Additional CLASSIFIED ADS

FOR SALE: R-4A, ST-3,500 watt linear, tri band beam, Clegg 22 er, etc. send stamp for complete list and prices. Might consider mint Eico 720 or Hammarlund HQ-180 in trade. Vern Schroeder, 607 Pine St. Batavia, Ill. 60510.

CW/RTTY AUDIO FILTERS, 1,275 plus-minus 100 Hz bandwidth 80db plus attenuation, 3db insertion loss NEW, used for 100 wpm rtty, $8.50 pp; 88mh unpotted TOROIDS, 5 @ $2.00 pp; WA@TJR, D. R. Kelley, 1490 Yaqui Drive, Florissant, Mo. 63031.

TOROIDS: 88 or 44mhy. 30/$10. POSTPAID (5/$2.50). Ribbons for 14,15,19,28,32,33, Mite, Lorenz-black nylon 12/$3.50 postpaid. 60 speed gears for model 15-19 (74912-74913) $3.50/set. 11/16" tape-fresh - $8/case/40 rolls. Sprocket feed paper for all models $.50/box. Single copy roll paper (8-1/2") NEW $12.50/case/12. Late model 28 typing units, excellent $175. New cover for model 14 reperf $10. DESKFAX 6500 Tranceiver $15 (2/$25.) plus paper $3/pkg. Manual for TXC-1 FAX $7.50 postpaid. Stamp for picture catalog. Van's W2DLT Electronics 302R Passaic. Stirling, N.J. 07980.

DIGITAL COMPUTER EQUIPMENT CATALOG: IC's, Computer Units, photo resist, etc., 50c (refundable), Postpaid U.S., MNH - Applied Electronics, P.O. Box 1208, Landover, Maryland 20785.

SAROC -Las Vegas - Jan. 4-7

*****

RTTY Equipment--

CONTINUED FROM PAGE 17

Model 14 RO Typing Reperferators (no keyboard) $15.00 each

Model 14 Non-Typing Reperferators $10.00 each

In order to purchase the equipment you must send payment in full (cashier's check, money order, etc., payable to the A.T. & S.F. Railway Co.), with a letter stating the following:

1. The location(s) where you intend to pick up the equipment.
2. A list of the pieces you want to buy at the location(s) mentioned in (1.).
3. Your name and address.
4. A statement as to whether or not you will accept a partial order (with appropriate refund) if all of the pieces specified are no longer available.

The inclusion of a self-addressed stamped envelope with your letter is mandatory, for response to your letter, or return of your money in the event that the equipment is sold out.

The letter must be addressed to:

Mr. C.C. Glover
Purchasing and Materials Depart.
P.O. Box 1674
Topeka, Kansas 66601

Address Correction Requested
RTTY JOURNAL
P O Box 837
Royal Oak, Mich. 48068

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DECEMBER .1972

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RESULTS-1972

SARTG RTTY Contest.

CLASS A) & B),

1	LŪ2ESB		209.375	31	DL2XP	4	29.050	61	VK2EG 16 900
2	I5MPK		167.610	32	PI1HRL		23.635	62	JA1EUL 17 720
3	IT9ZWS		144.640	33	W7KS		21.000	63	OK1AMS 450
4	YA10S		131.565	34	W5EUN		19.550	64	CE3GK 420
5	VU25KV		123.510	35	SM5BKA	5	18.480		
6	DL0AK		120.780	36	DK1GH		16.065		
7	I1BAY		117.180	37	W8CQ		15.390		
8	I8CAQ		112.985	38	W1AEE		14.725		
9	KZ5BH		107.360	39	I8KCD		14.520		
10	JA1BK		98.550	40	OZ7OU	6	14.030		
11	KH6AG		93.720	41	VK3KF		13.260		
12.	CE3EX	1	78.925	42	FI8BZ	7	13.090		
13	C31FQ		73.080	43	OK20P		12.980		
14	K2PAR		72.630	44	K8ILL		12.875		
15	SM5BTG		67.620	45	WA6IDQ	8	12.450		
16	KZ5LF		66.395	46	HA5FE	9	9.880		
17	VO2AF		63.270	47	VE5TO		9.630		
18	KL7GRF		62.320	48	LA7MC		8.820		
19	K5ARH		59.130	49	VE4SC		8.370		
20	W2LFL		58.500	50	ON4CZ	10	8.360		
21	K6WZ		51.570	51	LA2YE		8.010		
22	W3KV		46.655	52	JA1ACB	11	7.800		
23	ZS6BBK		46.110	53	WB6QFE		6.670		
24	WB6IMP		46.060	54	PA0WDV	12	6.390		
25	XE1YJ		45.540	55	W0NP		5.100		
26	W4CQI		40.885	56	EI5BH	13	4.575		
27	W5TZB		39.690	57	OZ4FF	14	4.420		
28	W6IZJ		34.960	58	SM3AVQ		3.640		
29	OK1MP	2	33.300	59	HA5FA		3.510		
20	SM6AEN	3	30.600	60	FM7AJ	15	1.330		

CLASS C), MULTI OPERATOR

1	WB6SCH	93.060
2	DKØDX	74.970
3	SL6ZK	23.405
4	OZ7RD	16.640
5	SK1BL	14.260
6	SK5AA	4.160
7	GB2SM	135

CLASS D), S W L 'S:

1	PETER BOER NL-687	142.450
2	WALTER MEIER HE9HXW	89.910
3	PAUL KUENG HE9FUJ/HB9AVK	89.100
4	PEGGIE LONGWEL USA-6	71.820
5	LEE REYNOLDF ENGLAND	58.080
6	LUTHER QUICK EA4-21390	39.300
7	PAUL MENADIER USA-1	38.640
8	KLAUS HEIDEFELD	18.590
9	J. ZILLMANN	12.075

*****

RESULTS-1972 WAE RTTY Contest.-

1. Single Operator

EUROPE

I5MPK	44.352	B
I1BAY	29.039	B
G3OZF	22.945	A
IT9ZWS	22.790	B
F6AUE	20.636	B
F9RC	17.700	A
IS1AUV	10.080	A
IØPEP	8.904	B
ON4BX	5.046	B
OK1MP	5.425	A

SOUTH AMERICA

9Y4VU	5.829	B
PY1DCB	297	A

OCEANIA

ZL2ALW	6.216	A
KG6JBG	200	A

OK2OP	3.424	B
SMØOY	3.200	A
DK5LJ	2.904	A
I5GIF	2.155	A
OE5OEL	1.632	A
OK2PBM	1.575	A
I1AMP	1.326	B
G3IGG	560	A
SMØUER	480	B
SKØAB	300	B
DL1VR	224	B

APRICA

CR6CA	30.870	B

ASIA

4X4MR	4.830	B
JA1ACB	632	A

NORTH AMERICA

WB6RXM	23.049	B
KL7GRF	17.232	B
KZ5LF	12.348	B
W3KV	10.879	B
KG4FK	8.056	A
K5ARH	8.052	B
W5EUN	7.040	A
WA6WGL	6.920	B
W8CQ	4.576	B
W2VAQ	1.748	A
W6AEE	1.560	B
VE4SC	512	B
VE5TO	84	A

2. Multi Operator

EUROPE

DL2AK	17.108	B
UK4FAD	11.051	A
HA5FE	5.520	A
DJ8BT	1.634	B
SK5AA	565	A

3. SWL Category

EUROPE

HE9FKB	6.512	
HE9FUJ	2.628	
L.Reynolds	2.504	

NORTH AMERICA

Paul T. Menadier	6.670	

check log: G6JP, SM5APS, SM6AFN KG6SR/KC6

S.O.R.C.A.R.S. *self operating*

RTTY contest amateur station.-

The following article, which will be published in two parts, is hard for us to classify, probably because it is so far over our heads. Although we don't expect anyone to complete the ideas into a working model we hope it gives some food for thought to those that understand those insidious "chips" that do things we simply can't understand. (editor)

Part 1 of 2 parts-

JOE KASSER, G3ZCZ/W3
1701 East-West Hwy, Apt.205
SILVER SPRINGS, MD. 20910

Introduction

Here are some of the things that SORCARS will do.

1) SORCARS will send CQ's on the band, tune for a reply and alert the operator when one is received.

2) SORCARS will take care of the routine parts of a qso by filling out the log and transmitting the standard information (signal report, name, qth etc.).

3) SORCARS will monitor a frequency or frequency band and print out any messages addressed to your station, logging all times and frequencies of reception.

4) SORCARS will operate a rtty contest without the presence of the station operator.

Each of the above modes of operation does not necessarily utilize the whole of SORCARS so that when partially constructed, SORCARS may be used in a semi-automatic manner.

During the course of an rtty qso, the operator may run a tape describing his set up. The machine may operate using "auto-start" techniques. The operator will consult his frequency and time measuring equipment (vfo. dial and clock), and enter data into the log book. In fact some operators type the frequency and time information onto the printer page and use the roll of paper as their log record of their station activity.

As integrated circuits became available to the amateur, articles appeared in the amateur radio press describing how they could be used to build accessory equipment for the Amateur Radio Station. Time passed and these integrated circuits became cheaper and more numerous. The projects described became more and more complex, graduating from simple oscillators through solid state keyers and call generators, to digital frequency counters.

This article describes the techniques used in a fully automatic rtty contest station with facilities for semi-manual operation. All these techniques have already been developed and the idea of SORCARS was born from the modifications of already published designs.

This is not a construction article. I'm not going to present detailed circuitry. SORCARS in its entirety is a complex system. In fact it is a small hard wired computer. A good working knowledge of digital techniques is required in order to translate the block diagrams in this article into working schematics.

SORCARS is described in the form of modules. Each module being usable as is, or in conjunction with a number of others. If two or more modules are interconnected then some of the station operation becomes automated, until finally when all the modules are complete - SORCARS is born. This feature enables each of the modules to be incorporated by the operator into his station one at a time as they are constructed. For example, he can use one module to send CQ's auotmatically while drinking coffee, or entertaining guests, or building other modules. He can use a second module as an automatic band monitor, and so on.

The Contest Station

Consider the usual rtty station in block form as shown in figure I. This approach considers the log book entry to be the end product of the contest qso. The station operator is considered as a device that converts data to rtty format by typing on the keyboard and converts received rtty data into a suitable log book entry. The SSB transceiver shown in the figure is considered to be operating under vox. control with an audio afsk rtty signal input through the microphone socket. Let me stress that this treatment of the rtty station is only held to be valid for the CONTEST STATION.

Consider the actions of the operator during the contest.

1) He tunes the rig: - tuning across the bands checking each received signal.

2) He recognizes incoming signals:

- checking if the incoming signal is a CQ call or if it is a message to his station.

3) He remembers the call signs of stations that he has worked so as to avoid duplicate qso's.

4) He transmits outgoing information: - transmitting CQ's, calls to other stations, and sending the required contest exchange data.

5) He handles incoming information: - transferring the data from the printer paper to the log book.

6) He fills out the log: - recording both the relevant incoming data and the station generated data such as the date, time, frequency, etc.

During the contest each of these operations is performed in a fixed predetermined sequence, each operation depending on the previous one. The order in which all these activities take place can be shown in the form of a diagram. This diagram is known as a Flow Chart and is shown in figure 2.

Let us follow the operation of the contest station on the flow chart of figure 2. The station has been set up so that the receiver is tuning the band. A quick listen on any frequency determines the route through the flow chart. Assuming that a CQ call is not heard, the band is tuned until one is, or the band edge is reached. If the band edge is reached the tuning starts again going the other way and continues until a CQ call is heard or the other band edge is reached. Each time a signal is tuned in, the receiver locks in on that signal while it is being investigated. The signal is first examined to determine if it is a rtty signal or another type of transmission. If it is not rtty, we continue tuning. If it is a CQ, then has he been worked already? If he doesn't reply, try again. If he still does not come back try one last time then give up and continue tuning. If he does come back hold the qso. After signing off listen on the frequency to see if someone else calls in for a qso. If the frequency is clear or nobody else is calling, continue tuning for another CQ call.

After tuning for sometime without a contact it is time to call CQ. The receiver is tuned to a clear frequency (a clear frequency is defined as a frequency that is not occupied by any kind of radio transmission). A CQ call is then transmitted. After transmitting the call we listen for a reply. If no reply is heard another call is put out. When a reply is received a contest qso takes place. After signing off, pause on the frequency for a few moments in case somebody else is trying to get a word in, then continue tuning as before. After a period of time in which no contacts have taken place change to a new band and try again for contacts on the new band.

This sequence of operation can be said to be typical for contest operation no matter who is operating.

In order to do the contest automatically SORCARS must be built. Let us consider SORCARS as a group of Modules, and let us call these modules Function Modules.

Function Modules

Now consider each module in turn, what it does and how it does it. Each module may be complete by itself or may utilize common power supply voltage and signal lines. The Function Modules and their method of interconnection are shown in Figure 3. Each Rtty Station already contains some modules. This discussion will consider each module and its applications both in SORCARS and in the normal station. The detailed information on the operation of the device in the module is described in the referenced article for each unit. It is also assumed that the article in question has been read and as such an understanding of the detailed operation of the unit exists.

1. The Terminal Unit.

The terminal unit is the most important part of SORCARS, because any station that cannot be copied cannot be worked. A stable, sensitive and selective unit is thus required. The unit described in Reference #1 is such a device. Besides containing a sensitive and selective signal path as shown in figure 4, it also contains motor/printer control circuits. These circuits inhibit the motor operation except during the time that a rtty signal is being received (correctly tuned in).

In SORCARS the tu. is modified such that the control lines may be taken out to interface with the Control Module and the signal lines are broken to allow other signals to be fed directly to the keyer from the Data Module.

Since the unit is fully described in the referenced article there is no need for any more discussion on this subject.

2. The AFSK Module.

The use of afsk methods of generating the two tone rtty enables SORCARS to operate on both Hf and Vhf equipment, record data on magnetic tape and accept data recorded on cheap magnetic tape or casette recorders. The particular advantages of the use of afsk with SSB equipment are fully discussed in Reference #2.

The choice of audio tones in SORCARS

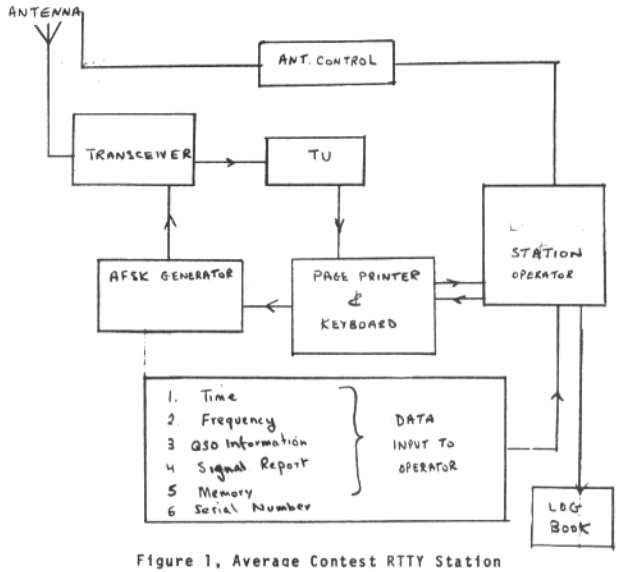


Figure 1, Average Contest RTTY Station

is such that a frequency of 2125Hz represents the Mark Signal, and a frequency of 2975 Hz the Space Signal.

The afsk unit must generate clean audio tones with negligible keying transients and harmonics. The two tones should also be of equal amplitude. Such a unit is shown in Figure 5, while the unit is discussed in full detail in the articles listed as References #3 and #4.

In SORCARS the afsk unit is modified such that the normal/reverse switch is removed. The unit is wired in the "normal" position. If an "upside down" signal is to be transmitted the invertion will take place in the actual tty data in the Data Module. The tone control line is interfaced with the Control Module. In the initial stages of the assembly of SORCARS the actual switch is just physically moved from the AFSK Module to the Control Module.

3. Frequency Counter Module.

This is a standard "simple" frequency counter the like of which has been described in numerous magazine articles. A block schematic of such a device is shown in Figure 6. It is an extremely (comparatively) simple device containing only the control circuitry and the counting decades. There is no requirement for any display units as the frequency is printed out on the page printer. Of course if there is a fully built counter already in existance in the station there is no need to increase the size of the junk box. Just modify it and pretend that the readout tubes do not exist.

The BCD outputs from each decade are brought out to interface with the Data Module, which will convert the bcd signals to tty signals for printing.

The counter can be used to monitor the vfo frequency only, with a later correction made manually to determine the actual frequency of operation, or a hetrodyne unit as described in Reference #5 may be constructed and installed in this module to allow the actual operating frequency to be printed out. Either an additional correction must still be made by the operator, to add the 2125Hz Mark frequency to the suppressed carrier frequency indicated by the counter, or the number 2125 must be added to the count electronically in the counter circuitry, since for all intents and purposes the Mark Frequency becomes the carrier frequency.

4. Clock Module

This is another standard device, counting down from either the 60Hz line frequency or from a crystal standard (the same one as used in the frequency counter?) to obtain the seconds and minutes/hours pulses. Which method is chosen will depend on what is available in the station or the degree of accuracy required.

The four figure output from the minutes and hours counters are brought out to interface with the Data Module in a similar manner to that of the Frequency Counter Module outputs.

5. QSO Counter Module

This is the simplest module of all. It

consists of three Decade Counter stages as shown in Figure 7, allowing the module to count up to 999 qso's before repeating. The input pulse is generated by the Control Module once per qso, hence the number stored in the counter is the total number of qso's since the counter was last reset. The reset takes place in a manual or an automatic manner prior to the start of the contest.

The BCD outputs from the counter are brought out to interface with the Data Module in the same way as the outputs of the Frequency Counter module.

6. CW ID. Module

This module consists of a solid state CW call generator generating any call as required, eg. DE G3ZCZ/W8. A number of such units have already been written up, suitable designs are given in references #6, #7, #8, and #9.

The module comes in two versions, the simpler one only generates the station call, the more advanced one generates the call of the other station as well, by sequencing through the call stored in the Stations Worked register. It sequences through the letters in the register and generates the morse letters corresponding to the tty letters in the register. The operation in either case is such that a single pulse from the Control Module initiates the identification cycle.

7. The SSB Transceiver

The SSB Transceiver is used in the RF section of SORCARS. If another type of equipment is to be used, suitable modifications will have to be made. The advantages and simplicity of this technique have been fully covered in References #2, #3, #4 and #10. The carrier crystal in the rig is changed so as to move the audio passband so as to allow the use of the 2125Hz and 2975Hz tones. Audio is fed into the mike socket and the push to talk relay is controlled from the Control Module. The receiver audio is fed to the terminal unit. The receiver agc line is also brought out so as to interface with other modules to allow automatic signal reports to be generated and the antenna rotated by the relevant modules.

Push to talk control is used in SORCARS instead of VOX, so that audio tones may be generated by the Afsk Module without putting a signal on the air. These tones are fed to a magnetic tape recorder for use in the station memory modules, and as a qso recorder in the manual station. Push to talk is also used as a "fail safe" technique to inhibit any audio circuit failure mechanism from putting out a signal on the air.

The band change switch and final tuning control knobs are modified so as to allow them to interface mechanically with the Bandswitching Module.

8. The Antenna

Use the regular station unit.

9. Report Giver Module.

Rtty signal reports are given as RS--. A sensitive terminal unit is employed so that weak signals are copyable. All readable signals are Q5 by definition, hence the message RS 5- is the same in each qso.

The variable is the signal strength, which is given on a scale of units within the range 1 through 9. Anything stronger than S 9 is given as 9. The agc voltage in the receiver varies as a function of the strength of the received signal. An analogue to digital converter (ADC) is employed to convert the receiver agc voltage to a digital signal. encoded in a BCD format so as to be compatible with the outputs of the other modules.

An analogue to digital converter is basically a cheap and simple device. The expense comes in where high accuracy and speed of operation are required.

I don't remember seeing ADC techniques being published in the amateur radio press, but books have been written on the subject and one or more of them must be available at the local public library or book store. I will just give a brief introduction into two techniques that the average amateur can use.

The first such technique uses comparators or level sensors. One kind of comparator circuit that is well known is the "Schmitt Trigger", although it is usually used as a squaring circuit, or level detector. If nine level sensors are connected up to the receiver agc voltage line in parallel, each level sensor being set to a voltage that is equivalent to a value of one S unit greater than the preceding one, the outputs of the level sensors can then be encoded in BCD format using a matrix of gates. The levels can be set up so that the total response characteristic if the module is linear. Figure 8 shows the agc voltage split into a number of levels, describing the agc voltage coding diagramatically. Integrated circuit devices such as the uA710 are ideal for use as voltage level detectors and are even quite cheap if obtained from surplus sources.

The second technique is that of the Ramp Generator - Counter, shown in block format in Figure 9. The agc voltage is put through a response shaping network so that the output of the network is a voltage within the range of 0 to 0.9 Volts

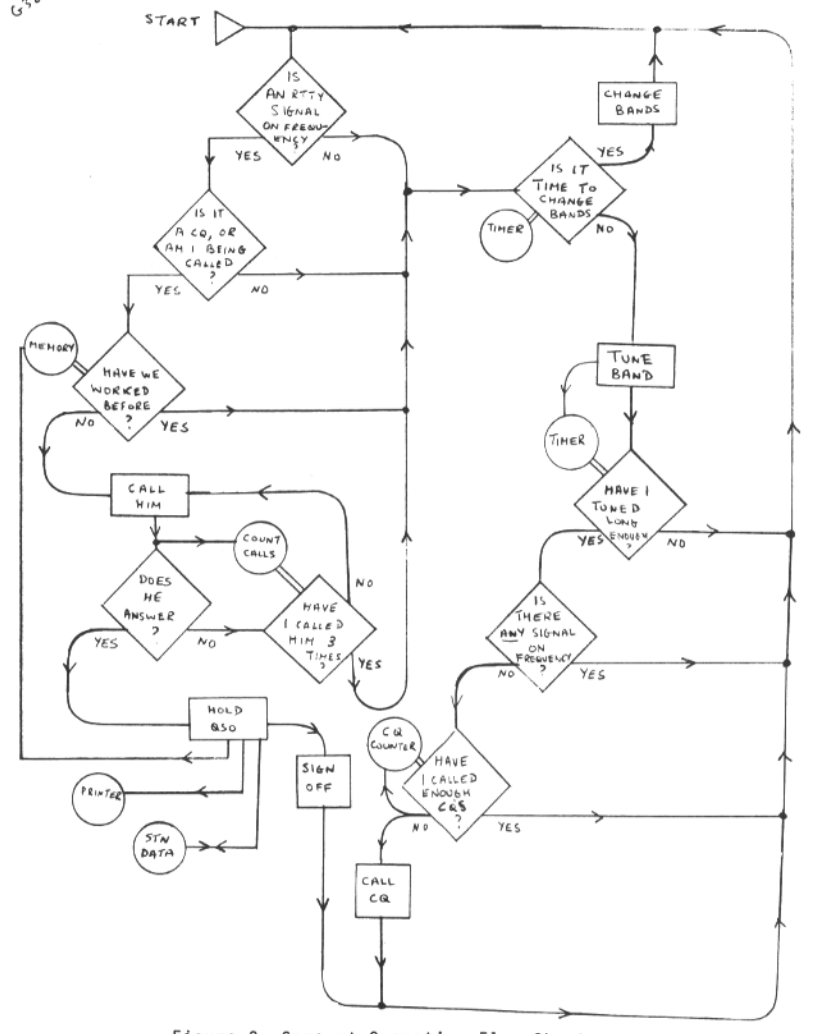


Figure 2- Contest Operation Flow Chart..

and each 0.1 Volt increment is equivalent to an increment of one S unit.

The comparator ADC sampled the input voltage continuously and generated a BCD output. The Ramp Generator does not sample the ADC input voltage instantaneously. A Sample Start pulse initiates the analog to digital conversion sequence. The pulse starts a ramp or sawtooth waveform climbing and allows the counter to count the pulses being put out by the clock pulse generator. The time constant of the ramp is made such that one clock pulse period, or one count of the counter is equal to the difference between two levels. If nine levels are equal to nine S units, the counter will have counted nine clock pulses by the time that the ramp voltage has reached that input level corresponding to an S9 signal. The input voltage and the ramp voltage are both fed to a comparator in such a way that the output of the comparator will change state when the level of the ramp voltage exceeds the level of the agc voltage. This change in the output state of the comparator stops the counter. Thus if the agc voltage was at a level corresponding to S3, the ramp voltage would exceed the agc voltage only after the counter has counted to 3. The counter is then stopped and the BCD output 3 is available as a digital equivalent of S3. The Ramp Gen-

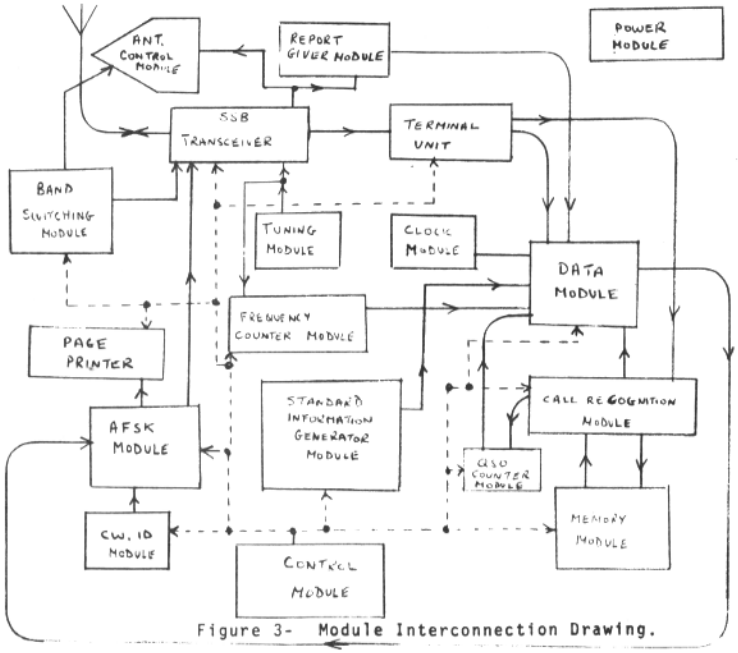


Figure 3- Module Interconnection Drawing.

erator is a single shot device so that the analog to digital conversion occurs only on command. This ADC takes a period of time to sample the input voltage. If a high speed clock is used the sample period can be made to be very short.

In the amateur station the sample period can be relatively long (even up to one millisecond).

Both kinds of counter will have an inherent error, in that each round down the report to the next lowest count. This is because a voltage is only given as corresponding to being above a certain level. If the input signal is between two levels (ie., between 3 and 4) at the time of sampling (say 3 1/2), the counter will stop at 3, because the moment 3 1/2 was reached the counter was stopped and it never got to count to 4. The level sensor circuit similarly does not indicate 4 since the comparator set to switch at the fourth level never changed state.

The above descriptions of ADC techniques have only been intended as simplified introductions to their methods of operation.

The output of the Report Giver Module is in BCD format so as to be compatible to the outputs of the other modules.

The interface between the Report Giver Module and the Data Module allows the BCD signal report to enter the Data Module following the reception of a Sample Pulse from the Control Module. This module may be used in the manual station as a digital "S" Meter prior to its incorporation in SORCARS.

10. Page Printer.

SORCARS uses the station page printer. The keyboard which is not used during the automatic mode of operation, is used to write information into the memory modules and for test purposes during setting up for the contest.

11. Power Module.

This module contains all the ac and dc power supplies for SORCARS. Each supply is fused in both the primary and secondary sides of the line transformer, as well as in each of the dc supply lines.

All fused lines are sensed so that any ONE FAILURE **shuts SORCARS down** and activates a remote alarm so that the operator can put SORCARS back into the fray without loosing too much time. To facilitate troubleshooting the state of each of the fuses is indicated on a lamp display panel. The state of each supply line is shown by two lamps, a green one indicating that the supply is present and a red one indicating absence. This is a lamp redundancy exercise so that a lamp

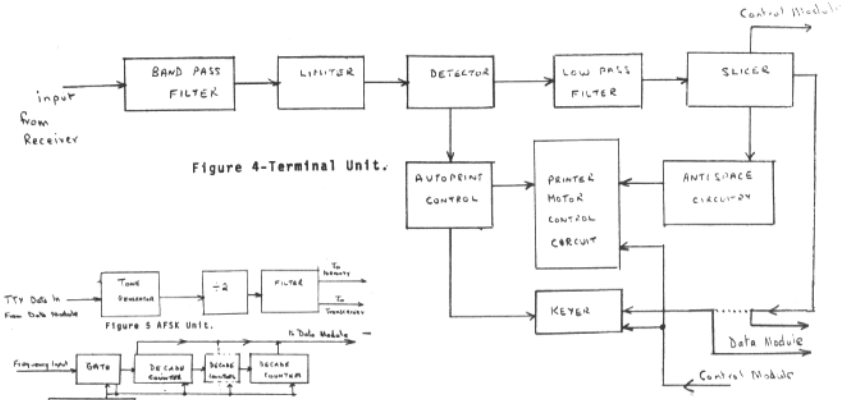


Figure 4-Terminal Unit.

Figure 5 AFSK Unit.

Figure 6- Frequency Counter Module

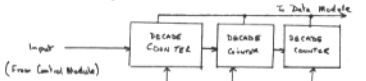


Figure 7 - QSO Counter Module

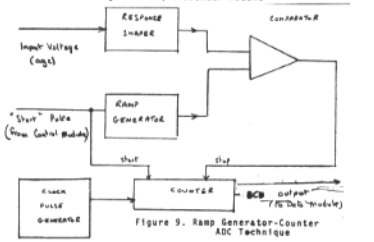


Figure 9. Ramp Generator-Counter ADC Technique

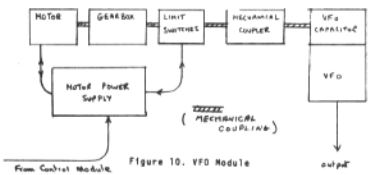


Figure 10. VFO Module

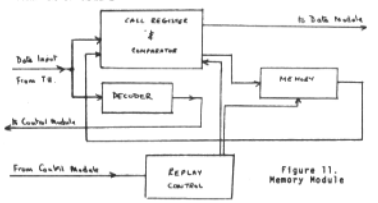


Figure 11. Memory Module

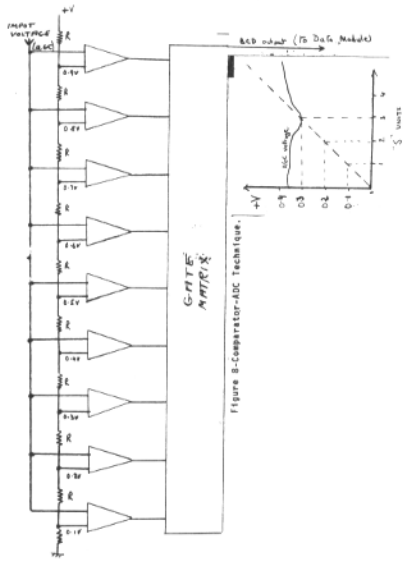


Figure 8-Comparator-ADC Technique.

failure does not give misleading information when troubleshotting in the middle of a contest.

Extensive use is made of interlocking relay logic to ensure that **under no circumstances does a faulty SORCARS put any kind of signal on the air.**

The ac. supplies for the transceiver and the printer motor are also routed from and controlled by the Power Module.

12. Tuning Module.

An external Vfo Module is used in the transceiver so as to allow the use of a remote tuning facility for automatic tuning of the band without modifying the transceiver.

A block schematic of the module is shown in Figure 10. The variable capacitor is turned by the motor so as to change the frequency that the rig operates at. The circuit techniques for using a remote motor turning circuit have been published in many model control circuits and will not be discussed in detail. The gear ratio on the motor is adjusted so as to give a very slow tuning rate. A high torque pulsed power supply as used in some model car sets is employed to drive the motor so as to ensure instantaneous (as compared to the tuning rate) "start" and "stop" control of the motor. The

slow tuning rate gives the Terminal Unit time to "lock" on to the rtty signal and determine its nature. The control lines interface with the Control Module which generates the signals required to operate the other modules.

Consider a typical event, the motor is running and the vfo is tuning up the band. A signal appears at the input of the tu. If it is a rtty signal the autoprint facility in the tu sends the Control Module a "signal received" pulse. The Control Module sends the Vfo Module a "hold" signal by cutting off the power supply to the motor. The transceiver thus sits on the frequency of the received signal until the Control Module should send it a "continue tuning" signal, by reconnecting the power supply to the motor.

The motor drive is fitted with limit switches that are set so as to keep the vfo tuning the required section of the band. The limit switches reverse the polarity of the pulsed power supply to the motor, causing the motor to change its direction of rotation.

The original concept for this module was to replace the tuning capacitor by a variable capacitance diode, and the use of a sawtooth or ramp voltage waveform to vary its capacitance. A "sample and hold" gate was to stop the tuning at the command of the Control Module. The practical difficulties involved with the long (of the order of minutes) hold times, due to the storage capacitors discharging with resulting frequency drift, necessitated the change to model control techniques and the use of the motorized capacitor.

It is possible to modify the transceiver directly by removing the tuning knob and replacing it by the motor gear assembly but that does tend to spoil the appearance of the unit.

Since many circuits have been published for external vfo's, and the motor control circuit and mechanical assembly has to be built anyhow, the extra vfo might just as well be built and incorporated in the module. A suitable external vfo is described in Reference #13.

13. Antenna Control Module

This module ensures that the antenna connected to the transceiver is always the correct one for the band in use. An input from the Bandswitching Module selects an antenna select (coaxial) relay so as to route the required antenna to the rig.

Rotating the antenna presents a problem. Tracking Systems are complex and near impossible when using a single antenna. Since all signals copyable by SORCARS are Q5 by definition, rotation of the antenna only increases the signal strength or in the case of a very highly directional antenna, brings signals up from the noise. A compromise is thus chosen in which the antenna is rotated and pointed in the direction that the propagation predictions have suggested is optimum for the band at that time of day. Rotator control is achieved by modifying a rotator control unit.

An alternative solution is to use a single multiband vertical antenna, the use of which eliminates the need for this module.

14. Call Recognition Module

This module is a modified SELCAL device. The original Selcal was described in Reference #11. It recognized Calls, NNNN's, and turn on signals. In SORCARS the unit is modified so as to recognize CQ's as well. This module swings into action once the TU autoprint signal indicates the presence of an RTTY signal on frequency. The Control Module determines what signal the Module is to search for at any particular time. This module then sends the Control Module a signal if the wanted radio signal has been found. The Control Module takes it from there.

This facility is used in the manual station to allow the operator to persist with other pursuits while the modules monitor the band, knowing that should a CQ call appear, he will be alerted instaneously by an audible alarm, and his equipment will be set up on frequency ready to answer the CQ should he desire to attempt to establish communication with the station calling CQ.

15. Standard Information Generator Module

In the manual non-contest qso it is quite usual for a tape to be run describing the station equipment. This tape is run each qso and may be considered as "standard information".

In the contest, the standard information may be punched on paper tape as well. Consider a typical piece of contest standard information:

------DE G3ZCZ/W8,
YOU ARE 5- MICH.

The -- represents non standard information that is multiplexed in to the data by the Data Module. Such non standard information is the other station's call, the signal report and the serial number of the qso.

***

Balance of article and drawings will follow in Part 2.

VHF RTTY NEWS

RON GUENTZLER, W8BBB Editor
Route 1, Box 30
Ada, Ohio 45810

RTTY REPEATERS, ASCII, and MISCELLANY

This month we have several unrelated items that should be of interest.

RTTY REPEATERS: Herbert Drake, Jr., WB61MP, sent the following information regarding a planned RTTY repeater for the San Francisco area: "The repeater is in the final stages of assembly and we expect to have it operational within a few weeks - perhaps by early October. Its input frequency will be 147.93 MHz, and it will transmit on 147 33 MHz. Although standard 2125/2975 tones will predominate, narrow shift will be available and accessible thru special control codes. The medium will be FM, set at peak deviation at 5 kHz, or less.

"Of special interest might be the feature that code regeneration will be used, with the result that marginal signals should be quite acceptable to the repeater. The Baud rate and keying tones (even the MCW ID) are crystal derived, and a time/date printout each transmission will facilitate automatic logging by a monitoring machine and autostart users. 45-Baud operation only is designed in at this time. . . .

"Paul, WA6EUZ/6, has contributed much time and material toward the RF portion of the project, while I have done the logic circuits. We are hopeful that the repeater will provide a means for many VHF RTTY enthusiasts separated by the many hills and ridges in the Bay area to communicate better than now possible simplex."

ASCII: Ray Haines, Jr., W2IUE, sent a chart comparing the ASCII and Baudot codes along with both 5 and 8 level tapes from which the chart can be printed! "As for the converter, well it's still in the brain box, nothing to show and tell - yet. Like most hams, we don't have a rich uncle so the $$$$ is important, and we have to work for it." He states that both the 5 and 8 level tapes from which he prepared his chart are available from him.

Jack Hart, WA2HWJ, sent a "semi rebuttal" to the 1972 OCT column. Part of it is given below. We are hoping that he will compose an article for RTTY that will give much more detail on the current state of land-line telegraphy in the U.S.

". . . I have to this day never heard any 8-level TTY on the radio frequencies. Most of what is on is either 5-level (mostly slow speed, please note) or hard-to-decipher MUX or military scrambled messages. Only recently have we seen upgrading to 100 WPM by a few RTTY commercial stations. Other users, such as Associated Press, either have stuck to 66 WPM or have gone to equivalents of the Bell Telephone "Dataspeed", which is often 5-level serial tape sent at speeds of over 1000 WPM. AP even uses 5-level, 66 WPM machines to drive a typesetting computer. There is no doubt some 8-level RTTY somewhere, but it would necessitate a whole system change-over, and I have often been told that for RTTY systems it isn't worth the money the user would have to put out.

As for commercial land-line circuits, granted the Western Union TWX network is 8-level. But, it is not considered a real "hard" land-line type network because there is a Dataset in the base of the machine that converts the dc to voice frequency tones. This network is not as large as the Telex network which uses 5-level machines, in many cases 15's and 32's, at 66 WPM. Western Union's big problem now is to integrate the two into a workable system, and the future will no doubt see the 8-level machines take over. And, Telex is hard dc wired into WU offices, while TWX goes thru Bell System Central Offices. The marriage of the two will be interesting."

To break for a moment - There were two large, switched Teletype networks in the U.S. in which subscribers used Teletype machines instead of telephones to make their calls to anyone else who was a subscriber. One was owned by the Bell System and was called TWX (teletypewriter Exchange); the other, owned by Western Union, was called Telex. Western Union has taken over the Bell

System operation. Hence, they now have two different systems that must be freely interconnected.

"Most Bell System private line Teletype circuits are 100 WPM 28's. In this part of the country, NYC-LI, only 28's are used for 5-level commercial circuits. Ma Bell still uses 14's and 15's in her own network, although their death knell has been sounded. We are now replacing the old work horses with a Teletype Corp. visual display terminal. But, please note that even this modern appliance eventually sends to Model 28's! It incorporates a parallel ASCII to serial Baudot converter with different clock settings for the 5-level Baudot speed wanted! . . .

"I have heard rumors that Teletype machines as we know them are on the way out, as your column duly hinted at. But, they are not gone yet. Model 15 owners should be especially informed that parts are still made for the machines by Teletype Corp. I have seen mention in several ham magazines that the parts are no longer made. T'aint true. They are available; but try to find a parts book for the old faithfuls, HI! That's another story."

Another break - Typetronics lists many manuals for TTY gear. See ads in RTTY and send for the lists.

". . . The future will be nothing but vitual displays with heat-type printers. The Teletype Inktronic, the "ink squirter", is not popular because it can make only one copy. The only mechanical printer still gaining popularity is the "line-at-a-time" printer, which radically differs from the Teletype machine we knew. I have heard mention that Teletype is coming out with a Model 40 which will be the forerunner of a "new breed" Teletype machine; completely electronic up the printing mechanism itself, very unlike the 37. IBM, Univac, Burroughs, and all the others have had machines like this for years. . . .

"Personally, I was glad to see the higher speeds allowed by the FCC, but my question is: "What for?" Have heard a little 100 speed on the air, and do not see the need for it. If all the RTTYers could go 100 speed it would have been a great moment in the history of ham RTTY. But the poor guy with the 15, which will no doubt outlast him (ha!), has to sit back and wish he had the wherewithall to get a 28, or build a speed converter. I spent many years as a teenager saving for my 28 . . . (Incidentally, a lot of my ham friends can't see why I went to work for Ma Bell when I already had a 28!!!) My opinion is that 60 speed is fast enough for what we are doing. When you look around the bands you see that most of the guys hand type, so what's the difference if the machine is geared for 60 or 100 WPM? It seems that some fellows want change for the sake of change. I would guess by your closing comments that you would rather see us using the ASCII code. I heartily agree. We should have petitioned the FCC for permission to use ASCII at 100 WPM while retaining Baudot at 60." Thank you!!!

To give an example of the large quantity of "printers" now available from various manufacturers, a look at the 1972 AUG. issue of "Communications Digest" reveals ads for eight different models available from as many manufacturers. Four are video, two are "non-impact," and two are "conventional." All are ASCII format. One works at 1200 characters/second which is 12,000 WPM!

MISC: We are slowly compiling a "current awareness" list. We hope to get it in next month.

Please keep the information/comments coming!

73 ES CUL, RG.

***

RTTY equipment available

William D. Johnston, WB5CBC
1808 Pomona Drive
Las Cruces, New Mexico 88001

A genuine bonanza of Teletype equipment lies in wait for the lucky souls who can pick it up. Over the past couple of years, the Santa Fe Railroad has been replacing all of its Teletype equipment with late model units, and the older stuff -- Model 14 and Model 15 year -- is up for grabs. Although most of it has already been disposed of (one story says that over six hundred Model 15 printers were sold as scrap metal for 2¢ a pound), there are still quite a few pieces left.

The equipment is being sold "as is, where is," first come, first serve. Don't let the "as is" fool you. These machines were taken right out of service on the rail line, and have been maintained by experts. Of course, there's no guarantee, and you can't get your money back, but I bought quite a few of the machines that were from the local area, and I have never seen cleaner or more perfect equipment.

Now, the "where is." You have to pick it up yourself, but if you live near a "where is," you're in luck. The following table shows the quantities of equipment at each of the locations:

CONTINUED ON PAGE 17

RTTY-DX

JOHN POSSEHL - W3KV
Box 73 Blue Bell, Pa., 19422

Hello there .....

Molto Buono! Tres Bon! Wunderbar! and in plain English, Terrific! These were some of the expressions coming from various quarters after the recent "Maple Leaf" Sweepstakes sponsored by the CARTG. Conditions were just great world-wide and we heard no complaints to the contrary. The boys on the West coast USA and in the Pacific area usually have a difficult time even hearing Europe in a contest. This time there were some good openings which helped considerably on the multipliers. We will leave the final analysis to the computer up at CARTG Headquarters but there is certain to be a lot of records broken in this one. With numbers up around 300 being given out toward the close of the contest we would imagine that the top man will be close to 5M and a score of stations will post scores of well over 1M. Let's wait and see.

Now for some details. It looks like this contest marks the final demise of the wide shift. Narrow shift was the order of the day and we cannot recall even printing anything other than the narrow. Even so, with all the activity crowded into roughly 20 khz of the band even the best of receiving equipment was hard put to cope with the tremendous QRM at times. We would imagine that in the not too distant future things will narrow down considerably from the present standard. The present receivers and transmitters in use are stable enough to cope with it and there has been some dabbling in the 70-80 hz region by some of the boys. However, before everyone goes off on their own tangent there should be some international discussions on such things so that every one is pulling in the same direction. Well, we had better get back on the track again. Oh yes, the Contest. There were some surprises in store for the DXer in this one and a few new countries for most of the boys. A few days prior to the contest Carl, HB9P, and his crew set up shop in Vatican City as promised and HV3SJ was again on RTTY before and during the contest period. Lacking precise QSL information at the moment we would imagine that a card to HB9P would get to the right place.

On 11 October, Mike TU2DD in Abidjan, Ivory Coast, opened up on RTTY for the first time. He is using the SB-101, SB-200, and a Creed machine and puts out an excellent signal to all areas. He ventured into the contest and did a fb job for a newcomer in the fantastic pile-ups he naturally caused. Several years ago TU2AK made a brief showing on RTTY but just as quickly disappeared and to our knowledge no one ever got a QSL. Let us hope that Mike stays around for a while. You can QSL to his manager who is ---

Arthur Freud, K2QHT
Glamore Court
Smithtown, N.Y. 11787

As we mentioned last month you had to do some fancy tuning to copy VP8ME. However, for the contest Jay got everything adjusted more to amateur RTTY standards with his shift right on 170 hz and his speed right on 45.45 band. The QRM on his frequency was something to hear but Jay handled the situation very well for his first sustained contest operation. Jay is trying to get VP8MX on from the Falkland Islands plus another VP8 station in British Antarctica so be prepared for these rare spots sometime in the future.

I would say that the real surprise in the contest for the very few that were lucky to work him was Edgar, CT1DV. He is the very first RTTY ever from Portugal and seems to be on at most any time on the 14 mhz band with a real fb narrow shift signal. Edgar says that QSL's can reach him via the bureau or directly to ---

Radio Station CT1DV
Escola Alema
Lisbon, Portugal

For an overall picture of what multipliers were available here is a list of most (but surely not all) of the countries that were known to be active in the contest. CE-CR6-CT-DL-EA-F-FO8-G-GI-HA-HB-HC-HI-HK-HP-HV-I-IS-IT-JA-KH6-KL7-KZ5-LU-OE-OK-ON-OZ-

PA-PY-SM-TU2-VE-VK-VK9-VO-VP7-VP8-VP9-VU-W-XE-YA-YV-YN-ZS3-ZS6-ZL-4X4-9Q5-9Y4. So you see, it was quite possible to get more than half way to DXCC in just one week end. Multipliers for the contest could easily run into three digits if you got just some of them on a few bands. The highest we were aware of at this writing was 84 by ON4BX.

At this time we would like to give you a progress report on two of the stations we have recently mentioned as soon being active on RTTY. Emile, 9G1WW, has his ST-5 and AK-1 all ready to go. The delay at the moment is still the gears for the Model 28 KSR. We have some coming from the factory but there is a delivery delay as is usual with everything these days, hopefully he will have them by the time you read this or perhaps sooner. Emile appreciates the efforts made in his behalf by the RTTY Groups contacted in trying to locate the "odd" gears he needs. Incidentally, he listened in during the contest but as his machine prints out at 83 wpm with the present gears he did not make much of the copy.

ZE1CE has also been quite busy getting things in shape. He has completed a TU however the results are marginal due to it being necessary to wind his own filters on bits of ferrite rod with resulting very low Q. 88 mh toroids are on the way which should improve receiving considerably and in the meantime he is getting his KW2000A tranceiver to FSK. So it really should not be too long before Rhodesia is QRV.

From Japan comes the following good news. Ted, JA1FFX, writes to tell us that he has had contacts with DU1JS. Jack is running 100 watts and is using a Mite machine and a surplus military converter that only wants to print wide shift at the moment. He is looking around 14090 khz daily for contacts. Another station, DU-1EJ is also due to be active very soon. Gin, JA1ACB, has had contact with New Hebrides. YJ8JS is the call and James is the name. No additional details at this time but keep looking for this one. You may possibly recall that back in the January 1972 column we noted that Barney, ZL2ALW was trying to locate a machine for Jim so we can thank Barney for having much to do with getting this rare country on RTTY. Should you be so fortunate to contact Jim his QTH at the time of the item noted above was --

James A. Stent, YJ8JS
c/o Aeradio
Port Vila, New Hebrides

Ecuador has been fairly active before and during the contest. HC1DL puts out an excellent signal with Ben, formally YV5AWW, at the keyboard. He can be reached at --

Bernado J. Diaz
P.O. Box 289
Quito, Ecuador

Just as this was being written we can report additional activity from Trinidad. Rus, 9Y4RB, is putting out an excellent signal after some starting up problems. With an assist from Frank, 9Y4VU he now has things going in fine style. QSL to --

Russell Barrow
10 Mayfield Road
Valsayn, Trinidad

This month W A C Honors go to --

Nr. 202 - Lennert Bjureblad - SM6AEN

Nr. 203 - Henri Coste - LU2ESB

Both awards are issued by the authority of Bo, SM4CMG, Contest and Awards Manager for the SARTG and are the result of participation in the August Contest. The full results of the WAE Contest of April and the SARTG Contest are out and can possibly be found on other pages of this issue.

Those of you interested in contacting different prefixes on RTTY will find the following event taking place in early January to your liking. Between January 4th and 7th the Ninth Annual "National Young Scientist of the Year" exhibition will take place in Dublin and will feature an exhibition station with the call sign EI0YSE (Young Scientist Exhibition). Special QSL cards will be issued and RTTY will be active to the following schedule. 5 Jan. 1300 to 2100z 14mhz -- 6 Jan. 1100 to 2100z 14 mhz -- 7 Jan. 1300 to 2100z 14 mhz. In addition, and for all you true Irishmen that have been to long away from the old sod, there will be SSB transmissions in Gaelic on 7 Jan. 1100 to 1300z on 80 meters.

In closing I urge you to get your RTTY-DX totals to me by December 1st for the listing in the January 1973 issue.

With the year coming to a close I again wish to thank the many of you that have made these writings possible by your contributions of timely DX information without which this column would not be possible.

To RTTYers everywhere. May you have a good 1973 ALL WAYS.

73 de John

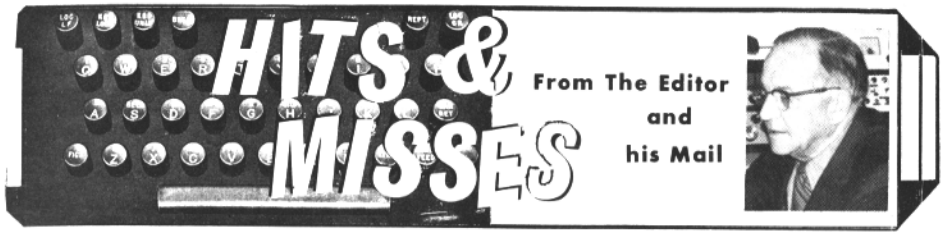
Special Notice - Alexander Volta RTTY Contest

Starts - 1400 GMT December 2nd
Ends - 2000 GMT December 3rd

See November Journal for complete rules.

***

FLASH-7Q7LA and VS6GA now QRV



After publishing the RTTY JOURNAL for 6 years we are still somewhat amazed at the interest and enthusiasm of our many loyal subscribers. Our subscription list has grown steadily, mostly by word of mouth recommendations of our readers. With over 2000 domestic and about 300 foreign subscribers I have no idea what percentage of those interested in RTTY this might include. If we guess at 50% this means there are about 4,000 fans in this country.

Where are they? Anyone listening on the ham bands knows that only a small number are very active on the air. Going on surmise only from what we have learned in the six years we would say the largest group are on MARS. RTTY in MARS has become very popular due to the ease in handling volumes of traffic. These are on frequencies not in the ham bands so many, including us, never hear them. In the last Armed Forces day, held last May, more RTTY messages were turned in than CW and this has been true for several years.

So a lot are on MARS. Where are the rest?

A large number are equipped for print only and spend much time on commercial stations or just reading the mail.

Another large group are interested, like reading about it, but for a number of reasons are unable to be active. A surprising number of readers have apartment addresses.

Others enjoy building and experimenting and RTTY offers a relatively uncommercialized field for new ideas. When a project is finished and tested the interest is over and is seldom used much on the air by the builder. (These are the articles we would like to have so others can try them out.)

A great many are on the VHF frequencies and concentrated around large population centers but never heard outside of their particular area.

This leaves us with the small group that are active on lower frequencies and this group is again split up between those that like to rag-chew, exchange technical information, and the DX chasers. Many of course do some of all these things.

So this leaves us with a few hundred active signals out of possibly 3 or 4000 potentials. WHY? -- your guess is as good as ours and we have often wondered about it.

Some say 'I can't type' but neither can we and many others that are active, but we get by thanks to patience of others.

"Machines are not available" is no longer an excuse. Every issue of the Journal has ads for available machines and a little scouting around will usually turn one up in the local area.

"Too expensive", like all phases of ham radio depending on personal desires it can be a little or a lot, except for a printer, now available for under $50 the junk box can furnish parts for a simple converter to operate with any present rig available.

"Too complicated" - not nearly as much as some of the handbooks and articles might sound. We admit the need for a concise, step by step handbook for the beginner, the ARRL has been considering publishing one but so far it is in the future. Many articles have been published in the Journal in the past and Ron Guentzlers series of articles a few years past covered the subject but are seldom available to the newcomer. Our advice is usually to contact someone that is active on RTTY but this is not so easy in isolated places. What we should do is quit procrastinating and publish a simple "How to get started Handbook". However where there is the will there is a way and we doubt if many are not on the air because of this reason.

"Lack of organized activities". We find this hard to believe as a reason for low activity. Local or national nets find it hard to get active members. DX contests find about the same stations participating over and over. We have tried to have the ARRL include a section for RTTY in the annual sweepstakes but with the usual ARRL attitude of "we don't like to change anything as it might rock the boat" so far have had no luck. Frankly we wonder how much activity there might be on RTTY in a sweep-

stakes but would like to try. DX equipment and antennas are not necessary and might bring out a lot of action. We are still trying on this but the wheels of the gods move slowly. WAC and WAS certificates are available endorsed for RTTY but have relatively few takers.

If after reading all this you expect an answer - we don't have it. Not even suggestions or explanations. Maybe the status quo is the best way, certainly RTTY is gaining in interest not declining. We just wish we knew where in hell all the 2000 fellows are that send us three bucks a year to read about it.

***

While on the subject of RTTY activity we have several times mentioned the fast increase in overseas stations.

Out of curiosity we checked back on the results of the annual DX Sweepstakes. In 1965 the winning score was 62,500 points with 50 USA logs and 32 foreign turned in. In 1966 the winning score was over 86,000 points. 1967 brought the first score over a million with PY2CQ running up 1,280,000 as winner. In 1970 VK3FZ hit over three million for a record. We feel that this record will be broken in the recent contest and predict over 4,000,000 will be necessary to win. Although conditions will vary from year to year all of these scores have been with the same scoring system.

Why the big increase - first there are many more foreign stations on from different countries which makes for more multipliers. More bands are being used to add multipliers and increased activity from Asia has made working all continents the rule rather than an exception. The zone scoring system makes it almost impossible for a Stateside or Canadian station to win but John, W3KV has been over the million mark with this handicap. The lack of participation by stateside stations, especially on the lower bands, makes it difficult to run up contacts during the hours the DX bands are dead. In the mean time a count of logs now shows more foreign participation than from the states. In 1971 there were 64 logs from foreign stations and only 56 from the states. A direct turn around from the earlier contests. We admit many do not like contests but as far as RTTY is concerned they like it better overseas than we do.

***

This is the December issue and a great many subscriptions expire, if yours is one of them there should be a rubber stamp notice on the back page. If you intend to renew you can help us by renewing early and also assure not missing a copy. Do it NOW.

***

We need some little items - to fill these little spaces-

***

BACK ISSUES

New subscriptions and classified ads are cash in advance as we have no method for billing. New subscriptions will be started with the current issue and one back issue, if requested. Please do not ask us to start any further back than this. Back issues - if available - may be ordered at 30¢ each at time of subscription. The JOURNAL is mailed about the 20th of the month preceding the dated month. May and June are a combined issue and July-August is a combined issue.

The ONLY back issues available are listed below. 30¢ each.

1966-Oct.- Nov.-Dec.- [3]
1967- None.
1968- March. [1]
1969- Oct.-Nov.-Dec.- [3]
1970- None.
1971- Jan.-May.-June.-July-Sept. Oct.-Nov.-Dec.- [8]
1972- Jan.-Feb.-April-May-July-Sept.-Oct.-Nov.- [8]

[MAY-June] -[JULY-August]are combined issues.....

RTTY JOURNAL
Box 837
Royal Oak, Mich. 48068
Editor & Publisher - 'Dusty' Dunn, W8CQ

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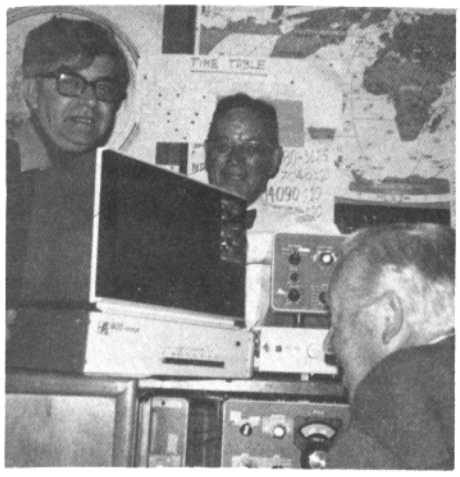
RTTY in the VATICAN



Close up of the RTTY gang at HV3SJ during the CARTG contest Left to right--Edwin, HV3SJ,-Carl- HB9P,-Willie,HB9HK, -all equipment was video.

Last April, Edwin HV3SJ asked us if we would like to come to Roma in order to "modulate this station with RTTY". After short consideration we agreed to do this during de great canadian CARTG-RTTY-DX-Contest in mid-October. Operators were Carl HB9P, Willy HB9HK, Ulrich DJ9TT and John WA7IIC and Jurg HE9HKE was the chief-Logbookkeeper.

The QTH of HV3SJ is located on the flat roof of a 5 story-building, is sunny and warm and has a magnificient vue over Roma. The Quad is still 10 meters higher!

Edwin put at our disposal his Collins S-Line and we brought along the Swissmade RT72 RTTY-Converter and the complete Video-RTTY-Line and as a safety measure: two printers. But we did never use them at all because we were able to read all stations on our television-screen in a perfect noiseless, paperless and inkless manner.

The contest itself started very nicely with some W5 and KZ5-dx-contacts on 7Mc, then came 14 and 21 Mcs. Saturday night and Sunday morning the conds. became very poor. Unfortunately transmitter-troubles made us close down Sunday well before the end of the Contest. Nevertheless we realised about 80 contacts with about 40 countries and 6 continents with a total of about 165 000 points during a total of 23 working hours. Afghanistan, Japan and Australia were some of the most outstanding contacts.

We returned home and were very pleased with the results and the fact that we were able to give many hams a new country. Furthermore we saw that narrow shift is used everywhere now. 79 contacts were with 170Hz. shift and only one hungarian station came along with old 850 Hz. shift. Perhaps the organizers of this contest should consider shortening the length down to 24 hours, say from Saturday 0200 to Sunday 0200 which would be enough for everybody.

Many more things could be reported, namely positive ones: that is the highball-feeling of beeing at the receiving end of a Pile-up, and negative ones as the two hours struggle with the italians customs officers at Como, Italy, but there is not enough space to give every detail.

We would like to thank Edwin and we hope that he will be able to keep HV3SJ - RTTY on the air in the near future.

Carl HB9P

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RTTY Equipment--

CONTINUED FROM PAGE 12

	Model 15	Model 15 RO (no keyboard)	Model 14 Transmitter Distributor	Model 14 RO Typing Reperforator (no keyboard)	Model 14 Non-Typing Reperforator
Amarillo, Texas			10	15	
Cleburne, Texas	2	6	5		4
Topeka, Kansas			2		
Wickenburg, Arizona	2			1	
Bakersfield, Calif.			3	1	1
Fresno, Calif.			8		1
Los Angeles, Calif.	1		7	11	3
Needles, Calif.	3			2	
San Bernadino, Calif.			15	12	3

All machines are 60 speed, 5 level, with communications symbols and synchronous motors. The prices are as follows:

Model 15 RO page printers (no keyboard) $20.00 each
Model 14 Transmitter Distributors $10.00 each

CONTINUED ON PAGE 20

CLASSIFIED ADS- 30 words $1. Additional words- 3¢ ea.

Cash with copy, Deadline 1st of month.

FM MOTOROLA SCHEMATIC DIGEST - 136 giant pages 11-1/2x17 schematic diagrams, alignment instructions, crystal information, trouble shooting information. $6.50 postpaid. S.M. Wolf, PO Box 535, Lexington, Mass. 02173

GOING OUT OF BUSINESS; Loads and loads of teletype and electronic "steals". Bring your truck or station wagon, wheelbarrow or lug it on your back; but come out. Facsimile machines, Deskfax units for sending and receiving. Loaded with tubes, optics, motors, relays, switches, etc. Operable and ONLY $9.00 each cash and carry - COME & GET EM WHILE THEY LAST. C.B. GOODMAN & CO. 5826 South Western Avenue, Chicago, Illinois 60636. Phone: 312-476-8200.

11/16" PERFORATOR TAPE, 40 roll case - $7.95. Sprocket feed paper, $3 per box (FOB). "Teletype Equipment, Supplies and Information for the Radio Amateur." FREE LIST. BVE, POB 73-R, Paramus, NJ 07652.

TYPEWRITER RIBBON RE-INKER; Hand operated model now only $3.50. K575 or K764 ink available at all National Cash Register Stores. 75c per tube. Walter Nettles, W7ARS, 8355 Tanque Verde Rd. Tucson, AR. 85715.

TECHNICAL MANUAL for Model 14 TeeDee, that long searched for complete description, adjustment, lubrication and parts book all in one for only $2.25 Postpaid. BVE Enterprises, "Communications Equipment, Supplies and Information for the Radio Amateur", POB 73, Paramus, NJ 07652. (Send for free list of other goodies.)

WANTED: STELMA PC-334, PC-336 or PC-403 PC plug in or any information on these. G. S. Naniwada, JA1ACB,3-4-8, Izumi, Hoya, Tokyo 188. Japan.

DOVETRON TELEPRINTER SPEED CONTROLLER - The DOVETRON TSC-1000 Teleprinter Speed Controller is an all-electronic, solid-state synchronous motor controller that functions as an electronic "gear-shift" by varying the frequency and amplitude of the motor driving voltage, permitting a teleprinter to send and receive at any speed between 50 and 120 WPM. A five position front-panel switch permits instant selection of 60-67-75-90-100 WPM operation, provided the teleprinter is equipped with 100 WPM gears and a 50 or 60 Hz synchronous motor. A second front-panel control permits (1) electronic range-finding, (2) synchronization of the teleprinter to the exact speed of an incoming signal, and (3) copy of any speed between 50 and 120 WPM. The teleprinter automatically sends at the same speed at which it is receiving. Useable on any line frequency between 40 and 400 Hz, the TSC-1000 permits stable speed operation on power mains with fluctuating frequency and amplitude. Although designed specifically for use with the 28KSR/28ASR, the TSC works equally well with other Model 28 devices, the Models 32, 33, 35 & 37, the Kleinschmidt TT-100 and Mite Midgets. Input: 115 vac plus-minus 10%, 40-400 Hz. Size: 8" H x 8" W x 11" D. Weight: 17 pounds. Price: $129.50 FOB South Pasadena. Your QSL will bring complete specifications. DOVETRON, 1015 Fremont Avenue (Box 267), South Pasadena, California, 91030 (213-682-3705).

FOR SALE: MODEL 28 ASR. BRAND NEW #195154 THREE SPEED, 60-75-100, GEARSHIFT that shifts printer, mechanical reperf and TWIN TDs. Brand new auxiliary reperf 60-75-100 WPM. 500 MA auxiliary loop supply with switching controls for in/out of loop. Cabinet air cooled with whisper fan. Steal this beauty for $875.00. Larry Kleber, K9LKA/W9CPD, Belvidere, Illinois 61008. 815-544-2075, 544-3794.

NEW HAM MAGAZINE!! Interested in public services, humanitarian actions and international friendship? Sample issue free. Published every three weeks. Worldradio, 2509 Donner Way, Sacramento, Calif. 95818 WB6AUH

MORE RTTY! THAT'S RIGHT. In 1970 there were more feature RTTY articles in HAM RADIO Magazine than any other general amateur magazine. You need RTTY Journal, but you need HAM RADIO also. $6.00 per year; $12.00, 3 years. Ham Radio, Greenville, N.H. 03048

BACK ISSUES OF RTTY JOURNAL - I have a complete file of all issues from Vol. 1 No. 1 to date. Will reproduce any issue for $1.10 pp. Add 25c for air mail delivery. John Isaacs, 3175 Val Verde Ave., Long Beach, CA. 90808.

PHONETYPE TERMINAL UNIT - MARK III, ACOUSTIC COUPLER, for use to operate teletypewriter, using a regular telephone. Highly reliable circuitry, thousands in use by deaf people nationwide. Automatic power switch, visual monitor light, self-contained unit ready to drive keyboard, magnet, and motor lines. $134.50 FOB. Send for brochure. R.H. Weitbrecht, W6NRM, APPLIED COMMUNICATIONS CORP., P.O. Box 555, Belmont, Calif. 94002.

WANTED - FOR USE BY DEAF PEOPLE - TELETYPE MACHINES Model 15-19-26-28-32. Must be in reasonable condition, complete with keyboards. Can pick up anywhere. Send information to R.H. Weitbrecht, W6NRM, P.O. Box 555, Belmont, Calif. 94002.

"RTTY SPEED CONVERTER" A drilled, fiberglass 4" x 6-1/2" printed circuit board now available for the WA6JYJ speed converter in the DEC 71 issue of HAM RADIO. $6.00 postpaid. Complete parts kit including PCB, $40.00, postpaid. P & M Electronics, 519 South Austin, Seattle, WA 98108. (41 words)

"AFSK GENERATOR" - PCB and all components except input output jacks, power supply and chassis. $6.60. P & M Electronics, Inc. 519 South Austin, Seattle, WA 98108 (23 words)

KLEINSCHMIDT MANUALS - for TT-4, TT-100, TT-76, TT-107, etc. Mite KSR teletypewriter supplies, gears, parts, covers. Wanted Teletype manuals. Send SASE for list. Typetronics, Box 8873 Ft. Lauderdale, FL. 33310. W4NYF.

BIG SALE ON MODEL 28 Typing Reperforators (RT) mounted on a tape handling stand which includes large tape take-up spool and supply reels as well. As an intermediate storage bin. O/A dimensions, 36" high, 20" long, 8 1/2 wd. Both LAXD transmitter-distributor and LPR typing reperforator come equipped with three speed gear shifts. Allowing down as well as up speed conversion. Synchronous motor LMU-12. Excellent. $85.00 each while they last. Atlantic Surplus Sales, 580 3rd Ave. Brooklyn, N.Y. 11215

FOR SALE ST-6 BOARDS $10.00. Model 14 typing reperf with 60 wpm sync motor and cover $25.00 plus shipping. Sodus unit (model 15 stunt box) set up for 60 wpm, like new, $25.00 plus shipping. W9DGV 2210-30th St. Rock Island, Ill. 61201.

MODEL 28KSR w/ stunt box, sel call and many extras. $350.00. ST-6 with tuning meter all housed in 3 x 10 x 14 cabinet includes internal switching for 170 and 850 shifts. $250.00. Model 14 typing reperf $50.00. Model 14 TD. $25.00. Bill Sherwood, W6FBY, 501 Loring Ave., Los Angles, CA. 90024. (213) 474-0727.

CLASSIFIED ADS-

KLEINSCHMIDT TT-98 Page Printer w/ comm keyboard and loop supply. $60.00. Kleinschmidt TT 100 Page printer w/ comm. Keyboard and loop supply $60.00. Kleinschmidt TT-117 page printer & TT178 A reperf combo, loop supply-$110.00 Model 28KSR, $185.00. Model 14 reperfs, R.O. $15.00. Model 2B R.O. missing cover-$10.00. Model 14 chad type R.O. reperfs w/ keyboard. 75 wpm. $22.00. TT-16/FG reperfs R.O., chad type - $15.00. 40 roll case 11/16 wide paper tape $5.00 per case while supply lasts. All black ribbons $4.50 doz. PPD. Hallicrafter HT 37 - $100.00. Model 26 TTY. $25.00 P Davis, 1830 Toepfer Rd. Akron, OH. 44312

MODEL 28 typing reperforator and transmitter distributor (LAXD). Both 3 speed mounted on stand with common drive motor. 2 ea. in Universal cabinet with 2 tape bins and power supply. All or part for sale. Very reasonable. A. Stein, Apt. T-2, 2013 N. Daniel St., Arlington, Va.

ULTRA MODERN Model 311 KSR Teleprinter by SCM -- all solid state, 60 and 100 WPM at flick of switch. Very quiet operation and most modern styling -- would look nice even in living room. Communications type. 5-level Baudot. Tested and working - $375. As is - $325. Data sheet available. BVE Enterprises, PO Box 73-R, Paramus, NJ 07652.

FOR SALE: 28KSR, AUTO C.R. and LF. Non overline. 28 Type Typing Reperf (Types on tape) and TD. Reperf and TD with three speed gear shift. Gears for 28KSR for 60, 75, 100 WPM included. Heath Model SB 610 Monitor Scope and Lakeside Time Master Timer. ST 6 - Hal Devices Demodulator, Factory wired with factory cabinet. Bargain of the year $475.00.

Model 15 RTTY, New Motor, Steel Floor Model Cabinet $45.00 - Local pickup, cash or certified check. W8LSN 3375 Byron Rd., Howell Mich. 48843, phone 517-546-1341

COMPLETE RTTY JOURNALS from 1965 through 1971, 7 volumes complete, postpaid, first check for $15. gets them. Thomas Chittim, W8LSN, 3375 Byron Rd., Howell, Mi. 48843 (517) 546-1341.

BUILD OR BUY - AUTOSTART automatically turns tty machine on and off. Great for MARS net operation. Will not respond to voice or tones outside the 2125 hz space tone passband. Hooks to speaker. PC board 2.50, wired 17.50 AFSK-2. TU-Dual output to directly drive two TTY machines or a TTY and reperf. Current limited transistor switches (60ma), input bandpass filter, tuning meter or scope connections, 850 and 170hz shift. PC board 4.00 wired 49.50 TU-3. AFSK OSCILLATOR-Two oscillators gated for no phase distortion during switching, Keyboard input buffered for long line noise immunity. PC board 3.00 wired 29.50 AFSK-2. SEND SASE for schematics and info PC Electronics W60RG 10253 E. Nadine St., Temple City CA 91780.

UNUSED SCOPE TUNING MODULES, CV89A series, get a spare, $15.00. CV89A Converter $125.00. Northern Radio converter 174-$70.00. Den-35, $80.00. Joe Szabat, W3LST, 228 Plummer, Oil City, Pa. 16301.

NEMS CLARKE VHF FM RECEIVERS. Type 1671 tunable 175-260 Mhz. $95.00. Type 1412 tunable or xtal controlled 215-260 Mhz. $125.00. Both units are in excellent condition. Larry Smith, 43629 24th St. West. Lancaster, CA. 93534 - (805) WH 2-9859.

TTY EQUIP. 15-19 PRINTERS, 14 TDs, tape perfs., power supplies, tables, tape, paper, audio converter. QST's 1946 thru 1970. Make offer. W6NQE, 707-822-5500.

BUY or borrow for copying manual of Radiation Inc., TDMS series 5EB-R.2B and 6EB-R.2B, W. J. Tabor WØKUI, Welch, Minn. 55089.

SAROC EIGHTH NATIONAL CONVENTION THE PRESTIGE convention at the Flamingo Hotel Convention Center, Las Vegas, Nevada 89109, January 4 through 7, 1973. SAROC special room rate $15.00 plus tax, per night, single or double occupancy, only 500 rooms so get your accommodations request in early. Advance Registration $10.00 per person. Registration and eyeball session on Thursday. Seminars, Meetings, Exhibits, open Friday and Saturday. SAROC -SWAN Electronics Social Hour, Friday. Ladies Program, Saturday. SAROC Sixth National FM Conference, Friday and Saturday. SAROC-HY-GAIN/Galaxy Cocktail Party, with Leo WØGFQ, at the Organ, Saturday. SAROC Buffet Hunt Breakfast, with Champagne, Sunday. Advance Registration with Sergio Franchi Flamingo Midnight Show, two drinks, $17.00 per person. Advance Registration with Sergio Franchi Flamingo Dinner Show, no drinks, $21.00 per person. SAROC Jet Roundtrip Vacation Package Plan includes, airfare, Deluxe Flamingo , Hotel Room for three nights, SAROC Advance Registration with Flamingo Hotel Dinner Show: via United Airlines departure cities; Baltimore/Washington, $280.00; Boston, $312.00; Chicago, $222.00; Cleveland, $250.00; Columbus, $246.00; Detroit, $244.00; Hartford, $304.00; Milwaukee, $233.00; New York/Newark, $296.00; Philadelphia, $290.00; Pittsburg, $262.00; via Frontier Airlines departure cities: St. Louis, $209.00; Kansas City, $188.00; Denver, $135.00; Omaha, $182.00; Lincoln, $176.00. The price quoted is per person, double occupancy in hotel room. If single occupancy in hotel room is desired add $25.00 additional per person to each amount quoted. All fares and schedules are subject to CAB rules and regulartions, send for additional details. Remember to send accommodations request to Flamingo Hotel. Send Advance Registration and information request to, SAROC, P. O. Box 73, Boulder City, Nevada 89005."

KLEINSCHMIDT TT-4ATG printer, keyboard, used, good, $48.00 with 60-100 gears. Freight $20. east of Miss. $10. west of Miss. Also have ASR, KSR typing punches. Mark/Space Systems Co. 3563 Conquista, Long Beach, CA. 90808. (213) 429-5821.

MODEL 28 ASR - Complete like new, 60 wpm gears, automatic carriage return line feed, stunt box non-overline (will not double line feed on pix tape) $600.00 firm. Jim, WB6SCH, 3202 S. Olive, Santa Ana, Calif. 92707.

SALE: TT271/FG Page printer; Kleinschmidt, send receive comm. keyboard. english characters, 60-75-100 wpm. Used good. $40. each. Model 28 Typing reperf, TT315/UG Code LPR 35 tape data 11/16 wide chadless or fully perforated, TTY set M28ASR, used good, $35.00 each. Model 28 Type reperf TT317/UG codeLPR-37 tape data 11/16" wide, chadless or fully perforated, used good, $35.00 each. Model 14 type-reperf- send receive. sync motor, end of line indicator, tape retainer, keyboard, used good, $32.00 each. Model 14 trans- distributor, sync motor, used good, $17.00 each. Synchronous motor; LMU-12 for model 28ASR, used good, $9.00 each. Synchronous motor for model 14 - 15, used, good, $5.00 each. Synchronous motor for Mite page printer 115V 60 hz. unused, $20.00 each. TRXD-10 combo sync motor, no cover, $18.00 each. Send us your requirements. Atlantic Surplus Sales, 580 3rd Ave., Brooklyn, N.Y. 11215.

WANT: CV-89A audio type T.U. Give condition and price. W9YCJ John Moore, 136 McKinley, Valders, Wis. 54245 Phone 414-775-4625 evenings.

TOROIDS, 88mm. UNCASED - 5/$1.50 pp. W9FTE, Dick Sanborn, 8800 W. Clovernook Ct., Milwaukee. Wisc. 53224

ADDITIONAL CLASSFIED

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