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DECEMBER 1970

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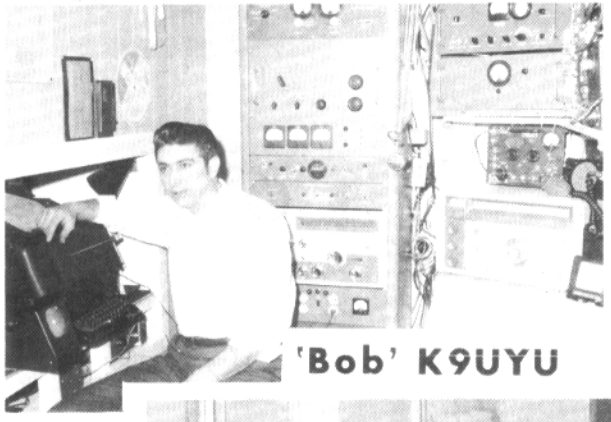

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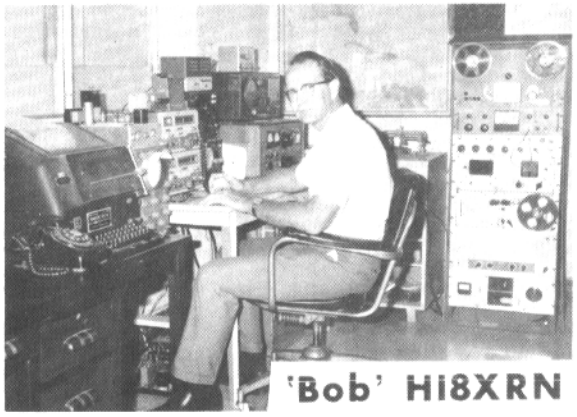

'Bob' HI8XRN

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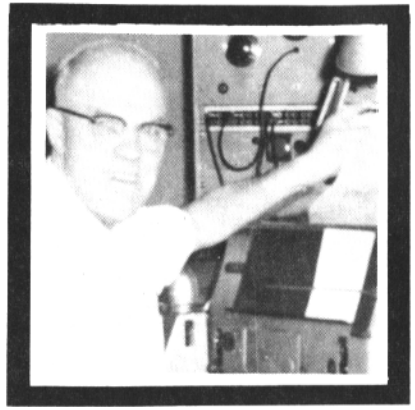
Sidney Burnett
VE3GK

1903 - 1970



Mr. Sid Burnett, VE3GK, president of the C.A.R.T.G. died suddenly October 19, 1970.

In the middle of September Crys and the writer had the pleasure of visiting Sid and his wife Gwen for the first time at their home in Toronto. We saw Sids RTTY equipment, his printing set up where he worked many hours publishing the CARTG RTTY NEWS, we enjoyed listening to Gwen and Sid on the twin Hammond Organs in his home, saw the trophys for the coming CARTG DX Sweepstakes. Most of all was the impression of a human dynamo, that although retired, wished he had more time for his longing to help others and promote interest in RTTY and CARTG.

Not being an author it is difficult to find words to express our feeling of loss and sympathy to Gwen and the family. A number of letters received in the past week have expressed the same feelings. They say the good deeds of a man live after him. --Sid has a lot going for him.--

In response to our request for a little information on Sids background we are reprinting parts of a letter from Gwen, it tells the story better than anything.

He was 67 years of age, born in Grantham, Lincolnshire, England, coming to Canada around eleven years of age. Always intensely interested in radio, he was building peanut tube receivers for his friends in the early 1920's. He conducted a daily column in the Toronto Daily Star entitled "What's Wrong With Your Radio?" for several years, and received his Amateur License in 1929 and has held the call of VE3GK ever since. Over the years he has been active on CW and Fone, but the RTTY mode was the one that gave him the most pleasure. He liked the challenge of building equipment and getting it operational, even more than he liked operating. Of course, the last three years his big interest was "C.A.R.T.G." and the many hours he spent on the Newsletters, etc. and writing to RTTY enthusiasts, answering their questions, sending out data and information on RTTY, were truly a "labor of love". Of course, having being retired from business for twelve years gave him more time than usual to put on it, and it gave him an interest in life. I was so pleased he was here for the 10th World-Wide RTTY DX "Manitoba Centennial" Sweepstakes and was hoping next year to have the eleventh called the "British Columbia Centennial" Sweepstakes. He was looking forward to having it the usual "best ever" event, and the way the Logs are coming in already, it seems we will have a big turn out again.

***

Some questions have been asked as to the future of CARTG. Again several letters from Canadians have shown an interest in continuing Sids dream. At present Gwen, VE3AYL, Sids XYL, will follow through with all the contest scoring, mailing of the trophys and any other details of the contest so everyone is asked to send in the logs as usual. Gwen has been active in helping Sid with past contests and is extremely competent to finish the job. Others have offered to help if needed so we hope that everyone will send in a log. Let's all help make this contest a memory to the hard work done by Sid to promote it. Send all logs to CARTG, 85 Fifeshire Road, Toronto, Ontario, Canada. If there is some question of your log being late an airmail postcard in advance might help a little.

***

Mainline ⊛ Solid State
ST-6 DEMODULATOR

PART 3

IRVIN M. HOFF, W6FFC
12130 Foothill Lane
Los Altos Hills, Calif. 94022

PART 3, CONCLUSION

A number of people having read the first two articles on the ST-6 (Sept. and Oct. 1970 RTTY JOURNAL) suggested they would be interested in some voltage measurements and other trouble-shooting suggestions. Thus we decided with the editor's permission to write one more article on the ST-6.

INDICATOR LAMPS: The original lamps suggested were Sylvania cartridge lamps. Those have proven to be difficult to find, and relatively expensive. A new-type lamp has been brought to my attention that seems perfect for the job. It is rated at 10,000 hours, may be used at voltages from 12-28 with good brilliance, is readily available, easy to install, low-cost at 30c each, and available in various colors. You can order them from:

Western Radio
1415 Indian Street
San Diego, Calif. 92101
Attn: Gary Pierce K6CAQ
Amateur store manager

Garey suggests you mention the color of the wire leads as being 'Violet' as this distinguishes this particular lamp from some others of different characteristics which they also sell. Then also mention the color of the unit you want -- available in Red, White, Green, Blue or Amber. These are the "Muralites' made by Mura Corp., 355 Great Neck Road, Great Neck, N.Y.

While on the subject of indicator lamps, take a pencil and on your October 1970 RTTY JOURNAL, page 8, on the schematic of the indicator lamps, mark "UNREGULATED POSITIVE" on the right side. This got chopped off by the printer somehow. Thus negative voltage goes to Q11 and positive voltage goes to Q12. The size of the resistors depends on what lamps you use, and may be made as large as is convenient to give ample brilliance -- thus prolonging the life of the lamps.

CIRCUIT THEORY OF THE ST-6: Some of this is self-explanatory and some has already been covered, but some of the interesting aspects have not been mentioned.

THE LIMITER: When a high-gain device is run "wide open" (called "open loop" on op amps), it will clip rather than remain linear, thus putting out symmetrical square waves. The amount of gain can be easily controlled by a feedback resistor, thus exact parameters can be set up in advance by the engineer and the circuit will perform as expected. So with the limiter on, we put out square waves at pin 6 of OA-1, and with the limiter 'off" (feedback resistor added), we preserve sine wave output that faithfully follows the input signal waveform unless we start clipping.

THE LOW-PASS FILTER: This is a 3-pole active Butterworth filter. The first stage isolates the input and following stage, and at the same time is used as a amplifier to bring the output of the detector stage back up to the maximum we can use and stay linear, giving maximum dynamic range for limiterless operation.

THE THRESHOLD CORRECTOR: This has been discussed earlier this year in the reprint of our Dec. 1964 article. On steady mark the output of the low-pass filter will be about 8 volts, this runs through the threshold corrector network and comes out at about 4 volts. This is further reduced to about 2 volts by the network in the output of the normal-reverse switch. When sending normal RTTY such as RYRYRYRY for this illustration, the output of the threshold corrector (which was 4 volts on steady mark), now becomes plus-and minus 8 volts due to the capacitor storage system. This is way too much voltage for the input of the op amp to handle (5 volts max. differential voltage), so the 220K resistors divide this in half, for about plus-and-minus 4 volts under RTTY conditions.

THE SLICER: This circuit again runs "open loop" for maximum gain. The out-put on mark (positive voltage) runs the keyer transistor with about 5 ma. conducting current via the 2.2K resistor. On space (negative voltage), the diode blocks negative voltage and allows a little current to be applied to the base of the MJE-340 to cut it off completely -- any voltage in excess of about -0.7 volts negative is shunted to ground through the diode on the base of Q1. The diode on the output of the slicer was added primarily to prevent the standby system from putting positive voltage in any quantity on the slicer op amp.

THE KEYER TRANSISTOR: This MJE-340 (or other high-voltage type) is saturated on mark with about 5 mills of current, thus only requiring a 'Beta' of about 12 to saturate completely with the 60 ma. loop current. On 'space' the transistor is cut off with negative voltage, and the diode in the base prevents any transient spikes from the back EMF of the selector magnets from rising above 0.7 volts.

THE LOOP SUPPLY: Full-wave, highly filtered voltage gives about 170 volts on space for low distortion on the printer. The "floating loop" system peculiar to units I have developed gives approximately plus-and-minus 35 volts on space and mark, respectively. The 12K resistor on the FSK output merely keeps this voltage from rising to around 70-80 volts, which would destroy most FSK or AFSK diodes. The R/C network on the collector of Q1 absorbs most of the back-EMF of the selector magnets, preventing damage to the transistor.

THE STANDBY SYSTEM: Putting the S3 switch to 'Standby' allows the transistor Q2 to conduct, putting about 11 volts on the base of Q1 through the 2.2K resistor at that point, which limits the current to about 5 ma. At the same time through a diode gate, (on pin 3 of OA-6) the autostart system is disabled, turning the motor on if it was off, and keeping the motor on as long as the standby switch is in use. (or the "remote" standby either one.) Another diode gate operates the proper indicator lamp to show you are in standby-- this last is shown on page 8 of the Oct. issue, not on the main schematic. Silicone diodes are used for these gates, due to their excellent reverse resistance in the hundreds of meghoms.

THE ANTI-SPACE: When a positive (mark) signal passes through the slicer, this also goes to Q7 through a 10K resistor limiting the current to about 1 ma. This causes the NPN transistor to conduct, and the voltage at its collector then is very low, perhaps 0.2 volts or less. This in turn shorts the 10 mfd. capacitor through a 330 ohm resistor R41. The only purpose of that resistor is to limit the current in Q7 while the capacitor is discharging. The 330 ohm resistor plus the 10 Mfd. capacitor gives about a 3 ms. discharge time, so the system works equally well on speeds well in excess of 100 WPM -- where the "bit time" is perhaps 13 ms.

While on steady mark, Q7 is then 'low' and the voltage at pin 3 of OA-7 is less than 0.1 volt due to the network of R42 and R43. By the way, the draftsman accidentally included an "R40" as he numbered the 330 ohm twice. Just put an "X" through R40 as there is none.

The inverting input (pin 2 of OA-7) is held to about plus 2.6 volts. Since this is greater than the 0.1 volts at pin 3, it takes charge, and the op amp now has about negative 11 volts for output. (The "inverting input" causes the output voltage to go the opposite polarity). This negative output voltage is blocked by both diodes CR21 and CR22 and is shunted to ground through the 33K bleeder resistor R 46.

When the input signal goes to space, the slicer puts out negative voltage, this is used to bias off the Q7 transistor, and this bias voltage is held to a maximum of -0.7 volts by the diode CR20 at its base. Since the transistor is not conducting, the R38 resistor now charges the 10 Mfd. capacitor C19 through the 330 ohm resistor R39. The charge time is affected by R42 and R43. Those last two resistors were added primarily to keep the voltage at pin 3 of OA-7 from rising above the 5.0 volt maximum input the op amp can handle. This charge time raises the voltage at pin 3 to more than the 2.6 volts bias on pin 2, and when this happens, the output of the "open loop" OA-7 suddenly flips to positive output. This takes about 275 ms. or so, somewhat longer than the minimum time needed to print a normal "blank" RTTY character faithfully. As a result the 10 Mfd, could be made smaller but these figures were chosen as being adequate for anybody building the unit.

When the output of OA-7 goes positive, this immediately puts standby voltage on the base of the Q1 keyer through the 2.2K resistor, and at the same time the voltage through the diode CR22 quickly puts the autostart into "no signal" configuration and starts the 30-second 'countdown' to turn the motor off. If all this occurred prior to the autostart being turned on, you can see it will prevent the motor from ever being turned on at all, even though there might be a steady carrier in the space channel.

It works whether the limiter is on or off, whether straddle tuning or just what, all it takes is for the slicer to think the signal is somewhere in the region of 'space' information.

The place you will normally appreciate this feature is for stations trying to set their shift. The machine quickly locks into markhold when they go to space, instead of "running open".

No method was provided to disable this feature. If necessary, you can always ground the collector of Q7, and could, if desired, add yet another switch to do this intentionally.

ADDING "SEL-CAL" TO THE ST-6: This was not mentioned previously, as only a handful of individuals have the electronic Sel-Cal unit, but here is the easiest way to adapt such an unit to the ST-6. Attach a 10K resistor to pin 6 of OA-4. The other end attaches directly to the Sel-cal input which also has a diode to ground. This diode would pass negative voltage, so ground the anode. The relay in the Sel-cal unit then grounds the base of Q4 to keep the motor from turning on. Since the motor control relay in the ST-6 grounds the base of Q1, the magnets will not chatter while other QSO's not directed to that station are in progress. This system allows you to monitor all incoming signals via Sel-cal, and yet gives the back-up of the normal autoprint system as well. If you want to monitor only those signals that the autoprint system thinks are authentic RTTY, then put the 10K resistor on the right side of CR14-G instead, and then the Sel-cal will not monitor at all until the autoprint says there may be a signal. The rest of the system is the same. On the PC boards developed by the author and sold by Stafford, both places are brought out to the connector, so the user has an immediate choice.

THE AUTOPRINT SYSTEM: We use the term "autoprint" since so many people think of "autostart" as having no advantage to their station. All "autoprint" really means is "automatic printer control", and this is most useful to anybody, whether sitting there at the machine or wandering around the room (as well as being out of town).

The theory behind "autostart" has been mentioned in a previous article, so we shall mention instead how it is accomplished in the ST-6.

The discriminator stage has an extra set of diodes (CR3 and CR4) which sample the mark and space channels and combine their output for positive voltage. Thus if the signal is tuned properly, this "plus-plus" voltage is relatively constant in amplitude. This is filtered slightly via C2, and sent to the input of OA-5 through a voltage dividing network that reduces this voltage to something the op amp can safely handle. That is, the typical discriminator puts out perhaps 7-8 volts at test point 2 for normal RTTY, but the op amp can only take up to 5 volts maximum input. So the network reduces this 7-8 volts to about 3.8 approximately.

To best discuss the autostart section, let's say we had a signal until this moment, the motor is running and we just stopped printing. OK, the voltage at test point 2 now varies since we are getting random input and in any event is less than it was previously with an authentic signal. So the voltage at the inverting input of OA-5 is less than that at pin 3 by the fixed bias system, so pin 3 predominates and we get positive output voltage from OA-5. This passes through CR27 and the 350 Mfd. capacitor is charged through the 3.6K resistor R61. As there are some shunt resistors across the 350 Mfd. capacitor, it will take about one second or a bit less to charge this capacitor to the point the voltage at pin 3 of OA-6 is greater than the 2.2 volts at pin 2 from the fixed bias network. When this voltage at pin 3 becomes more than 2.2 volts, the OA-6 op amp flips to positive output. This is passed to the standby system by diode CR24, putting the printer into markhold. It is also blocked by CR25 from going to the motor control system, so the voltage on the 20 Mfd. capacitor C20 now starts to slowly bleed off. This will take maybe 20-30 seconds. When it gets low enough, Q3 stops conducting, which in turn turns off Q4 which turns off Q5 and the relay opens, turning off the motor. When Q5 stops conducting, Q6 starts to conduct, and pulls about the same amount of current through R47 in its collector as the relay had previously pulled through Q5. Thus the only purpose of Q6 is to keep the current through the voltage regulators the same whether the relay is open or closed. This is perhaps a "purist" approach, but it seemed worthwhile.

While speaking of the relay, the diode CR23 in the collector of Q5 prevents any back EMF from the relay harming the Q5 transistor. This simple protective circuit is most effective, but would be a "no-no" for the keyer transistor and printer magnets, since there we must have faithful reversals that occur quite rapidly. This is of no interest to the motor relay.

There are several minor advantages with the ST-6 autoprint circuit that do not at first appear but were carefully engineered into the circuit. The fast-slow system was added in such a manner that the autoprint circuit does not lock up into standby when going from one to the other. While transmitting, the standby system does not completely short out the 350 Mfd. capacitor, thus a signal that "tail-ends" will start up the autoprint in less than normal time, and less information is missed under these circumstances. In "standby" the 350 Mfd. capacitor would remain at about 4.3 volts instead of the usual 7.2 volts, thus it "recovers" quite rapidly after sending your c.w. should another station come on instantly. (If it hasn't come on within

one second, then you get your normal on-off protection.)

Now let's take the situation where the motor is off and we have had no signal for some time. Now a signal suddenly appears.

The voltage at the test point 2 in the discriminator goes to say 7.5 volts. This becomes about 3.8 approximately at pin 2 of OA-5 overcoming the fixed bias on pin 3, causing the op amp to flip to negative output. This negative voltage is blocked by CR27, so now the positive voltage on the 350 Mfd. capacitor C21 slowly bleeds off through the R59 and R60 resistors. As the voltage lowers past about 2.2 volts, now the fixed bias at pin 2 of OA-6 takes over, causing OA-6 to flip from positive output to negative output. When this happens, the markhold voltage through CR24 disappears allowing the printer to now follow the incoming signal. At the same time, the 20Mfd. capacitor C20 is quickly charged through the current-limiting resistor R55. As it passes about 0.7 volts approximately, Q3 conducts, causing Q4 and Q5 to conduct, turning the relay on. This stops Q6 from conducting. The 50 mills or so the relay pulls is compensated by the loss of the 50 mills through Q6, and the voltage remains stable.

That pretty much takes care of the autoprint operation. Other things are quite minor, like the "motor on" switch. This merely grounds the collector of Q4, causing Q5 to conduct keeping the motor running, regardless of what OA6, Q3, Q4, etc. are doing. S4B just parallels this "motor switch" so that when using "fast autostart" the motor will remain on.

VOLTAGE MEASUREMENTS:

These measurements will be given in either "mark and space" columns where appropriate, or in "signal-no signal" columns. They are only approximate for the most part, and should you get something that is close, but not necessarily identical, your circuit is probably normal. All measurements were made with a Heathkit 10 Megohm V.T.V.M.

OP AMP OA-1:

PIN (Mark or space either one)	
1. 7.8	5. -11.4
2. Ø	6. -7.7 a.c.
3. Ø	7. 11.8
4. -11.8	8. 9.4

NORMAL-REVERSE SWITCH: About plus 4 for mark, -4 for space.

OP-AMP OA-4: Mark signal

2.	Ø
3.	2.0
6.	11.0

TEST POINT 2 7.8 on mark for 170 shift discriminator Ø volts d.c. with ST-6 input disconnected.

OP AMP OA-2: (mark input)

1. 8.2	5. -11.4
2. Ø	6. 8.4
3. Ø	7. 11.9
4. -11.9	8. 8.7

OP AMP OA-3

PIN	MARK	SPACE
1.	8.2	
2.	8.5	-8.5
3.	8.5	-8.5
4.	-11.9	
5.	-11.5	
6.	8.5	-8.5
7.	11.9	
8.	8.5	

OP AMP OA-5:

	SIGNAL	NO-SIGNAL
1.	7.4	8.2
2.	3.9	Ø
3.	3.4	3.4
4.	-11.8	-11.8
5.	-11.0	-11.9
6.	-10.8	11.4
7.	11.8	11.8
8.	11.5	7.8

OP AMP OA-6

	SIGNAL	NO-SIGNAL
1.	7.5	8.1
2.	2.2	2.2
3.	Ø	4.7
4.	-11.9	-11.9
5.	-10.8	-11.9
6.	-10.8	10.8
7.	11.9	11.9
8.	11.4	7.7

OP AMP OA-7

	MARK	SPACE
1.	7.5	8.1
2.	2.3	2.3
3.	Ø	4.2
4.	-11.9	-11.9
5.	-11.9	-11.9
6.	-10.8	10.8
7.	11.9	11.9
8.	11.5	11.5

Q1	MARK	SPACE
B	0.6	-0.7
E	Ø	Ø
C	1.0	170

Q2	S-3 ON	S-3 OFF
B	11.3	12.0
E	12.0	12.3
C	11.9	Ø

Q3	SIGNAL	NO-SIGNAL
B	-10.3	Ø
E	- 9.5	Ø
C	-12.0	-12.0

Q4	SIGNAL	No-SIGNAL
B	-0.7	Ø
E	Ø	Ø
C	-0.03	-12.0

Q5	SIGNAL	NO-SIGNAL
B	-11.3	-12.0
E	-12.0	-12.0
C	-11.8	10.2

Q6	SIGNAL	NO-SIGNAL
B	-11.9	-11.3
E	-12.0	-12.0
C	12.0	-11.8

Q7	MARK	SPACE
B	0.7	-0.7
E	Ø	Ø
C	0.05	9.3

10 MFD. CAPACITOR IN ANTI-SPACE

MARK	SPACE
Ø	9.3

TROUBLE-SHOOTING: With the use of the voltage measurements, you should be able to pretty well pin down where the problem is. I suggest you first make sure the power supply is putting out about 12 volts positive and 12 volts negative. Then go from there. Start at the beginning with the limiter and make sure you can balance the output for zero volts d.c. with the pot (no signal input at all). Then add a mark signal and see if you get somewhere around 7-8 volts d.c. at test point 2. Then check test point 3 and see if you get about 8-9 volts d.c. there -- you should get positive voltage for mark and a similar negative voltage for space. Then check the output of the slicer at pin 6 to make sure you still get about positive 10-11 volts on mark and negative 10-11 volts on space.

From here on, the other comments should tell you what is happening.

THE SIZE OF C'C' CAPACITOR AND R'D' RESISTOR:

These were selected to give a voltage that the slicer could handle on RTTY reversals safely. The resistor would first be selected so that the voltage at test point 3 was no more than say 9 volts. Just hand pick a resistor that gives 8-9 volts on steady mark at test point 3, then, if the one you are presently using does not do this. From the following table, pick the appropriate capacitor:

R'D'	C'C (60 speed)	C'C' 100 speed)	
300K	.018	.01	
270K	.02	.012	
240K	.022	.012	.0022
220K	.025	.015	
200K	.027	.015	.0012
180K	.03	.018	
160K	.033	.02	

CONCLUSION: Hopefully the comments made in this follow-up article will assist in correcting any problems you might have encountered. Also, perhaps you will now better understand how the various circuits work. We have tried to answer all the questions we have been asked.

Future plans call for perhaps adding 3-pole 80-Hz. Butterworth channel filters at some future date for optional use via a different plug-in card. "Active" channel filters do not seem too feasible at this time as R/C circuits are much more prone to drift than L/C circuits. The cost would probably be twice as much as using 88 Mh. toroids, and there would be little savings in size, but there would be a great savings in weight. The basic ST-6 as presented works so well, however, none of these options are anticipated in the immediate future.

The large, easy-to-read schematics are still available from the author for $1, postage piad anywhere in the USA or Canada. Add $1 for air mail outside this area.

73, Irv

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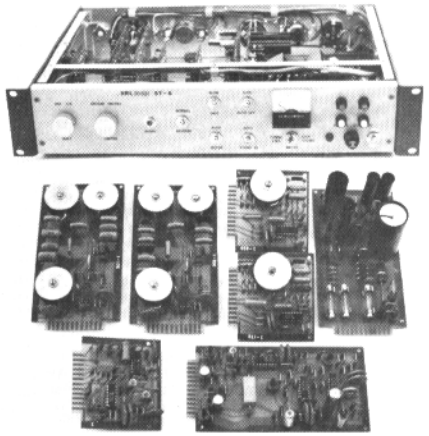
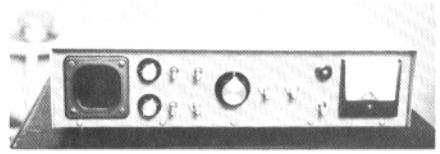


ST-6 and PC BOARDS from HAL Devices



ST-6 built by K1LPS

VHF RTTY NEWS

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

VHF ACTIVITY

We have recently received news of operation in two separate areas: Washinton DC and Detroit, Michigan.

Sam Staton, K4ITB, in Arlington, VA, reports: "The Northern Virginia (Teletype) Emergency Net with W4BRK in Winchester as NCS, meets on 145.44 MHz every Sunday evening at 1930 local standard time, with stations from VA, WV, PA, DC, and sometimes OH and NJ.

"In addition to this regularly called net, W4JCV, Leesburg, VA, transmits ARRL bulletins and local information on the frequency every night at 2200 local standard time. He is backed up by WA4SVR in Sterling, VA, and K3ARN in Frederick MD.

"W4JCVs signals are reported heard every night by WB2EPY and are regularly heard in PA and NJ ... He transmits AFSK, 850 Hz shift, 2125/2975 Hz, on lower sideband and carrier. He transmits bulletins first to the Washington DC, area and then beams toward Baltimore and repeats them. He then stands by briefly on phone for any calls before copying the ARRL bulletins at 0100 local time.

"The Delaware Valley Green Keys Net has been entered recently by at least one station in the Baltimore/Washington Area (1900 local time, Mondays on 146.700) and several of us are now looking for that one.

"I am enclosing a list of stations who check in with W4JCV or into the Teletype net with some degree of regularity."

The following stations are on 2 meter AFSK AM Teletype:

WA4SVR	Bob	Sterling, VA
WA4GHA	Mark	Alexandria, VA
K3IWI	Bryce	Rockville, MD
K3TBD	Adam	Baltimore, MD
WA3HEN	Doris	Baltimore, MD
WA3JZR	IBM Club	Gaithersburg, MD
K4MR	Brad	Manassas, VA
WA4CGY	Ernie	Arlington, VA
K4ITB	Sam	Arlington, VA
K3TGY	Bill	Waldorf, MD
WB4MAE	John	Alexandria, VA
K4GCM/4	Will	Annandale, VA
WB4JJE	Kathy	Annandale, VA
W3PKF	Ed	Frederick, MD
K3ARN	Charlie	Frederick, MD
W3CIY	Mark	Frederick, MD
W3AME	Fred	Simpsonville, MD
WB4RFF	Jerry	Charlottsville, VA
WB4GEZ	Larry	Leesburg, VA
W4VZR	Ron	Alexandria, VA
W3CJK	Bill	Glen Burnie, MD
K3BEQ	Murray	Cheverly, MD
WA4RQA	Roy	Falls Church, VA
WA3MTY	Bill	Dundalk, MD
W3BFE	Jack	Frederick, MD
W3CKA	Charles	Baltimore, MD
K3TLE	Willard	Littlestown, PA
K3LTA	Bob	Westminster, MD
WA3FBB	Phil	Baltimore, MD
WA3EBV	Ken	York, PA
WA2LAT/4	Wayne	Chantilly, VA
K2AGI	John	Murray Hill, NJ
W2MNE	Lou	New Summerfield, NJ
K3RHO	Jack	Camp Springs, MD
WB4DVR	Chuck	Vienna, VA
WB2VMU	Wayne	Atlantic City, NJ
K4LJH	Charles	Hamilton, VA
K3FHC	Jim	Columbia, PA
WA3OZA	Sandy	Baltimore, MD
W3GBE		Annapolis, MD
WA3KHE	Chuck	Damascus, MD
WA3OJX	Steve	Frederick, MD

The following stations are on AFSK FM on 146.700 MHz in the Washington DC area:

W4CTT, W4CSR, W4VZR, K4KCX, WA4GHA, K4GCM/4, K40HW, W3SFY, and W3HXP.

The above list, although sent to us by K4ITB, was compiled by W4JCV. He also lists 34 more stations that are "making progress toward getting on AFSK AM."

Joe Janules, K80EF, in Fraser, MI, sent along the following: "On the FM roster, it is a shame I could not send you last winter's list as there were close to 30 stations. Once they are in-active for a few months they get "De-Listed".

"This coming Winter an "AM" net is trying to be formed on 145.800 MHz. They are trying for Tuesdays at 2000 Hrs EST. Will let you know the results."

The list of active 25F2 - vertically polarized stations in the Detroit area is:

		146.820	146.700
WB8AAK	Dearborn	X	X
W8AEJ	Trenton	X	
K8AQC	Allen Park	X	X
WB8BCH	Ann Arbor	A-S	
W8BX	Detroit	(A-S)	A-S
W8DYV	Taylor	X	X
W8GBT	Southfield		X
K8GSJ	Southfield	X	
W8GYV	Detroit	(A-S)	A-S
K8ICZ	Taylor	A-S	(A-S)
WA8KJH	Brooklyn	X	X
W8NIT	Plymouth	A-S	
K80EF	Fraser	X	A-S
K2RAM/8	Roseville	X	A-S
WA8SEL	Detroit	X	A-S
W8SNE	Almont		X
K8YEK	Troy		A-S
K8YTE	Royal Oak	X	A-S
K8ZOA	Melvindale	A-S	X

(A-S) signifies secondary autostart monitoring channel. Stations may be on other channels or using equipment and/or related gear for various other purposes."

Well, these lists were quite impressive. It was nice to finally get a good idea of the AFSK on AM activity along the East Coast as well as hearing that there is some AFSK on AM activity expected in the Detroit area.

That's it for this month - keep those cards and letters coming folks!
73 ES CUL RG.

*** *** ***

More on FSK for DRAKE T4X

Richard Tashner, WB2TCC

I have read with interest the article, by K1LPS, on FSK for the Drake T4X in the October 70 issue.

He points out however that to shift from 850 to 170 shift it is necessary to either open the cabinet or to reach the side of the T4X to make this change. The enclosed circuit has been in use here for over a year and permits switching of the shift from the loop supply in the TU.

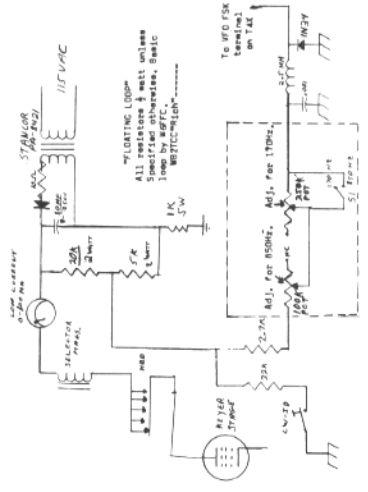
It is basically the well known "floating loop" by Hoff, W6FFC, however with a few additions (shown in the boxed in portion of drawing). The pots provide a variable amount of voltage to the diode shifter. This enables adjusting the shift by merely adjusting the pot.

Adjustment procedure is as follows: Switch S1 is first placed in the 850Hz position, this shorts out the 250K pot. The 100 k pot is then adjusted for 850 Hz shift. Then the switch is opened and the 250K pot adjusted for 170 Hz shift. To change shifts all that is necessary is to throw the switch to the desired shift. This switch may be located anyplace convenient and does not have to be near the T4X.

One word of advise. You will notice as the pots are adjusted the space frequency will change. Mark will also change but only slightly. However you will quickly find a place where the correct shifts are obtained.

One idea for finding the proper shift. At this station the speaker output of the R4A was connected to the horizontal plates of the HO-10 scope and an audio generator set at 850Hz was connected to the vertical plates of the scope. The crystal calibrator of the R4A was turned on and the "transceive switch" on hte T4X was put in the "Xmitter" position. At this point the Xmitter VFO is tuned to zero beat with the Xtal Calibrator in the R4A and then the break switch on the printer is pushed. The pot is then adjusted until an elipse is indicated on the scope. This elipse is known as Lessijous 1-1 pattern and indicates that the tone from the receiver and the output from the generator are equal - or 850 Hz. The same procedure is repeated for the 170 Hz shift by setting the audio generator to 170 Hz.

If you go slowly and carefully the shifts will be very accurate.



RTTY-DX

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

Hello there ...

Murphy, the great equalizer, started us all out with a handicap during the Contest. One hour before it was to begin we checked WWV. The propagation forecast was U-5. Not a very good sign, particularly at the start of a contest. Periodic checks made throughout the Contest came up with even more dire predictions, W-5. WWV forecasts do not go much lower than that and it is a fact that the Contest went on during a severe magnetic disturbance. Most severely affected was the path, North America to Europe, and vise-versa. These being the two most populated areas ham-wise, it put a severe dent in the exchange point build-up possible between the two areas. In sharp contrast, the path to other areas were surprisingly good, and in the broad picture scores will be generally higher, on the average, than last year. We found this to be true in our own case, much to our surprise, since we used the same equipment and put in the same amount of time. Possibly one very good reason for the higher scores was the very sharp increase in activity on Ten, Forty, and Eighty meters by you DX stations. Fifteen took on a large share of the traffic but Twenty, usually the band in which to build up the exchange points, was a very poor performer. It was almost a waste of time to be on it during the daylight hours when Ten and Fifteen were really going strong. It seemed too, that many more stations were active this year. Many of the newer DX stations did a tremendous job in putting out signals on three, four, and in cases, even five bands. I know that all of you join in appreciation of the efforts of CR6CA, 9F3USA, EA7PZ, HI8XRM, ZS6-BBL, & FO8BS, to recall a few. All Continents were active, with good representation for the first time in a few years. JA1ACB, & VU2KV from Asia. HK3SO, WA3HXR/YV5, CE3EX, OA4BR, LU8DR, & PY2CBS from S. America. ZS6BBL, CR6CA, & 9F3USA from Africa, and of course, many Europe and North America if you could poke thru an opening. FO8BS, KH6AX, and scores of the boys down under made sure that there was no famine of Oceania contacts. We will not spoil the fun by getting into individual scores as the Contest Committee will soon have the results available for all to see. We will only mention that there will be "some" scores over the million mark, and perhaps one or two a few leaps over that yet. We think!

A good barometer of DX activity to us is reflected in the issuance of WAC certificates. This month we were overwhelmed, and I know that we all extend our congratulations to the following stations on earning this Award.

Nr. 134	Bo Ohlsson	SM4CMG
Nr. 135	Larry Mallek	K6YUI
Nr. 136	Kermit Slobb	W9BT
Nr. 137	Wolfgang Puenjer	DL8VK
Nr. 138	Ulrich Dieter	DK3CU
Nr. 139	Franz-Josef Bolwin	BJ6ZBA

That station in Romania that is soon to be active on RTTY is Eugen, YO2AFB. We all appreciate the efforts of Uli, DK3CU, who sent a complete machine and TU to that country recently. Uli says that since it must go thru the Customs of several countries before it arrives in Romania it is difficult to say just when Eugen will get things going.

Rene, EA7PZ, recently mentioned that he had a couple of additional machines that he was hoping to get going and place with other Spanish hams. He apparently has been successful in doing this as there has been activity from Jose, EA7NJ and Juan, EA7KF. Both are putting out excellent signals from Savilla.

Jean, FG7XT, recently obtained fourteen practically new Creed machines at what must be the biggest bargain of the Century, Eighteen Dollars, and he will shortly activate several additional stations in Guadaloupe and Martinque. Jean is presently converting them to 45 baud so watch for increased activity from the French West Indies in the near future.

Jean also passes along word that activity is due at any moment from Easter Island by CE0AE, Father David. Some problems with the machine are holding him up at the moment but we anticipate hugh pile-ups once he gets going.

While Pierre, XE1YJ, was traveling around Europe, Paco, XE1WU, got going on RTTY and puts out a wonderful signal from Mexico City. Although Paco is new to RTTY he has been hamming it for about 34 years and he was giving out a Mexican multiplier to some of you in the Contest.

Down South Africa way Jan and Joey, ZS6BBK/BBL have had contact with the following stations, now listen closely, ZS2MI, Marion Island; ZS1ANT, Antarctica; FB8XX, Keguelan; and ZD9BO, Gough Island. All have been using 50 baud and various shifts and Jan indicates that they will be glad to arrange skeds if requested. Jean, F8KI, adds to this by informing us that Maurice, FB8XX is on 14080 every Saturday between 15 and 1600z. Add to this also, the fact that FB8XX has been printed at 20 db over 9 by Gin, Ja1ACB, and you can well imagine that Maurice is not difficult to hear.

You RTTY-DXers really had cause for excitement during the last days of October with the arrival of Hugues, FH8CE on the RTTY bands. To say that this is a rare contact in any mode is an understatement, but on RTTY it is simply terrific. Hugues has been putting out an excellent signal on 20 and 10 Meters usually at around 1600-2000z. From Jean, F8KI, we have word that Hugues is using a Drake TR-3 on AFSK at only 30 watts output and that he has the full line of Teletype machinery, Model 15 Printer, Model 14 Reperf, and Model 14 TD. This is no DXpedition so you should all have an opportunity to contact this rare spot. QSL's can go direct to --

Hugues Langaudin, FH8CE
P.O. Box 289
Moroni, Comoro Is., Indian Ocean

F5BH, Jean-Claude, of Meudon, was the fellow that got Hugues set up and going and was his first contact.

As you may have gathered, Venkats trip to the States has been postponed until the latter part of November or early December. We understand that his itinerary will be about the same, but as time is short you may contact Dusty or myself for any last minute developments. VU2KV was doing a great job in the Contest and in a way he was glad that the trip was delayed as it gave him the opportunity to get into the CARTG Contest which he had missed all previous years due to travel away from home. You are advised of a correction in Venkats QTH. It is -- 102 Jorbagh, New Delhi 3 (not 13) India.

Frank, K2RSR/VP9, now has the call VP9GR, and was active under this call in the Contest.

Newt, K8QLO, informs us that he now has QSL cards for most States for contacts made with EI stationsSend a SASE to Newt at 5725 Lodewyck, Detroit, Michigan 48224. Full information appeared in the May issue.

The recently formed S.A.R.T.G. has come up with the first of a series of Awards for RTTY activities. It is a very beautiful certificate in Five Colors that will brighten the wall in any ham shack. The rules for obtaining it are as follows.

WORKED SCANDINAVIA RTTY AWARD, "WSRY"

Any station that has worked the following number of Scandinavians on Two-Way RTTY, can apply for the "WSRY" Award.

For Scandinavians: 25 QSO's needed
For Europeans (Non-Scandinavians): 16 QSO's needed
For Non-Europeans: 8 QSO's needed

All QSO's after May 1, 1970. All Amateur bands may be used. Send a list of contacts (no QSL's needed) with all information; date, time (GMT), band. Fee - $1.00 U.S. (SKR 5:-), or 10 IRC to:

S.A.R.T.G. Contest & Awards Manager
BO V. OHLSSON, SM4CMG
BOX 1258
S - 71041 FELLINGSBRO, SWEDEN.

The countries/prefixes used in Scandinavia are: LA (Norway), JW (SWALBARD), JX (Jan Mayen), OH (Finland), OHØ (Aland Is.), OX (Greenland), OY (Faeroes Is.), OZ (Denmark), SK/SL/SM (Sweden), and TF (Iceland).

Next month we will announce some additional Awards for RTTY activity available through the efforts of the BARTG, as space limitations prohibits its inclusion at this time. We also hope to post the latest QCA standings, the complete roster of WAC Certificate holders, and the current standings on RTTY-DX. A word about the RTTY-DX listing. It is not necessary to send me any cards or lists of countries. All I need is the number of countries you have worked and the number confirmed. You can do this on the air, by QSP, or by postcard, but please send in your listing. My thanks and appreciation to those who have already done so.

This is the last issue of 1970 and I would like to take this opportunity to again thank all of you out there that have made this column possible. It is you and the information you send in who are the real authors.

TO ALL, BEST WISHES FOR A HAPPY HOLIDAY SEASON. de John

HITS & MISSES

From The Editor and his Mail

This issue completes four years of our publishing the Journal. Thanks to the support of our readers and authors we have grown and made what we hope are small improvements in that time. With this issue we have switched to a "photo composed" type which we think will be more legible, especially since the former type was getting very difficult to print solidly due to extreme wear on old machines. We have a few other improvements we hope to make from time to time but right now a girl to help us with the details and the subscription controls seems necessary to give us the time. Anyone know of a "bunny" that can type?

***

We goofed off again. Flew to Florida for a week and now we are paying for it with a stack of mail. Have patience, it has happened before and we always catch up.

***

We have had several letters asking about including FAX in the Journal. Maybe this is something to think about in the future but as of now we seem to lack space for all of the RTTY articles we would like to run. At an Ontario hamfest last month we met a ham VE3ADO, that has a large number of FAX machines for sale very reasonable. His ad appears in the classified section and I am quite sure he would answer any questions. They are very compatible with existing RTTY equipment.

***

Punched tape can be a handy thing for sending a CQ. However anyone putting on a circular tape and running it over and over again, without listening, is defeating the purpose and causing unneedless QRM. 3 or 4 lines of CQ with your call interspersed often, any machine can print a CQ correctly, but the call often comes out different every time, is plenty to attract a QSO if anyone is listening. If no answer, run a repeat, the more crowded the band the shorter the CQ and we can guarantee better results. Most operators will give up and pass over a long CQ call rather than answer it.

Something else -- the operators name at the end of a CQ can save a lot of embarrassment to fellows like me with a poor memory and by the same token when answering a cq a mention of the name may save embarrassment on the other end.

***

Back issues have always been a problem since we have been publishing the Journal.

When we assumed the publishing in 1967 many readers thought it was to be discontinued and failed to renew so we started with a list of 1200 subscribers and printed about 1500 copies. After several months as the word got around we had a flood of renewals and new subscribers, almost all wanting the subscription to start with the January issue. This soon exhausted our back issues and continued through the entire year.

We increased our print order accordingly and for the most part have been able to supply most issues since 1967. However certain issues have been more popular than others and a few issues are exhausted. The July-August issue of this year, due to accidental spoilage of a number of copies at the printers, has been exhausted. These missing issues cause confusion when we get letters and checks with instructions to start a subscription with a certain back issue, especially when there is one or more issues not available.

We print a list of all available back issues each month. We are happy to supply any available but in the future we can not start subscriptions or renewals, more than two issues back. If other back issues are wanted and are available on the list we will be happy to supply them at the regular 30c each rate.

Our subscription list is now over 2000 paid, including subscribers in 45 foreign countries and this brings up another bottleneck. About half of the subscriptions expire with December issue which is mailed in November, and means that the renewal should be made in December which is a busy month for everybody, including us. A great many forget to renew until several months later which means we have to look up the old stencil, we keep the old ones for three months, pick out the back issues and make a mailing, all of which comes at a busy time. Why not check your stencil address now and if it has Dec. as the date send in your renewal check now! This makes it easier on us and assures that you won't miss any issues.

About 80% of our time is spent taking care of new subscribers, renewals and mailing back issues etc. It is very possible that we may make a mistake and we certainly hope that if something is wrong you let us know.

One last thing, we have no method for billing anyone for subscriptions or back issues and no forms in triplicate for businesses to be billed from purchase orders, maybe we are independent but we feel that anyone can risk $3 in advance and would rather keep the price low rather than increase it and install an office force. If too much money is enclosed we send a refund or if less than a dollar, extend the subscription a month or so. Anything to cut down on correspondence.

The classified ads have been growing and we would appreciate, when possible, that they be typed with upper and lower case type. Those received with all capital letters or hand written must be retyped. This not only takes a lot of time but anything we type is likely to have errors. Obviously we can not pre-check on advertisers and print ads with this understanding. We would like to hear from anyone having unsatisfactory service however so that future ads may be refused.

A few Statistics on the Journal (Compiled mostly because we were interested but you might like to read.)

Subscribers, Oct. 1970 - 2034

(We estimate that about 40% of all subscribers are members of some MARS organization.)

Countries represented. - 45

England, Italy and Germany in that order are the largest foreign groups.

Subscribers by call areas --

1st - 85	6th - 290
2nd - 205	7th - 120
3rd - 105	8th - 280
4th - 195	9th - 200
5th - 120	WØ - 185

Canadian - 65

The difference between total and these figures is foreign, APO, Air Mails etc.

***

Be Broad Minded-

Use NARROW Shift-!

***

Renew NOW -!

RTTY JOURNAL

Information on MITES ?

Having any problems with MITE printers? Another ham has volunteered to help with your problems. Harry March,

WB4HID/3, 1600 FOREST Ave. Apt. 3
Ft. MEADE. MD. 20755

has had 9 years experience in the air force with Mite equipment and attended the manufacturers school. He says; I will be glad to offer readers of the RTTY Journal my help -- this would cover adjustment procedures, schematics and sources of manuals, motors, connectors, etc. Do not ask about connecting the printer to your TU unit, only questions about the machine itself. Answers will be sent in turn and if the problem is with the print please send a sample. Be sure to state the problem clearly. Enclose a stamped and self-addressed envelope for a reply. (Editors note -- this should be a MUST when writing to anyone for information.)

***

A note from Freeman, KH6AX says "I worked 140 stations in the contest in 9 hours, ALL on narrow shift." (Freeman is broad-minded.)

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BACK ISSUES---

The ONLY back issues available are as follows-----

1966- Aug,-Sept,-Oct,-Nov.-Dec,----
1967- No issues-
1968- Jan
1968- Feb,-March,-April,-May,- June,- July-August,-Sept,- Oct,-Dec.--
1969- Jan,-Feb,-April,-May,-June,---- July-August,-Sept, Oct,- Nov,-- Dec,-.
1970 Jan,- Feb,-March,-April,-May,-- June,-Sept,

All back issues are 30¢ each.
RTTY JOURNAL Binders are $2.50 each.
Canada and Mexico $3.00

RTTY JOURNAL

P.O. Box 837 Royal Oak, Mich. 48068

DUSTY DUNN - W8CQ
Editor and Publisher

SUBSCRIPTION RATES 1 Yr, (11 issues)

U.S.--Possessions--Canada-- Mexico

First Class ----$ 3.00 Air Mail ------$ 3.50

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Air Mail- Central- South America 5.00
Air Mail --Other Countries - - - - - 5.50

TELETYPEWRITER; TT 100B/FG, Kleinschmidt model 150, send receive, sprocket or friction feed, 60 and 100 WPM, keyboard and cover, used, excellent $65.00 ea. Automatic "answer back" unit for the #15-19 teletype machines. This is a device which, when tripped, will send a pre-coded signal of up to 21 characters. It may be operated from the sending keyboard, or as on land line, by remote control. You can code in your call, name or whatever you desire. Complete #15 keyboard with answerback unit $12. ea. Squelch adaptor modification kit; used on radio receiver SP600JX17. Consists of squelch adaptor unit, tubes, knob, nameplate, cable clamp, terminal strip, w/100K resistor, .01 discap capacitor, skirt assy, and instruction sheet. Unused $6. per set. Free catalog on request. Atlantic Surplus Sales, 580 3rd Ave. Brooklyn N.Y. 11215.

TELETYPE PICTURES FOR SALE: Volume 2, 16 pages containing 50 pictures $2.00. Volume 3, coming $1.50. Also audio and perforated tapes. W9DGV-a 2210 30th St., Rock Island, Ill. 61201.

FILTERS: In plastic modules, fit standard octal sockets; tune for 2125 or 2975 Hz - $2.95 each. ($5/set); tuned for other frequencies (specify) - $4.95 ea. Dual unit, 2125 & 2975 in one case - $5.50. FAX PAPER, wide variety. RELAYS: Mercury-wetted types; time delay types. Send for list, or what do you need? FREE LIST of teletype, fax and electronics parts. Cooper, POB73, Paramus, NJ 07652.

REFERENCE BOOKS: Tactical Wire Communications Equipment - $2.20; Fixed Plant Wire Systems and Equipment - $2.25; Electromagnetic Wave Theory - $2.95; Fixed Station Communications Equipment - $1.95. (Lesson book FREE with each reference book). All postpaid. FREE LIST. Cooper, POB73, Paramus, NJ 07652.

WANTED TELETYPE: Models 28, 32, 33 and 35 and accessories, printers, etc. We pay freight and highest prices. Cash or trade. Call collect if you have COMPLETE sets to offer. AMBER INDUSTRIAL CORPORATION, P.O. Box 2129 South Station, Newark, N.J. Tel: 201-824-1244.

SAROC, JANUARY 7-10, 1971, Flamingo Hotel Convention Center, Las Vegas, Nevada. Sponsored by Southern Nevada ARC, Inc., Box 73, Boulder City, Nevada. Advance registration $14.50 per person accepted until January 4, regular registration at door, includes Flamingo Hotel Late Show and drinks, Sunday Breakfast, Cocktail Parties. Technical seminars and meetings, ARRL, DX, FM, MARS, QCWA, WCARS-7255, WPSS-3952 and WSSBA. Ladies Program. Flamingo Hotel SAROC room rate $12.00 plus room tax, per night, single or double occupancy January 3 thru 12, 1971. Mail accommodations request to Flamingo Hotel. Mail advance registration to SAROC, W7PRM, Club President, W7PBV, SAROC Convention Chairman.

RTTY ENTHUSIASTS!; How about giving yourself a real treat for Xmas. The Mainline TT/L-2 FSK demodulator with narrow channel filters. There is nothing like it. Custom Built by J & J Electronics, Canterbury, Conn. 06331

PARTS - ALL MACHINES - fast service on all machines from 14s thru 35s. SASE for list. Sell Fred your surplus TTY for highest cash or trade. Typetronics, Box 8873, Ft. Lauderdale, Fla. 33310 W4NYF

CV89/URA8 RTTY CONVERTER in excellent shape $140.00. Model 19 printer only less keyboard as is, $18.00. Will ship. Michael Jones, Rte 1, Box 532, Fortson, Ga. 31808.

WANTED: BARKER & WILLIAMSON rotary inductor #385 or 3852, any condition. Carl Steavenson, WB6RXM, 13638 Sproule Ave., Sylman, Ca. 91342

CHARTER JET FLIGHT TO SAROC. Roundtrip New York City Las Vegas $229.00, depart JFK 10:00 am January 7th. Roundtrip Chicago Las Vegas $199.00 depart O'Hare 12:00 Noon January 7th. Return January 10th. Includes Meals and Drinks aloft, Flamingo Hotel Room three nights double occupancy, Transportation and Baggage in and out of Flamingo Hotel, Dinner Show, Midnight Show, Saturday Buffet Luncheon, Sunday Buffet Breakfast, SAROC Tickets, Tax and Gratuity. $60.00 will confirm reservation, includes one dollar service fee. Final payment due before November 25th. Flight cancellation or written request for deposit refund will be accepted until December 1st. SAROC, Box 73, Boulder City, Nevada 89005.

FM SCHEMATIC DIGEST: Extensive collection of Motorola FM Schematics, Crystal Alignment and servicing information. 136 pages 11 1/2 x 17. $6.50 postpaid. S. Wolf, 1100 Tremont St., Boston, Mass. 02120.

THE ST-6 IS ALIVE and printing at HAL Services. Actual delivery of boards and parts now. It takes only 7 of our cards for a full ST-6; $16.50 includes the manual. Complete parts kit $125.00. Individual parts available for those with a partially stocked junkbox. The manual, with photographs, is available for $3.00 which can be applied to purchase of the full kit. You can order your ST-6 custom wired. Write for details on price and delivery. Shipping charges extra. HAL devices, Box 365RJ, Urbana, Ill. 61801.

RTTY PICTURES FOR SALE. Volume 1, 8 pages $1.00. Volume 2 16 pages $2.00. Over 100 different pictures. Audio and perforated tapes available. W9DGV, 2210-30th. St. Rock Island, Illinois 61201.

SPECIAL PROJECTS, TU's, kits, expertly built to order. Estimates without obligation. Of, by, and for hams. Applied Electronics Laboratories. (W6BD, ex-W6CQK), 1068 Eden Bower Lane , Redwood City, Calif. 94061.

CHANNEL FILTERS for two-tone TU. Brand new Northern Radio 85hz bandwidth. For 170hz shift: 2125/2295 hz, $6.95/pr. 1955/2125 hz, $5.95/pr. Single filters: 1955 and 2635 hz (specify 1st and 2nd choice) $1.95 ea. include postage for 3 lbs per filter. Matching 85 hz discriminator supplied with each filter. TT-63 Regen Repeater, $25. Collins 18S4, 10 channel xtal control Aircraft xmtr (200 watts) & rcvr, 2 to 18.5 mhz, $25. Technical Material Corp. model CFA-1 Dual Diversity (two front ends, one loop keyer) audio TU, built in oscilloscope, 3 1/2" rack mount, excellent condition, $120. Relay panels: over 20 telephone type relays and 2 stepping switches in stylish hinged-door rack mounting, $12.50. Laurence H. Laitinen WA6JYJ, 217 Orchard Rd., Felton, Calif. 95018.

FL-1 FILTER-LIMITER kit. HAL offers the filter limiter of the Mainline ST-6 for use with any TU. 3 pole Butterworth filter and 709N OP AMP on 3 x 6 G10 glass PC board. Complete kit including toroids and 12 pin edge connector, $11.00. Requires -6 or - 12 VDC. Write for more information on HAL RTTY products. HAL Devices, Box 365RJ, Urbana, Illinois 61801.

FOR SALE: MDL 19-$65.00, MDL 15-$45.00, both sync motors, commun. keyboards and type, table and power supply. 10 Klienschmidt TT 230/FG typing reperfs, very nice but 100 WPM, a steal for $10. each. Mdl. 14 typing reperfs, comm. keyboard and type with table $30. All above FOB. F500B-14 1.4 khz mechanical filters for 51J4 $25. ea pp. New friction feed platen rubber for 15/19 - $4.50 PP. LMU motors for 28KSR-$20. FOB. Lots of 14-15-19 parts, pieces etc. What do you need? Ed Bruns, W3EKT,, 8308 Longfellow St. New Carrolton, Md. 20784 (301- 459-5325)

TI SN7209L (round TO-5), SN72709N (DIP) OP AMP, $1.25 ea. Molex DIP sockets 60c ea. Cinch 50-12A-20 12 pin edge connectors $1.70 ea. Motorola MC890P/MC790P $2.00 - MC724P, MC789P $1.05 ea. Other MRTL in stock. HP2800 hot carrier diodes, 90c ea. 12/$10.00; matched 4/$4.25. Fairchild 900, 914 60c ea. 923 90c. All items new and fully guaranteed. Get our catalog. Hal Devices, Box 365RJ, Urbana, Ill. 61801.

SPACE/ONE SOLID STATE RTTY demodulator with meter tuning 850/170 switchable from the front panel. Heavy duty loop supply with provisions for adjusting loop. Electronic keyer stage supplying plus and minus voltages with provisions for adjusting to 1 MA. when driving diodes. Regulated power supply with reserve capacity. $124.95. FOB. J & J Electronics, Canterbury, Conn. 06331.

FOR SALE: Heath SB-101 $325, HP-23 with SB-600 spkr $45, SB-200 $179, SB series CW filter $11, SB-301 $239, 6 and 2 meter converters for the SB series $16 each, sixer $25, HR-10 $39, DX-60 $49, HG-10B $27, Comdel CSP-11 speech processor $59, Eico 723 $29, Ten Tec PM-1 $29. Before 3 p.m. call (615) 647-2891. Fred Harris, WA4URA RFD 4, Box 122, Clarksville, Tenn. 37040

ST-5 CIRCUIT BOARDS now available. Both cards drilled G10 glass board, $6.00. Boards and all parts, less cabinet and meter, for the ST-5 $43.50. Add shipping charges. Write for parts list. HAL devices. Box 365RJ, Urbana, Ill. 61801.

MODEL 19 VERY GOOD Condition, with auto carriage return and line feed. Teletype Co. power supply. $50. Must pick up. E. Shafer, W8MSG, 3479 Kersdale Rd. Cleveland, Ohio 44124

FEW 2AP1-902 SHIELDS LEFT $2.50 PP. - Complete set A53-C2345 for TTL-2 unused, make offer -- Lambretta TV200 Motorscooter, good, lots of extras, trade for good receiver or ?. R.N. Hayes, W8CL, 218 11th St. S.E. Massillon, Ohio 44646.

INFORMATION WANTED on Northern Radio Co. Dual F.S. tone converter. Model 1, Type 152. WB8BOI, Mike, 1951 Burns Ave., Ypsilanti, Mich. 48197. (313) 483-7384.

TELETYPE R.F. MONITOR navy model CHZ with Xtals, 115 V or 230V with manual, checks shifts in cycles per second. $25.00. E. Shafer, W8MSG 3479 Kersdale Rd. Cleveland, Ohio 44124

SELL: NEW 19 KBD complete with key tops, $35.00. 255A Polar relays $2.50 ea. Postpaid, Dowkey Electronic TR switch $8.00. Johnson 6N2 converter, $10.00. K8CRE, 9120 Cole Rd., Vassar, Mich. 48768

HAL RT-1 SOLID STATE TU/AFSK generator based on units in July 1969 "73" and September 1969 QST. All circuitry including PS on 3 x 6 G10 glass PC board, 850 and 170 Hz shifts, CW ID zener protected transistor loop switch, reversing switch, high and low impedance output FET audio. $40. Kit form. Cabinet $6.50 extra. The RT-1 is being used by Massachusetts and Illinois CAP units. Board only $4.50. 3 pole Butterworth filter boards, drilled 3 x 6 G10 glass $2.50. Write for details. HAL devices, Box 365RJ, Urbana, Illinois 61801.

LORENZ TYPE 15 TELEPRINTER, sync motor, 60WPM, pre code (answer back) floor cabinet $50.00. Western Union 14-15-19 teletypes cheap. Read ""Ekectron" on how to copy satellite maps on our cheap FAX set. Harry Lang, VE3ADO, 12 Orchard Dr.,, Port Colborne, Ontario, Canada.

WANTED: COLLINS STATION CONTROL 312B4, give price - condition and serial number in reply to Ed. Spencer, W7TMF, 1254 Heather Lane S.E., Salem, Oregon, 97302, Phone 503-364-1435.

TT/L-2 WITH OSCILLOGRAPHIC Display, 850 and commercial 425 cps shift filters. New. $250. Heath IOW-18 Oscilloscope - new $100.00. Heath IOW-14 Oscilloscope - new - $300.00. Heath IGW-18 Sine-Square Generator - new - $70.00. K2MVR.

CV-57/URR DEMODULATOR: Manual and cable incl[illegible] shift. Aut[illegible]ling. 8170 S. Willow Dr., Oak Creek, [illegible]

SOLD----------

NAVY TELETYPE CONVERTER model CV57 for 455 KC IF. Like new with all cables and manual and receiver unit. $95.00. E. Shafer, W8MSG, 3479 Kersdale Rd. Cleveland, Ohio 44124

MODEL 19 EXCELLENT condition $125; TELETYPE test set TS-917A/GG distortion analyser; Motorola 2 meter FM mobile T43GG/V complete accessories $75; Diodes 1N4007 1000 PIV 1 amp 23c ea. $20/100 postpaid. Charles Copp. W2ZSD 6 Northfield Lane, Westbury, NY 11590

POLAR RELAYS with sockets; cleaned, tested and adjusted. $5.00 ea. WB6CXE R.H. Ebert, 4171 Donald Ct. San Diego, Calif. 92117

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HomeBrew PAPER WINDER

Jim Studer, W9RYI

Drawing not to scale. All dimensions approximate - make it to fit. Motor 1-5 RPM. Size of dowell on motor shaft can be changed to obtain speed change.

Drive Belt: Heavy phono type drive belt. Should be round. Rubber band or flat drive belt can be used but slots must be deepened.

Paper must line up with take up reel and be started straight, otherwise it will wrap up to the side and eventually jam.

Slots in wooden dowel can be carved with a sharp pocket knife.

Connect take up motor across machine motor circuit 2-3 RPM of take up drum will follow tape transmission at 60 WPM.

Nothing critical about above parts or dimensions - scrounge all possible - My first one cost about $2.60 for a surplus motor and the drive belt.