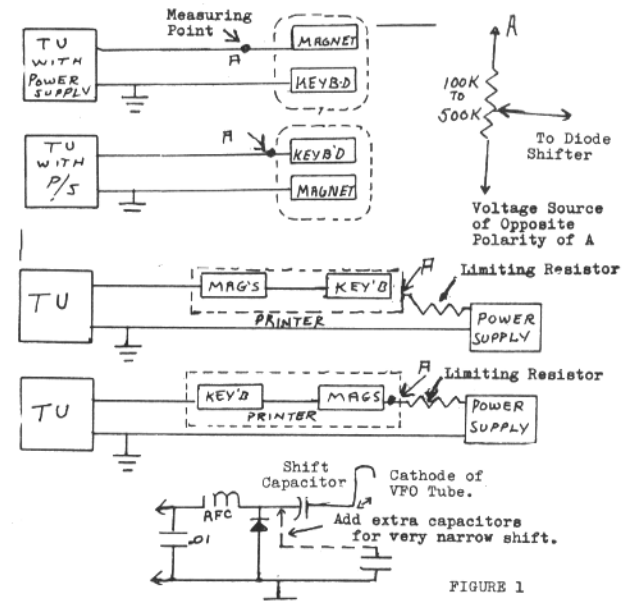


FIGURE 1

since it consumes very little current it may be taken from a voltage regulator. 100 volts or more is desirable. If the voltage measured is negative find a source of positive voltage.

4. Use a pot of 100 to 500K, connect one end of the pot to the highest voltage point found in the printer. The other end should be connected to a source of voltage of opposite polarity to that measured in the printer. Measure the voltage at the arm of the pot. Set it so that it reads either positive or negative with the loop open and opposite polarity with the loop closed. The pot should be adjusted for as high as possible symmetrical voltages positive and negative, with the loop open and closed. Do not connect the diode to the circuit yet, if you do, there is a possibility of the diode or the pot burning out. If the initial voltage measured was positive when the keyboard

and loop were closed, then the voltage at the arm will be negative. When the loop is opened the arm voltage would be positive. The pot may be left permanently set and left in the circuit or equivalent resistances measured from the ends of the pot to the moving arm may be substituted for the pot. The diode shifter is connected to the arm of the pot or the junction of the two resistors.

5. If the diode shift is backwards or "upside down" the diode may have to be reversed. The shift is set by adjusting the capacitor from the diode to the cathode of the VFO tube. For very narrow shifts you may run out of capacitor, in this case shunt capacitors may be added across the diode to ground. The larger the capacitor the smaller the shift. Shifts of only a few cycles may be obtained this way.

* * *

B.A.R.T.G. Annual Spring DX Contest ...

- 1) WHEN
02.00 G.M.T. 4th March, 1967 to 02.00 G.M.T. 6th March, 1967.
- 2) BANDS
3.5; 7.0; 14.0; 21.0 and 28.0 mc/s. Amateur Bands.
- 3) STATIONS
Stations may not be contacted more than once on any one Band. Additional contacts may be made with the same station if a different Band is used.
- 4) COUNTRY STATUS
A.R.R.L. Country list - except that KL7, KH6, and VO to be considered as separate Countries.
- 5) MESSAGES Messages exchanged will consist of: -

a) Message number	c) Time in G.M.T.
b) Report (R.S.T.)	d) Country.
- 6) POINTS
 - a) All two-way RTTY contacts with stations in one's own Country, will earn two points.
 - b) All two-way RTTY contacts with stations outside one's own Country, will earn ten points.
 - c) All stations will receive a bonus of 200 points per Country, including their own.
- 7) SCORING
 - a) Two-way exchange points, times total Countries worked.
 - b) Total Country points, times number of Continents worked.
 - c) Add item (a) and (b) together. This is your total test score.
 i.e. SAMPLE SCORE

a) Exchange points (302) times Countries (10)	3,020
b) Country points (2,000) times Continents (3)	6,000
c) Add item (a) and (b) above	9,020
	(total test score).
- 8) OPERATION
The Contest will be divided into two parts, single and multiple operating Stations. The transmission of RTTY on more than one frequency at one time will be disallowed.
- 9) LOGS AND SCORE SHEETS
Logs and Score Sheets should be received by:
Not later than 1st May, 1967 to qualify.

Hon. Secretary, B.A.R.T.G.,
Alan Walmsley, G2HIO,
The Firs, 3 Trinity Close,
Ashby-de-la-Zouch,
Leicestershire, ENGLAND

A SIMPLE LOCAL LOOP

Irvin M. Hoff, W6FFC
12130 Foothill Lane
Los Altos Hills, California 94022

A teleprinter must have a suitable power supply connected to it before it will work properly. Such a power supply is called a "local loop". It is usually a 100-150 VDC supply with a suitable resistor in series with the selector magnets to limit the current to 60 ma. (or 20-25 ma. for series connection).

Nearly all demodulators have a built-in loop supply so the printer may be connected directly to the demodulator. If the "standby" switch on the demodulator is selected, the receive loop is changed into a local loop and the operator may type on the keyboard for testing, etc.

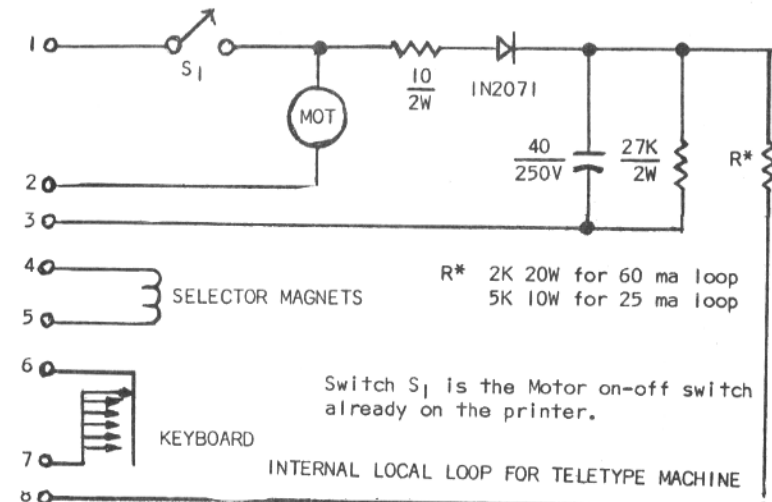
If the operator wants to type on the printer without hooking up the demodulator, then an auxiliary "local loop" is needed. He also needs a local loop if he has an additional printer (or reperferator) that he wishes to use independently of the demodulator. For instance, he may wish to punch tape on the reperf to play during his next transmission while the printer is receiving normal signals from the receiver.

Such a local loop can be simply constructed inside the bottom of the printer with a minimum of parts. Although isolation transformers are often used, they

are not necessary for a simple installation. See the accompanying schematic. A soldering lug terminal strip is placed inside the printer and the resistors, diode and capacitors attached to it.

Most printers come with three heavy-duty cables dangling from them -- one for the 110 VAC to run the motor, one for the selector magnets with a phone plug on the end, and the third for the keyboard with a similar plug. All these wires tend to clutter things up, so it is the author's habit of completely removing all existing wiring. A piece of Ham-M rotor cable (8 conductor with two of the wires being heavy enough to carry 110 VAC for the motor) is then connected to the various points shown on the diagram, and allowed to dangle 5-6 inches from the printer. An Amphenol octal socket with cap (78-PF-8 -- 34¢) is then attached to this cable. Now all voltages will be introduced through this cable. Thus the printer may be quickly disconnected from all cables with one simple plug -- facilitating its removal to another position. With this arrangement, additional pieces of Ham-M rotor cable may also be used to bring all incoming lines to the printer in a neat and orderly fashion -- another advantage being that with standardization any plug will fit any printer for maximum convenience and flexibility. "Extension

Continued next page



cords" of Ham-M rotor cable may also be constructed to allow the machines to be rapidly moved to other parts of the room, even to a different room, for that matter.

Back to the local loop. Attach a 110 VAC line with plug to terminals 1 and 3 of an Amphenol plug (86-PM-8 -- 39c). This will be the local loop plug and the 110 VAC line is the only line connected to the plug. To use the local loop, jumper terminals 2 3 and 4 together, then jumper terminals 5 and 6, and finally jumper terminals 7 and 8. This plug will enable you to operate the unit with no other connections. It may be moved to another room, taken to another building, etc. without requiring another power supply, etc.

If the unit is to be used in series with the demodulator, then this simple "local loop plug" is disconnected and another plug inserted instead. This second plug (another Amphenol 86-PM-8) will then be wired with

The TT/L Motor Control

Keith Petersen W8SDZ
1418 Genesee Ave.
Royal Oak, Mich. 48073

How does the TT/L Automatic motor control circuit work? This question has been asked quite often since the appearance of the Mainline TT/L in August, 1965 QST.

The operation of the TT/L circuit is quite different from other relay control circuits. There are three levels of current: (1) No current, (2) four to five MA, (3) Approximately 12 MA. The normal plate current of the relay control tube is 4--5 MA. The relay requires a pull-in current of 10 MA. The drop out current is 2.5 MA. A fail-safe feature, to guard against loss of messages due to failure of the filament of the relay control tube, has been provided by designing the circuit so that the motor is turned on when the relay is not energized.

For this discussion we will assume that the controls of the TT/L are set in the following manner: (1) Auto Start On, (2) Autostart Slow, (3) Standby switch set to Receive position, (4) Motor Control switch on "Auto".

With no signal input to the TT/L, The auto start stage (V5) provides approximately 80 to 90 volts positive to the "OR Gate" to provide a holding mark voltage

110 VAC again to terminals 1 and 3, and now the selectors magnets are available at terminals 4 and 5, the keyboard at terminals 6 & 7 -- terminals 2 & 8 will not be used this time.

Thus this simple system gives a flexibility seldom achieved in the typical station. Variations will immediately come to mind, and the terminal numbers may be varied to suit the operator. Certainly one cannot over-emphasize the convenience offered by using the octal plug arrangement, as many stations have wiring running all around that makes for very "haywire" connections, and few stations have a simple system that is immediately interchangeable with any other piece of equipment.

The use of the octal plugs also makes it very easy to combine all items into a master control panel with one cable running to each machine.

* *

for the 6W6. This voltage is also applied to the 20 megohm resistor and one MFD capacitor time constant circuit in the motor control stage. When the charge builds up high enough, the neon bulb fires, giving a momentary positive pulse to the grid of the relay control tube, increasing its plate current to approximately 12MA. This causes the relay to pull in, turning off the motor. The plate current returns to its normal value after the momentary pulse, but the relay will remain pulled in because this exceeds the drop-out current rating of the relay.

The junction of the 1.0 meg and the 1.5 meg (this is a change in value from the original 1.8 meg) resistors, which are connected in series between the plate of V-5A and minus 150 volts regulated, swings positive and negative in response to changes in the plate current. The diode connected from that point to ground limits the positive voltage that can appear to about .6 volt.

When there is no signal, the plate voltage of V-5A is greatest, thus making the voltage swing positive at the junction of the two resistors and the diode. Since the grids of the relay control tube connect to this junction, they will also be .6 volts positive. This voltage combined with the

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Results of 1966 RTTY

Sweepstakes DX Contest

Another RTTY-DX Sweepstakes Contest is now history. Some amateurs reported fair to good conditions. This year top position goes to Luciano Orsettigh, IIORS, (Lou) who is well known on all RTTY frequencies and whom many of us have worked in the past. His score of 86,924 points, 173 qso's, in 31 countries does him honor and is a very notable score, considering the small number of amateurs operating RTTY. In second place is Giovanni Guidetti, IIKG, another well known RTTY operator. He is new to the top ten list this year with 72, 912 points, 146 qso's, in 31 countries. In third place we find Herbert Alke, DLIVR, who was in second place in the Fourth Annual RTTY SS in 1964. Herb's score was 59,537 points 135 qso's, in 29 countries.

Many fine suggestions were submitted along with the SS logs. One which seemed to receive more comment than others was, "let's have a narrow shift RTTY SS soon". In fact, many contacts were made using narrow shift which enabled solid copy thru the QRM which was present at times. If you have any thoughts along this line why not drop John, W3KDF, a letter with your suggestions. The present state of RTTY operations by amateurs affords good copy from stable transmitters and receivers. Others suggested more operation on 10 and 15 meters. Ten was open quite a while both days during the contest, and at least 15 stations made good RTTY qso's on ten during the contest period. It should be even better this coming year. Conditions to VK/-ZL were poor here from the states, but conditions were fair to good in most other areas.

There were many new calls on RTTY this contest, and many of the old timers, but we did miss some calls who have been high scorers in past contests.

RTTY wishes to express its thanks for use of the Volta SS Contest scoring chart. It makes for more uniform scoring and enables quick reference when in doubt, so a big thanks to the SSB/RTTY Club of Italy. Thanks also to Bob, WA6WGL and to Merrill, W6AEE for checking the scores and the logs. Several amateurs had not counted all possible points and some had made duplications, so if your submitted score and the

published score differ, your contest gang did check carefully. Until our next SS contest, good qso's and keep those printers operating.

Following these leaders are --

Call	Name	Points	Contacts	Countries
DJ6ZBA	Josef	56,463	117	29
G3MWI	Alec	55,890	137	27
EL2F	Orbra	54,648	96	23
WA4LWE	Brad	47,061	161	27
W2RUI	Skipper	44,436	137	28
ZS6UR	Bill	40,926	60	19
VE3AYL	Gwen	30,450	114	25

These are followed by many others whose call and score is listed below.

Position	Call	QSO'S	Countries	Points
11.	W8CQ	95	26	27170
12.	W9HHX	141	22	24816
13.	ON4CK	66	23	21804
14.	KL7BAJ	83	17	21743
15.	WA8 BOT	128	21	21672
16.	K50LU	136	20	21060
17.	W4CQI	86	22	20042
18.	K7MNZ	105	17	18802
19.	WA6WGL	91	18	18234
20.	UA1KBW	60	19	17784
21.	IKBT	61	23	17733
22.	E1YJ	116	14	17542
23.	VE3WQ	81	21	17136
24.	W6LDF	70	17	15963
25.	W7ESN	77	17	15249
26.	W1GKJ	87	19	15162
27.	W8NGJ	62	20	14560
28.	VP9BY	85	18	13356
29.	HB9P	48	17	12393
30.	ON4HW	46	18	12096
31.	WA4GKN	77	18	10656
32.	F2FO	49	18	10206
33.	W6AEE	78	12	9876
34.	W7RQQ	84	12	9540
35.	VE3BIJ	56	18	9198
36.	W1AOH	39	18	9108
37.	WA4TAJ	42	17	8636
38.	PAODOK	38	18	8406
39.	W2FAN	47	17	8075
40.	LA1SH	56	10	7160
41.	W4GJY	43	14	6454
42.	ON4BX	--	19	5567
43.	WAOGED	62	11	5423
44.	F3PI	30	17	5093
45.	W7ATV	23	12	4404
46.	OZ7T	35	13	4160

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SIMPLE STATION CONTROL OF TWO TRANSMITTERS

Irvin M. Hoff: W6FFC (ex-K8DKC)
12130 Foothill Lane
Los Altos Hills, California 94022

Many stations have two or more transmitters -- usually one an older CW transmitter and the other a newer SSB type. The combination is not important, but few people realize how simple it often becomes to connect both of these transmitters together so they may be easily used alternately.

At K8DKC (and now W6FFC), we use a DX-60A with a crystal oscillator for RTTY on autostart -- there is no VFO for the DX-60A, as we use a Hallicrafters HT-32A for other RTTY frequencies. The accompanying schematic will show the manner in which these transmitters are coupled together -- the ideas shown would apply to various other combinations as well. Even the reader who has only one transmitter might get an idea or two from the manner in which only one transmitter could be easily controlled.

The DX-60A (like most transmitters) has a "standby" position. When this mode switch is placed in the CW position, it puts 110 VAC on two of the rear contacts to operate an antenna relay. In this case, it operates relay two. This relay stays energized all the time the DX-60A is in the CW position. This relay two does numerous things, as are shown. The top set of contacts are the internal contacts which change the input of the linear from the RF output of the HT-32A to the RF output of the DX-60A. The middle set of contacts on the right relay (R2-a) changes the cutoff bias line to the linear from the HT-32A to the DX-60A. (On both transmitters such a terminal is located on the rear panel. If your transmitter does not bring this line out to the rear panel, you can do it yourself easily enough.) The third set of contacts R2-b merely turn the appropriate transmitter on -- in the case of the HT-32A, this shorts the PTT line to ground. In the case of the DX-60A, it is a little more subtle. In this case, the remote "send" switch activates the master antenna relay #1, which in turn shorts out the bias cut-off line of the DX-60A via terminals R1-a

-- thus putting the linear on the antenna instead of the receiver, and at the same time allowing the DX-60A to have output. (To accomplish this an empty jack is inserted in the CW jack on the DX-60A, or else the internal bias line would always be shorted out.)

A word should be added about the unique method by which the main antenna relay #1 is activated. Many transmitters do not have an extra set of "floating" contacts -- such as the Collins S-line, for one. They often do have an extra set of contacts, one of which is grounded. In this case, the schematic shown works beautifully. Since one side of the 110 VAC power line is grounded, placing the plug in the wall socket correctly will provide normal action of the relay. Placing the plug in backwards provides no results at all. It is impossible to blow a fuse with this simple system. It has been working successfully for a good many years at a number of different locations, and the reader should not be skeptical of its advantages.

You may readily see that activating the "send" button at the printer will operate either transmitter depending on the position of the mode switch of the DX-60A. If the DX-60A is in "standby" then the HT-32A operates normally. If the mode switch on the DX-60A is in "CW", then relay #2 is activated as shown, and the HT-32A stays in standby, as its PTT switch is not used. With this set-up, you can leave the HT-32A in "VOX" position all the time whether the DX-60A is in use or not.

To change from one transmitter to the other, then, all that is done (assuming the HT-32A is in "VOX" position is to merely change the mode switch of the DX-60A from standby to CW. No other switches at all are required. This simplifies the total operation to the point of literally no possible error. If you wish to use only the DX-60A, you never turn the HT-32A on at all. If you wish to use only the HT-32A, you never turn the DX-60A on at all.

The clever reader will quickly get ideas how his own station might be conveniently arranged for similar operation. This station set-up was first used with a Johnson

Pacemaker SSB transmitter and a Heath DX-100B. It could be used equally well with any number of other combinations, for that matter.

The relay #1 is a Dow-Key DK-60-62C 115 VAC -- this relay has DPDT external contacts -- the other set may be used to mute the receiver during transmit, etc. This particular type of relay has a special shorting plug for the receiver to minimize voltage on the receiver during transmit. The relay #2 must therefore be a different type, and it is an Advance CB/1C2C/115A. This type relay has similar contacts on both sides.

By using the main antenna relay to short the bias line for the transmitters, proper timing sequence is provided so that the transmitters may not put out RF power until the antenna is first on the transmitter. Normal use of an antenna relay will soon cause its failure due to arcing of the contacts, even with moderate power. This system also protects the transmitter adequately in the event of a failure of either relay coil. If relay #1 fails, no RF output may be achieved by either transmitter. (The HT-32A was modified slightly as shown in the November 1965 QST page 49.) If relay #2 fails, then you get normal operation of the HT-32A. Thus this method is absolutely fail-safe, and again requires

only the normal operation of the mode switch on the DX-60A from standby position to CW to trigger the entire sequence of events automatically.

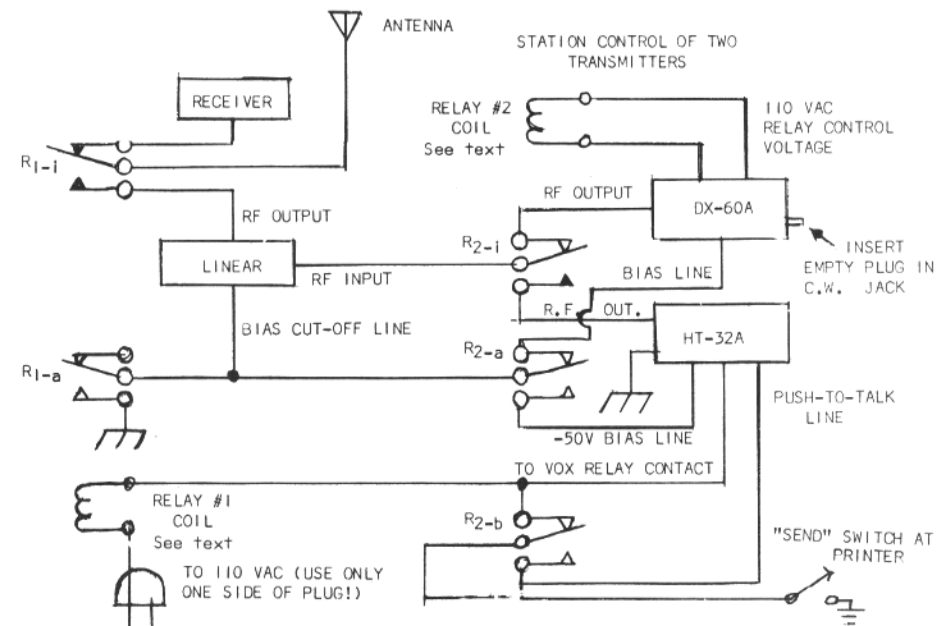
If not shown adequately, the line marked "to VOX relay contacts" going to the HT-32A merely shorts that line to ground if the PTT lines is activated.

In summary, many of the ideas shown will adapt to a wide range of transmitters, and most of the ideas shown will be beneficial to the station using only one transmitter. The only problem with this arrangement is the relatively high expense of the Advance CB/1C2C/115VA relay, which are now up to nearly \$25. However, the author has had a relay of this type for over 15 years, so the expense by this time has been well borne by its usefulness and longevity over the years.

The Dow Key relay costs under \$16, and if one were ambitious, a standard insert could be substituted for the shorting type on the one side and then the unit could be used satisfactorily for relay #2. Such an insert should cost less than \$1, and your distributor could easily obtain one if he already does not stock such items.

The advantage of having an inexpensive transmitter for xtal-controlled RTTY (autostart, etc.) cannot be overemphasized.

Continued on page 15



VHF RTTY NEWS

RON GUENTZLER - W8BBB
988 Chelston Rd.
South Euclid, Ohio. 44121



This month we want to cover some of the general aspects of VHF operation for those who have never operated here. The general topics to be discussed are FSK, AFSK, AM, FM, crystal control, suggested operating frequencies, and autostart considerations.

FSK vs AFSK

Because operation on the HF bands is limited to FSK operation in the CW portions of the bands, it seems to be the natural method of operation on the VHF bands. However, as the carrier frequency is increased, the ratio of the shift to the carrier frequency becomes smaller; this ratio can be used as a "figure of merit" for comparing the relative transmitter and receiver frequency stability required for successful FSK operation. The larger the number, the less stability required. For example, at 3.6 MHz a shift of 850 Hz is $850/3,600,000 \times 100 = 0.0235\%$ of the carrier frequency; if the same 850 Hz shift is used on 146.700 MHz, the required stability is 0.00058%! This is getting pretty tight. In fact, it means the carrier frequency stability has to be 40 times better on 2 meters than it has to be on 80 meters.

We do not mean to imply that it is not possible to run FSK on 6 or 2 meters, because K8AQC and K8QPA successfully operate over a two hundred mile path on 2 meters using FSK. However, for ordinary work, the stability problems are such that FSK is not generally recommended.

With AFSK things are better. When using AFSK, it is the audio output from the receiver that is useful. This output is not directly proportional to the carrier frequency as it is with FSK, therefore more instability can be tolerated. Most AM receivers can be detuned by 1 kHz if they are running with a 6 kHz bandwidth, and, unless there is severe QRM or QRN, the output is still usable by a TU. With wide-band FM receivers the amount of allowable tuning error is even greater. We do not mean to imply that it is desirable to

not accurately tune a receiver, we mean the wider the system bandwidth, the greater is the tolerance to frequency errors. Therefore on the VHF bands, AFSK is easier to use successfully than FSK.

AM vs FM

The index of modulation for FM is defined as the peak carrier deviation divided by the highest modulation frequency. For example, if the carrier deviation is set at 15 kHz peak, and the modulating frequency is 3 kHz, then the index of modulation, M, is 5. Using the same definition of modulation index gives $M = 1$ for AM.

With AM receivers the S/N (signal to noise) ratio at the output of the receiver is directly proportional to the S/N ratio at the input. (This assumes that the receiver is a perfect receiver or one having a noise figure of 1.) In an FM receiver the S/N characteristics are quite different from that of AM. There is an improvement of the S/N ratio in an FM receiver so long as the input S/N ratio is above a critical amount known as the "FM Improvement Threshold"; this means that when operating above the improvement threshold, the S/N ratio at the output is greater than the S/N ratio at the input. This is not a case of getting something for nothing; the amount of S/N improvement when passing thru the receiver is proportional to the square of the index of modulation. This is an example of the concept of exchanging bandwidth for noise. So long as the S/N ratio within the IF amplifiers is greater than the FM improvement threshold, the FM receiver will perform better than an AM receiver. However, when the S/N ratio drops below the threshold of improvement, the output from the receiver deteriorates very rapidly.

The practical result is: as the index of modulation is increased, the output S/N ratio increases giving a quieter signal; however for very weak signals, AM is better. Therefore, when trying to work over the absolute maximum distance AM is preferred, but when less than absolute max-

imum distance is desired, FM is the better medium. (FM system characteristics will be discussed in greater detail in a future issue.)

Crystal vs VFO

When a large portion of a band is used for general contacts, VFO control of a transmitter and a tunable receiver are the most practical modes of operation. Also, if a band is crowded, survival is dependent upon being able to move about into clear spots. However, in the relatively uncrowded VHF bands, the ability to move around may actually be a detriment, especially if the band is very wide such as 6 and 2 meters with a total of 4 MHz available in each band.

Also, because of the relatively unstable VFO controlled transmitters and tunable receivers in use on the VHF bands, it is possible to drift off a frequency. Resetability is also a problem; having tuned off a given frequency, it is difficult to get back into the frequency. Therefore, crystal control of both receivers and transmitters is considered desirable because with crystals it is possible to be reasonably sure you are where you think you are.

Distances

There has been some criticism of VHF RTTY because of its "limited" range. With about 30 Watts of RF output and a good receiver, 30 miles is a reasonable range to expect (if the terrain isn't too unfavorable). For metropolitan areas this is certainly adequate, and, in fact, desirable because "local ragchewing" should be local. On the other hand, the very reliable "land-line" copy every hour of every day makes VHF ideal for traffic handling under a relay system, where reperforation requires perfect copy. ("Land-line" QSOs are possible between Cleveland and Detroit on about 50% of the days of the year.)

Autostart

Autostart is a convenience for traffic handling, setting up operating schedules, and for knowing what is going on. In order to successfully employ autostart, it is necessary to pick a frequency to be used and be able to transmit and receive on that frequency. This means crystal control is almost mandatory. Also, because there is a possibility for some drift, even with crystal control, a system with some built in tolerance for slight frequency errors is desirable. This indicates that AFSK is better for autostart than is FSK.

So long as the amount of traffic on a channel is small, a simple means of activating the autostart is desirable. A simple mark-start, mark-hold arrangement is adequate. If the amount of traffic becomes too great, selective calling schemes can be devised.

Operating Frequencies

One might object to using crystal control because it makes the chance of working "DX" well nigh impossible. There is one simple solution to this problem: have everyone using a particular mode of operation on the same frequency. For example, all persons operating FSK should be on one frequency, those using AFSK on AM (6A2) on another frequency, and those operating AFSK on FM (40F2) on a third frequency. Of course, certain operating standards should be established such as the shift for FSK and the audio frequencies for AFSK. Antenna polarization is also important.

There is probably no sense in having all modes on one frequency because there is little compatibility between the different modes. 6A2 and FSK may be compatible, but 40F2 is definitely not. Therefore to avoid a lot of QRM and hurt feelings, the 40F2 mode of operation should be kept separate from the 6A2 and FSK modes.

Byron Kretzman, W2JTP, has been an advocate of the frequencies 52.600 and 146.700 MHz for VHF RTTY operation. We whole heartedly support the use of these frequencies. We would like to make two additional recommendations: 1) Use only 40F2 modulation on these frequencies, and 2) Use only vertical polarization. If 52.600 and 146.700 MHz should become so crowded that alternate "talking" channels are necessary, we will be open to suggestions.

We are open to suggestions from readers regarding frequencies to be used for 6A2 and FSK.

Activity

As mentioned last month, we are going to publish the information received regarding VHF RTTY operation be sent to us so that we may publish it here. Please be as specific as possible.

The following stations are known to be active. All of them operate on 146.700 MHz using AFSK (2125 Hz mark & 2975 Hz space) on FM with a nominal 15 kHz deviation and vertical polarization. (30W indicates 30 watts RF output; GP, ground plane antenna; C. Pol, circular polarization)

Continued on page 15

PREFIX COUNTRY	CN NOROCCO	DJ-DL WEST GERMA	FA ALGERIA	F57 SAINT MART	KMG MEDIANE	RUSSIA	BULGARIA
AC3 SIKKIM	CRA CAPE VERDE	EL ESTONIA	FC FINLAND	FM SWITZERLAND	GA GUYANA	HA HAITI	HE HUNGARY
AC4 AC4	CR9 PORTUGAL	EL ESTONIA	FC FINLAND	FM SWITZERLAND	GA GUYANA	HA HAITI	HE HUNGARY
AC5 AC5	CR6 ANGOLA	EL ESTONIA	FC FINLAND	FM SWITZERLAND	GA GUYANA	HA HAITI	HE HUNGARY
AD AD	CR7 MOZAMBIQUE	EL ESTONIA	FC FINLAND	FM SWITZERLAND	GA GUYANA	HA HAITI	HE HUNGARY
AW AW	CR8 GDA, PORT	EL ESTONIA	FC FINLAND	FM SWITZERLAND	GA GUYANA	HA HAITI	HE HUNGARY
BY BY	CR8 FIMOR ISL	EL ESTONIA	FC FINLAND	FM SWITZERLAND	GA GUYANA	HA HAITI	HE HUNGARY
BY BY	CR9 MACAO	EL ESTONIA	FC FINLAND	FM SWITZERLAND	GA GUYANA	HA HAITI	HE HUNGARY
BY BY	CT1 PORTUGAL	EL ESTONIA	FC FINLAND	FM SWITZERLAND	GA GUYANA	HA HAITI	HE HUNGARY
BY BY	CT2 AZORES IS	EL ESTONIA	FC FINLAND	FM SWITZERLAND	GA GUYANA	HA HAITI	HE HUNGARY
BY BY	CT9 MADEIRA IS	EL ESTONIA	FC FINLAND	FM SWITZERLAND	GA GUYANA	HA HAITI	HE HUNGARY
BY BY	CT97 JUAN FERNANDEZ	EL ESTONIA	FC FINLAND	FM SWITZERLAND	GA GUYANA	HA HAITI	HE HUNGARY
BY BY	CT98 CURACAO HAVANA	EL ESTONIA	FC FINLAND	FM SWITZERLAND	GA GUYANA	HA HAITI	HE HUNGARY

Hello there. . .

Boy, the time flies. It seems like only yesterday that the first column for the Journal was completed and here it is time to start another.

There seems to have been considerable activity on the DX bands in the past month or so and from this location, at least, conditions have been better than usual.

I'm going to try to consolidate the activities by continents and save any general remarks for the end, so here goes.

North America

I would say that the two most consistent (and loudest) stations are Jean, FG7XT, and Jim, VP9BY, hardly a day goes by that I don't hear them on the band sending tape in fine style. Every once in a while though, someone pops up to make things more interesting. A few logged recently were KL7BAJ, XE1BI, KP4GN, and a new station in Acapulco, Hugh of XE3TTT. Erosa, XE1BI was instrumental in getting him going as Erosa was at the keyboard during the qso. VK3KF was reading the mail so Hugh's second qso, second country, and second continent was with Eric.

Something of a rare bird in these parts recently was KZ5SC at Fort Clayton, C.Z. Andy, KZ5DR, was op during that session.

South America

Not too much activity from these parts recently. The gang from Venezuela have been supplying most of the action. Those heard or worked recently have been YV3LD, and YV5AWW/1. Every once in a while ZIP, OA4BR pops up with fb signals on what seems to be a dead band.

I suppose the most consistent source of DX contacts, at least from where we sit, is Europe. If the path is open you can usually hear an RTTY station and make contact. Here we will confine our listings to some of the new stations on and to some of the stations from the less heard from areas.

While in qso with Luc, F2LV, recently, —

he mentioned the fact he had a contact with SV0WJJ in Greece. Along with SV0WL on Crete, these are a couple of rare ones to watch for.

Here are some of the stations that have been on the bands lately. ON4CK, OE3HPA, OE1KRW, I1ORS, OE1PDW/5, I1RO, I1KFL, I1PET, SM7AIA, SMOOY, UA1KAY, UA1IM, UB5UN, UA1KAL, UA1KBW, UA4KED, UP2CG, and UQ2KAX.

Although this event took place some time ago I would like to mention the operation of GB3RCS at Seymour Hall during the International Radio Communications Exhibition. The RTTY equipment at the Hall controlled the transmitter some 70 miles away by land line remote control. The BARTG lads manned the equipment at the exhibition while Ray, G3LPC and his boys handled the TX and RX at the other end of the line. Those of you that had a contact with GB3RCS, probably had your copy read by some of the many visitors to the exhibition.

Oceania

The biggest news from this part of the world is the very recent tremendous increase in activity from Australia. Bill, VK2EG, and Eric, VK3KF, have been doing yoeman service for years in giving the gang contacts from that area in rag-chews and in contests. They are now ably joined by VK6VK, VK3NR, and VK3PB, and I understand from Eric that VK3DM and VK3ARD are also on. Distance wise, Vic, VK6VK, in Perth, is about as far out as you can get from the East Coast, U.S.A. He is also all by himself in Zone 29, (contest ops take note). Conditions have been such lately that the boys are also putting in excellent signals via the longpath. Bill, VK2EG, is on almost daily 20-2200 GMT looking for U.S.A. contacts. He hears lots of W stations chatting among themselves but he can't seem to break into it for a qso. Noel, VK3NR, has been putting in a fb signal at this time also. So point the beams east, men, if you want a VK qso the long way around.

Bruce, ZL1WB, was active during the contest but I have not had any reports on his activity recently.

Africa

The most constant source of activity from this area is Orbra, EL2F. Orbra is usually on twenty meters a couple of times a week. Don, EL2AL has been on for a few months now from Monrovia and I understand that shortly we can expect to print EL2AI.

The fairly recent flurry of activity from FB8XX, on Kerguelen, and FB8YY on Terre-Adelie certainly sent the boys scrambling for the keyboard. I was fortunate to work half of the duo with a mixed up CW, RTTY, no count contact with the other half. Those of you that have had a qso be patient on the QSL, Mike, F3PI, indicates it will be at least a six month wait due to the remoteness of the area. Haven't heard from South Africa since the contest. But then, condx to those parts, at least from here have not been good.

ASIA

We usually lament the fact that there is never any activity from this area. The truth is that there rarely is. However, there is activity now and has been for some months. Thanks to Bud, W6CG, I have some of the latest information on Cas, KA9AK. Cas is active on all bands on c.w., but as you know, RTTY in Japan for KA calls is restricted to above 29 mc. Bill, VK2EG has been successful in making contacts with Cas at 0245-0330 GMT from that area. I have listened at that time but ten is just not open. Cas has given the following schedule and at these times the USA stations are coming thru to Japan. Every Friday and Saturday from 2300-2315 on 29040 kc. Cas will be calling CQ on CW. If there are no takers after fifteen minutes he will QSY to 28050 kc. CW.

Well Cas, I hope you get some business. I know I'll be there really trying.

Bill, VK2EG, also sends word that 9V1ff in Singapore is getting ready for RTTY and should be on soon. Bill is presently working out a schedule with him so we should have more news shortly.

Well, I guess that about does it for this month. Just a few more random observations that may be of interest. Had a CW qso with Martin, OY7ML, and upon inquiring as to what's with the RTTY he told me he has packed the gear away for the time being. It seems that Martin lives in a three room apartment with the xyl and two

children. The machine is a real thumping "iron horse". So until Martin either gets larger quarters or a quieter machine, there'll be no activity from Torshavn.

I recently heard Josef, DJ6ZBA, sending out a QST tape on twenty meters telling the gang that ten meters was wide open for DX. Thought that was nice of Joe to take time to do this. Over the past few years ten meters has been so poor that we seem to forget that ten is a DX band again in a big way.

Again this column is heavily salted with W3KDF. Next month I hope to have more news from you fellows "out there" now that you know where to send it. Also, don't forget to send in your countries totals for the Honor Roll listing next month.

73 de John

* *

DX CONTEST RESULTS

Continued from page 7

47.	WB6TEH	45	9	3879
48.	DJ3GI	30	12	3852
49.	VK2EG	12	8	3808
50.	LA60I	35	12	3408
51.	VE3EBR	39	12	3384
52.	K2YEQ	17	13	3055
53.	WB6RXM	44	8	3032
54.	YV5CIP/1	29	6	2610
55.	SMOCLW	25	11	2541
56.	WA8MSG	21	10	2460
57.	W6UUS	33	7	2079
58.	W6JOX	30	7	1904
59.	K4VDM	37	7	1554
60.	W3WLF	19	8	1480
61.	W6NRM	25	6	1284
62.	F8KI	14	10	1200
63.	W3KDF	10	7	1015
64.	W7TZL	17	6	990
65.	K9QNV	29	5	760
66.	W7QCN/O	13	1	53
67.	W6IWE	5	1	16

* *

RTTY JOURNAL

P.O. Box 837 - Koyal Oak, Michigan 48068

"Dusty" Dunn — WBCQ

Editor & Publisher

SUBSCRIPTION 1 Year- (11 issues)

U.S.-Possessions - Canada--

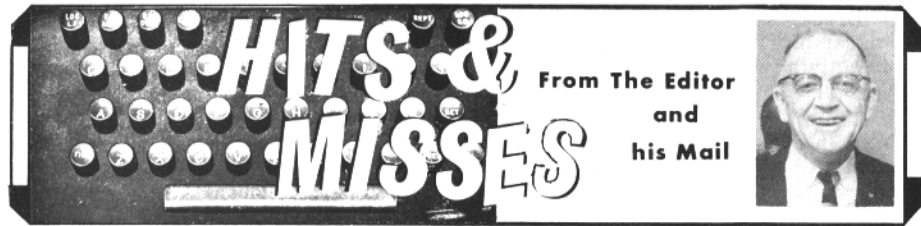
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This is a column for your ideas and suggestions, anything except personalities fellows . .

* *
One of the things we have noticed about RTTY in the few years we have been active is the relatively high turn over of interested hams. They appear, are very active for a while and then depart. Any phase of hamming is subject to somewhat the same cycle but we wonder if RTTY isn't more so than others. WHY? We have ragchewers, DXers, Technical discussions, VHF, one of the few modes where the fellow that likes to build can "home brew" either a complicated piece of equipment or a simple TU and compete with everybody. Due to the relatively few on RTTY there is a comradeship that is not found in other modes. Possibly one of the things that could sustain interest to many would be net operation. Fortunately there have been several nets formed recently. In another part of the JOURNAL we have listed what information we have. Everybody is certainly welcome to any net so why not check in some nite and get all the information. As we hear of other nets we will be glad to add them to our list. Any other suggestions to help keep RTTY the interesting mode most of us find it?.

* *
Several have asked - is there any objection to our trying to hit the auto start net, (3637.5) is one. -ell no- they will be glad to have you and willing to help in any way they can.

* *
In submitting articles for publication it will be a big help if a regular typewriter is used with double spacing. Drawings should be black lines on white paper and if convenient 6 1/4 inches wide. Almost any type of copy can be used but this saves a great deal of time in preparation.

* *
Our British cousins in RTTY, the B.A.R.T.G. society have published an informative booklet "RTTY The Easy Way" covering all phases on getting started in RTTY. Although some of the machines

mentioned are foreign, US models are mentioned and the other information applies to anyone. The price is 2/6d, we are not sure how much this is but a buck will get you a copy I am sure. Send to G2FUD, Arthur Owen, Gwernarth, 184 Hale Rd. Hale, Cheshire, England.

With the mention* of a certificate for WAS on RTTY we have heard of two certificates offered. The ARRL gives one endorsed for RTTY and The RTTY Bulletin of the Florida RTTY Society offers one. Send to Fred De Motte, W4RWM PO Box 6047. Davtona Beach, Fla. for this one. Incidentally, although this award has been offered for five years, no one has qualified. Here is your chance to get a Number 1. And I guess we are a poor salesman for a WAS RTTY contest. Not a single comment.

* *
The only back issues we have are 1966 from April to December. This will answer a lot of questions received. 30¢ per copy.

* *
We are still looking for an article on a nice simple - TU - tube or transistorized - for FSK and no polar relay. A one or two evening project that will work on most signals. There must be a bunch of them around but all we get are promises. Let's get these machines on the air then the complicated TUs can follow.

* *
Don't let the fancy 3C3 prefixes think you have a new rare one, Canada in honor of the Centennial Celebration this year have authorized amateurs to use this prefix instead of the regular VE. Canadian amateurs are going all out to promote this event. See information on the Centennial net in the net article.

* *
We get a number inquiry letters asking for help in obtaining equipment etc. Where, Why and How. At present we just do not have the time or ability to answer all these requests. Wonder if one or more persons around the country would like to help us answer these inquires. If so we will be glad to publish the names so that inquires could be sent direct.

- RTTY NETS -

While most nets are primarily for traffic, general news and information is also exchanged. Newcomers are always welcome - wait til the NCS (net control station) asks for breakers and hop in. Ask for any information you want. Maybe you will find net operation adding a purpose and interest to RTTY that you will enjoy. The nets listed are primarily lower frequencies, but usually have connections to VHF nets in the more populous areas. The VHF nets will be covered in W8BBB's column on VHF.

Northeastern Net - Daily except Sunday at 1900 EST. Approx 3635 kes.

Florida Net - Daily at 1900 EST. 3704 kes.

Canadian Centennial Net - Tuesdays and Thursdays at 1930 EST. 3630 kes.

Auto Start Net - Continuous - 3637.5 kc 170 Shift only.

A more complete listing will be published as we receive information.

* * - VHF NEWS

Continued from page 11.

tion; AS/C, auto start with a time clock; AS/24, auto start 24 hours per day.) Akron Ohio Area

K8EIW Don Nelsch, Cuyahoga Falls, 50W, Beam

Cleveland Ohio Area

K8AOE Fred Cupp, Willoughby, 30W, GP & Beam

W8BBB "RG" Guentzler, South Euclid, 30W, GP, AS/24

W8SUIT Dave Goodman, Cleveland Hts., 3W, GP

Detroit Michigan Area (K8AQC)

K8AQC Ron Kittel, Allen Park, 300W, Beam (C. Pol), AS/24

W8BYB Rod Buszard, Livonia, 25W, Beam, AS/C

W8CLL Ed Atems, Detroit, 50W, Beam, AS/C

W8CQ "Dusty" Dunn, Royal Oak, 35W, GP, AS/C

W8DYV Rich Schauer, Taylor, 300W, Beam, AS/C

W8KJH Fay Wilson, Detroit, 25W, GP

W8RRE Harry Bedard, Rochester. 20W, Beam, AS/C

Wichita Kansas Area (WØHVL)

WØDEA Vernon Medlam, Wichita,

WØHVL "AB" Bates, El Dorado, 30W, GP

WØJTN "Pete" Peterson, Wichita, 60W, GP

WØLUI Jay Williams, El Dorado, 30W, GP

WØMMR Kenneth Fuller, Wichita, GP

SIMPLE STATION CONTROL OF TWO TRANSMITTERS

Continued from page 9

It is a case of a small 3-4 tube transmitter costing well under \$100 versus a 30-35 tube monster costing over \$500. Plus the advantages of having an extremely stable unit.

On the other hand, this circuit was originally devised so the author could go from AM to SSB before he got on RTTY. You could still use such a circuit to go from SSB or AM to RTTY, etc.

The "send" button at the transmitter is actually a STDP switch that also mutes the converter at the same time, thus offering single-switch control of the station to go from transmit to receive. This type of station control was discussed in greater detail in the November 1965 QST.

A review of the procedures used by the author will suggest other possibilities for your own equipment. Dust off the old transmitter and hook it up with your new one for simple, fast, efficient and easy use.

* * TT/L MOTOR CONTROL

Continued from page 6.

cathode bias provided, causes the normal plate current to remain at about 4-5 MA. If tolerances of voltage, resistance, or tube characteristics cause this current to differ from the desired level, the value of the cathode resistor may be changed to correct the condition.

When a signal is applied to the input of the TT/L, V-5A will conduct, causing the voltage at its plate to be lower, due to drop across the plate resistor. The voltage divider action across the 1.0 meg and 1.5 meg resistors will cause the junction, and the grids of the relay tube, to go approximately thirty volts negative, causing the tube to be cut off. This allows the motor control relay to drop out, turning on the motor.

When the signal is removed again, the autostart stage reverts to it's standby condition, allowing the relay control tube's plate current to return to the normal level. This is not enough current to pull in the relay until the charge builds up in the delay circuit, firing the neon to provide the momentary increase to 12MA.

- COMMERCIAL STATIONS -

We have received a number of lists of commercial stations sending 60 words a minute. After the information is assembled we will run a list next month.