



'Joey' ZS6BBL

'Jan' ZS6BBK

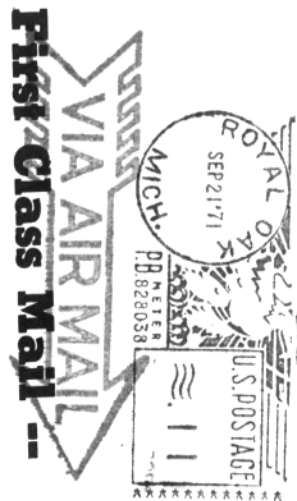
'Bill' ZS6UR



'Digby' ZS6BLV

'Chris' ZS6BCT

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Volume 19 No. 9

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1971 BARTG Contest RESULTS-

1. IICGE	141498	30. W6AEE	24440
2. IICAQ	127136	31. WA6KDI	22974
3. ON4CK	108304	32. WB6SCH	22534
4. IT1ZWS	106954	33. WAOATY	22032
5. DL1VR	99246	34. DJ1XT	21868
6. IICWX	85590	35. W7TZL	21182
7. W3KV	85410	36. ON5WG	20768
8. DJ8BT	82720	37. DM3RYA	17710
9. VE7UBC	74460	38. JA1ACB	16408
10. DK3CU	72518	39. ZL2ALW	15600
11. WA2YVK	69840	40. K1YGF	14700
12. IIEVK	66830	41. WA6TLA	14580
13. DJ6JC	63770	42. SMOFO	14050
14. ON4BX	58890	43. GB2SM	12600
15. F9RC	52220	44. PY2CBS	12240
16. KP1XHG	52000	45. DL8CX	9804
17. OK1MP	37990	46. I1AMP	9716
18. WA6WGL	37700	47. HA5FE	9384
19. ZS6BBK	37038	48. SM4CNN	7040
20. E15BH	36360	49. WB6QFE	6940
21. KZ5LF	34980	50. JA1FFX	6524
22. UK4FAD	31610	51. W3CIX	4872
23. I1MPK	30324	52. PY2DDS	4320
24. F5KK	30156	53. CE3EX	4000
25. K1LPS	29304	54. WB6RXM	3220
26. VK3DM	28704	55. YQ2AFB	2030
27. SM7BBJ	28566	56. W8TCO	1736
28. DLOEL	28032	57. OZ8O	1350
29. W5EUN	27132		

Results-3rd

RTTY WAE Contest- 1971

Single Operator

Europe	I1CAQ	27.180
North America	VE7UBC	29.858
South America	PY2CBS	16.130
Africa	no entry	
Oceania	VK2KM	15.375
Asia	JA1ACB	7.967

Continental leaders

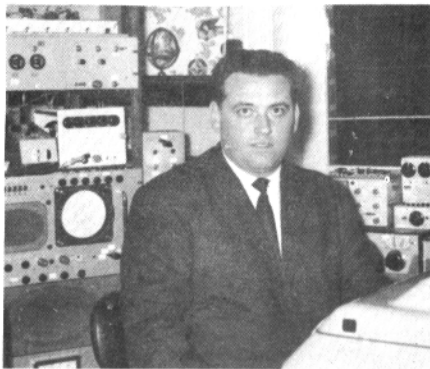
Europe	Top	Non-Europe	Ten
I1CAQ	27.180	VE7UBC	29.858
IT1ZWS	24.308	WA6WGL	19.224
I1CGE	22.576	PY2CBS	16.130
DL1VR	20.034	W2LFL	15.576
EA7PZ	17.228	VK2KM	15.375
SM4CNN	15.500	WA3KEG	12.874
DM2ERN	14.688	WA2YVK	11.988
DJ9MJ	10.032	JA1ACB	7.967
DL8VX	8.214	KL7GRF	6.420
F9RC	6.577	W1GKJ	6.214

NORTH AMERICA

Alaska	KL7GRF	6.420	WA2YVK	11.988
			W2VAQ	4.732
			K2RYI	408
Canada	VE7UBC	29.858	WA3KEG	12.874
			W3CIX	6.118
USA			W3KY	759
W1GKJ	6.214	WA6WGL	19.224	
W1KQY	5.474	W6AEE	896	
K1YGF	90	W7CBE	640	
W2LFL	15.576			

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'ARTHUR ,ON4BX, DXCC No. 1



Sometimes things are not like they seem. Several months ago we announced that Jean FG7XT was the first winner of DXCC on RTTY. However we have never received any cards from Jean for checking and Arthur 'ON4BX' has submitted more than enough to qualify so our award #1 plaque will be sent to him. Congratulations to Arthur and we expect several others to qualify very soon. Send John the cards and we will supply the plaques. ***

Overseas Autostart Net

Ben McGlashan, W6GY, and his pal Cal Smith were in the garage installing a mobile KWM2 in his new car. Kae, Bens XYL was standing in the doorway calling him, to answer the RTTY bell that was loudly ringing in the shack. Ben strolled in and watched the new model 32 which had started printing by a signal from Honolulu. It was from Freeman, KH6AX, and was a priority RTTY telegram from the Honolulu wing of the Civil Air Patrol addressed to national headquarters of CAP at Maxwell Field in Alabama and required a priority answer.

This auto-start feature is at both ends of the circuit on the fifteen meter band, operated on narrow shift of 170 Hz. In order to have stable stop and start each unit is Xtal controlled. Ben is a retired radio station owner and has been a ham for 52 years. Freeman is a Yacht Broker in Hawaii and has been a ham for 60 years, starting in California in 1908.

Today at 73 he is a 45 wpm CW operator and an expert on the green keys and also on SSB. If you vacation in Honolulu calling on Freeman is a must, Daily eyeball visits with hams are the vogue at Freemans. If the collection of Freemans QSL cards is available the eyeballs will get an eyefull also

*** RTTY JOURNAL

A Phase Locked Loop

AFSK Detector Demodulator--

ED WEBB, W4FQM/9

P O Box 17

Schaumburg, Ill. 60172

///

(We are very pleased to publish this article on a new type of terminal unit. Produced by the author under the name of "WCI" it has shown a great deal of promise by the few that are presently using it. Boards are available also from the author. As always, when writing authors, a SASE envelope is standard courtesy.)

///

The Phase Locked Loop AFSK detector represents an entirely new approach to RTTY demodulation. It uses no toroids or LC tuned circuits in the classical sense. It is very simple and the entire TU is on two small 4" x 4" PC boards. It will work with signals of 6DB signal plus noise to noise ratios or lower. It has no tuning scope provision as none is needed. A pair of light-emitting diodes provide all of the tuning indication necessary.

It has these features:

1. Automatic shift selection allows it to automatically copy any shift from 150 HZ to 1000 HZ without any manual switching.

2. Automatic Frequency Control allows it to automatically lock in and follow a drifting signal up to plus or minus 500 HZ.

3. Has a form of automatic threshold corrector.

4. Has anti-space.

5. Has Autostart with solid-state printer motor control

6. Has 170 volt loop supply coupled with extremely sharp selector magnet pulses and a constant current selector magnet driver.

7. Will operate with SSB audio pass bands (low tones) or normal RTTY tones at the flip of a switch.

8. Has noise squelch so that machine does not print on noise in absence of a signal.

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A PHASE LOCKED LOOP AFSK DETECTOR

As the Phase Locked Loop is a very linear broadband FM demodulator or detector, it naturally makes an excellent AFSK detector for RTTY. Because the characteristic of broadband detector is desired, no predetection filtering is used with the exception of the receiver RF/AF passband combination and C which limits the loop response to 450 HZ. The PL will lock on signals with a 6 DB S/N ratio.

The PL detector has a capture range of about 1 KHZ and a lock range of greater than 1.2 KHZ. Its output is fed through a 4 section RC ladder filter that removes the VCO carrier component from the demodulated information. The filter f is high enough so as not to induce unnecessary wave shape distortion. The output of the ladder filter provides very little post detection filtering; rather its main function is a scrubbing action for the demodulated information. The output of this ladder filter is fed to the inverting input of an op-amp and the same information is passed through a single section RC low pass filter where it is integrated and then fed to the non-inverting input of the same op-amp. The op-amp has in excess of 100 DB gain at these frequencies and thus functions as a tracking comparator to provide pulse shaping as well as amplification. The output of the tracking comparator is fed to a two section low pass RC ladder filter with a 6 DB point of 28 Hz. The output of the filter is fed to an IC Schmidt Trigger that has an output rise time of one microsecond. The Schmidt Trigger input trigger level is set to be at the 50% applied input pulse height so that it does not induce any pulse width distortion in the process of reshaping the original pulse.

The output of the tracking comparator is also sampled through a differentiating network that functions as a single section RC high pass filter with a 6 DB design point of 200 HZ. These pulses are then applied to a voltage doubling rectifier and filter. This negative voltage is then used to bias off the Schmidt Trigger in the presence of random noise associated with no signal being received or a signal too weak to provide

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nected to an isolation diode that connects to the NC keyboard contacts. Various other circuits, such as FSK and AFSK units, can also be keyed by the KBD contacts through additional isolation diodes.

This was done as the TU is used with a transceiver than has an FSK circuit on the VFO and it was undesirable to have the FSK circuit activated by received signals breaking the loop circuit. The RIT control is used to offset the receiver to obtain the necessary AFSK tones for the TU.

A simple autostart circuit is provided that will respond only to shifted signals. Nothing fancy, but it works well and has a triac to control the printer motor instead of the usual large contact relay driven by a smaller relay. The "Magtrac" is driven by a DTL/T L 5 volt logic level from Another Schmidt Trigger. The "Magtrac" will handle up to three amps continuously and greater than 12 amps on motor starting.

Also provided is a keying circuit for the -15 volt FSK keying voltage in the Signal One CX-7. Since the FSK on the CX-7 is upsidedown by amateur standards, an inverter is used to turn it right side up. An electro-optical isolator keys the -15 volt FSK voltage on Pin 9 in P 6 on the back of the Signal One. A front panel control sets the FSK shift and is read on the nixie readout.

12 VDC at better than 0.1% regulation at 50 MA is required for the detector and processing circuitry and a 170 volt loop supply is used. The loop supply should have a 250 MA capacity and is like the one used on Irv's (W6FFC)ST-6.

Initial Set-Up and Check-Out

For the set up you will need a VOM and a frequency counter or oscilloscope and calibrated AF oscillator. These last two items can be used to read frequency in place of a counter. The oscilloscope can also be very helpful should you have to go "pulse hunting".

1. Plug in the machine motor, keyboard and selector magnets. Plug in the AC power to the RCT. Do not connect your receiver to the RCT at this time. Function switch should be in autostart. Mode switch in SSB.

2. Connect a counter to TP-2 of the detector board and make sure that the mode switch is in SSB. Adjust R5 for a counter reading of 1500 HZ. This is the VCO center frequency adjustment for SSB mode.

3. Place the mode switch in normal and adjust R6 for a counter reading of

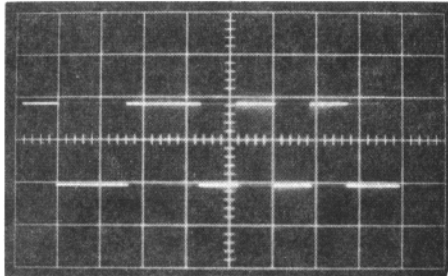
2500 HZ. This is the VCO center frequency adjustment for the normal mode.

4. Now connect your receiver 500-600 ohm audio to the RCT input. Set the volume at a comfortable level and tune to a clear frequency. The noise may trigger the autostart on, but don't worry. Now adjust the noise squelch pot R16 just to the point where the machine stops printing on impulse noise.

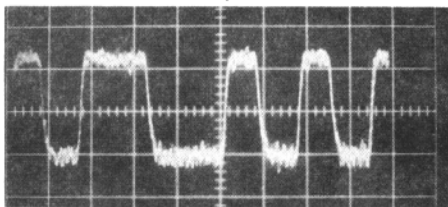
5. Place a 20,000 ohm per volt VOM or VTVM from TP-3 on the SMD board to ground and adjust the loop current adjust pot for a reading of 3.75 VDC. You now have 60 MA in the loop.

6. If you are using an SSB receiver or transceiver, use the SSB mode and place the receiver/transceiver in LSB. Place the RCT in the SSB mode and tune to a RTTY station so that you can hear both tones. The RCT will do the rest.

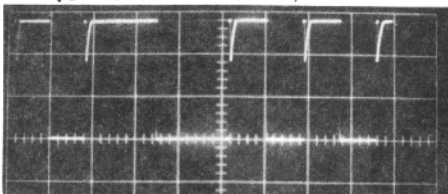
If you are using a receiver that has



125 Hz shift 150 WPM
SCHMITT TRIGGER OUTPUT AT TP5
10MS/CM X 5V/CM Y



PL² DETECTOR OUTPUT AT TP 3
10 MV/CM X 100MV/CM Y



SELECTOR MAGNET CURRENT.
PULSE AT TP-3 on SMD CARD
10 MS/CM X 1V Or 20MA/CM Y

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an AF² passband of up to 3 KC, then you can use the normal mode on the RCT.

Sources:

1. The PL2 (NE565K) and the comparator (N574IT) are available from the Signetics Corp. 811 East Arques Ave., Sunnyvale, Ca. 94086. NE565K is approximately \$11.00; the N564IT is approx. \$3.00.
2. The Schmitt Trigger, type TAA-560 is available from Amperex Electronics Corp., I.C. Division, Providence Pike, Slatesville, R.I. 02876. TAA-560 is approx. \$3.00.
3. The "Magtrac" type 501QPCX-1 is available from the Magnecraft Electric Co., 5575 N. Lynch, Chicago, Ill. for \$16.80.
4. The 12 VDC regulated power supply model LZS-11 is available from Lambda Electronics Corp., 515 Broad Hollow Road, Melville, L.I., New York, 11746 for \$38.00.
5. The Iso-Lit 1 is available from Litronix Corp., 19000 Homestead Road, Vallco Park, Cupertino, Ca. 95014 for about \$4.00.

References:

1. IRE Proceedings, 1958 Conference on Telemetering. "Phase-Locked Demodulation in Telemetry Receivers" by D. D. McRae
2. "Radio Telemetry" by M.H. Nichols and L. S. Rouch
3. Apnote D41, LIN-023-110, 10M Phase Locked Loop 565, Signetics Corp.
4. Apnote D45, LIN-010-80, 35M High Performance Operational Amplifier 5741, Signetics Corp.
5. Apnote Type TAA-560, Level Detector/ Schmitt Trigger by Amperex Electronics Corp.
6. Apnote Iso-Lit 1, Electro-Optical Isolator by Litronix, Inc.

WHAT IS MARS?

The Military Affiliate Radio System (MARS) is an organization of licensed amateur radio operators who are interested in military radio communications.

WHAT DOES MARS DO?
MARS creates interest and furthers training in military communications.

Provides an additional source of trained volunteer radio communication personnel and a system-in-being as an auxiliary means of communication instantly available to military commanders during local or national emergencies.

Provides a volunteer facility for handling personal, third party, moral type traffic between military personnel overseas and parents, relatives, and friends at home.

HOW DOES MARS OPERATE?

MARS member stations meet periodically in scheduled nets on military frequencies outside the amateur bands for the purpose of instruction in the use and modification of military communications equipment, and for the handling -- as an aid to training -- of MARS administrative, third party and, official emergency traffic when called upon by proper authority.

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HOW WOULD I BENEFIT?

By receiving a membership certificate authorizing operation on military -- MARS -- frequencies, operating manuals, and operating crystals as available. By receiving on-the-air training in military communications procedures and instruction in the use and modification of military communications equipment.

By becoming eligible for selected electronic courses offered by the U.S. Army Signal School, U.S. Navy Correspondence Course Center and the U.S. Air Force Institute upon completion of 6 months active membership.

By receiving, after 6 months active membership, excess and obsolete electronic communications equipment and supplies for experimentation, modification, and cannibalization. Issue of such items is based on availability of equipment, length of membership, degree of participation, and possible assigned mission of individual activity.

By receiving credits for MARS participation toward retirement in the Reserve Military Program if you are a military reservist.

By receiving a MARS issued certificate to aid in obtaining a military communications assignment upon enlistment in the Armed Forces.

HOW DO I JOIN?

16 years of age or older.

Hold a valid amateur radio license issued by the Federal Communications Commission or other authorized agency outside the jurisdiction of the FCC.

You may join either Army, Navy, or Air Force MARS but you may not join or belong to more than one MARS service branch at the same time.

Write to the Office of Chief Of Mars,
ARMY - Room 5B960 or
NAVY - Room 5D564 or
AIR FORCE - Room 5B543

The Pentagon, Washington 25, D.C.
request the address of the Director of the office in your geographical area.

COMING - BARTG CONTEST

See Last Month for Details

OCTOBER 1971 7

The ICARUS - ID. Versatile Station Identifier.

Part 2

Dr. FRANK E. STEWART - K5ANS
Bldg. 8 Box 815
Cooke County Jr. College
Gainesville, TX. 76240

APPENDIX

Karnaugh Mapping

As mentioned previously: (a) the Karnaugh map of fig. 2 allows one to determine quickly which counter states are all high for any particular bit; (b) it takes six AND gate diodes to decode any particular bit; and (c) as demonstrated in fig. 3c, if fewer than six diodes are used, several bits will be decoded simultaneously. The following are general rules regarding multiple decoding: 6 diodes decode 1 bit; 5 decode 2 bits; 4 decode 4 bits; 3 decode 8 bits; 2 decode 16 bits; and if only one is used, 32 bits will be decoded. Obviously if no AND diodes are used at all, the cathode of the OR diode will be high for the entire time IN is high: all 64 bits.

The only secret to Karnaugh mapping is to determine which bits may be simultaneously decoded by a single AND gate. Only "adjacent number groups" of either 2, 4, 8, 16 or 32 bits may be so decoded. Adjacent numbers within one of the four large squares of fig. 2 are either (a) side by side, (b) one on top of the other, or (c) at opposite sides of the square. For example, bits 2 and 10 are, by the latter criterion, adjacent. Counter connections for both numbers are identical except those to 8Q and 8-Not Q. Adjacent numbers may be simultaneously decoded by a single AND gate by simply omitting those counter connections which differ among the adjacent numbers. In fig. 2c, no connections are made at all to the 8Q and 8-Not-Q counter inputs.

There is a fourth criterion numbers may satisfy to be called adjacent: (d) they may occupy corresponding positions in adjacent large squares. For example, by rule (b) numbers 20 and 28 are adjacent; so are 20 and 52 by rule (d). By an extension of rules (b), (c) and (d) numbers 20, 28, 22, 30, 52, 60, 54 and 62 constitute an 8-member group of adjacent numbers which are simultane-

ously decoded by the first AND gate in fig. 7; diode connections are made only to those three counter inputs which are identical for ALL EIGHT members of the group. Similarly, gate 2 decodes numbers 52, 60, 54, 62, 36, 44, 38 and 46.

One subtle point should be emphasized. The number 20 is adjacent to 52; however 20 is NOT adjacent to 36 because these two numbers are in non-adjacent large squares. There is absolutely no way 20 and 36 can be decoded with a single AND gate unless numbers 4 and 52 are decoded also; the numbers 4, 20, 52 and 36 do indeed constitute a 4-member group.

One begins a mapping by first deciding which bits should be decoded. The author decodes those bits corresponding to either a RTTY spacing condition, or part of a Morse dot or dash. Bits to be decoded should be underlined. This has been done in fig. 2 for those bits decoded by the matrix in fig. 7. The remaining section of the Appendix will discuss how the matrix of fig. 7 was programmed. Before continuing, the reader should review carefully the first half of The diode Matrix section.

Each of the author's 64-bit RTTY matrices can be programmed to send as many as eight RTTY characters, with the Start pulses occurring during bits 2, 8, 18, 26, 34, 42, 50 and 58. In order to provide a natural pause between the CW - ID and the Figs. - Blank - H the author decided to let the Start pulse of the Figs. character occur during bit 18 rather than 2 or 10. Since a Stop pulse occurs during bit 42, it does not matter whether bits 42-through-63 are decoded or not. Indeed, some or all of them should be decoded if doing so results in a savings of diodes.

Gates 1 and 2 have already been discussed. All eight numbers in each of the two large ellipses are adjacent by rules (a), (b), and (c). By rule (d) all 16 are adjacent and, therefore may be decoded by a single 2-diode AND gate (gate 3). All the numbers in the third large square are in a "don't care" category, but are decoded, when convenient, to save diodes. Gate 4 decodes all the adjacent numbers in the two horizontal ellipses. Finally gate 5 decodes bits 51, 50, 59, 58, 35, 34, 43 and 42.

Fig. 7 (excluding the Stop gates) represents only one of many possible solutions to the problem of program-

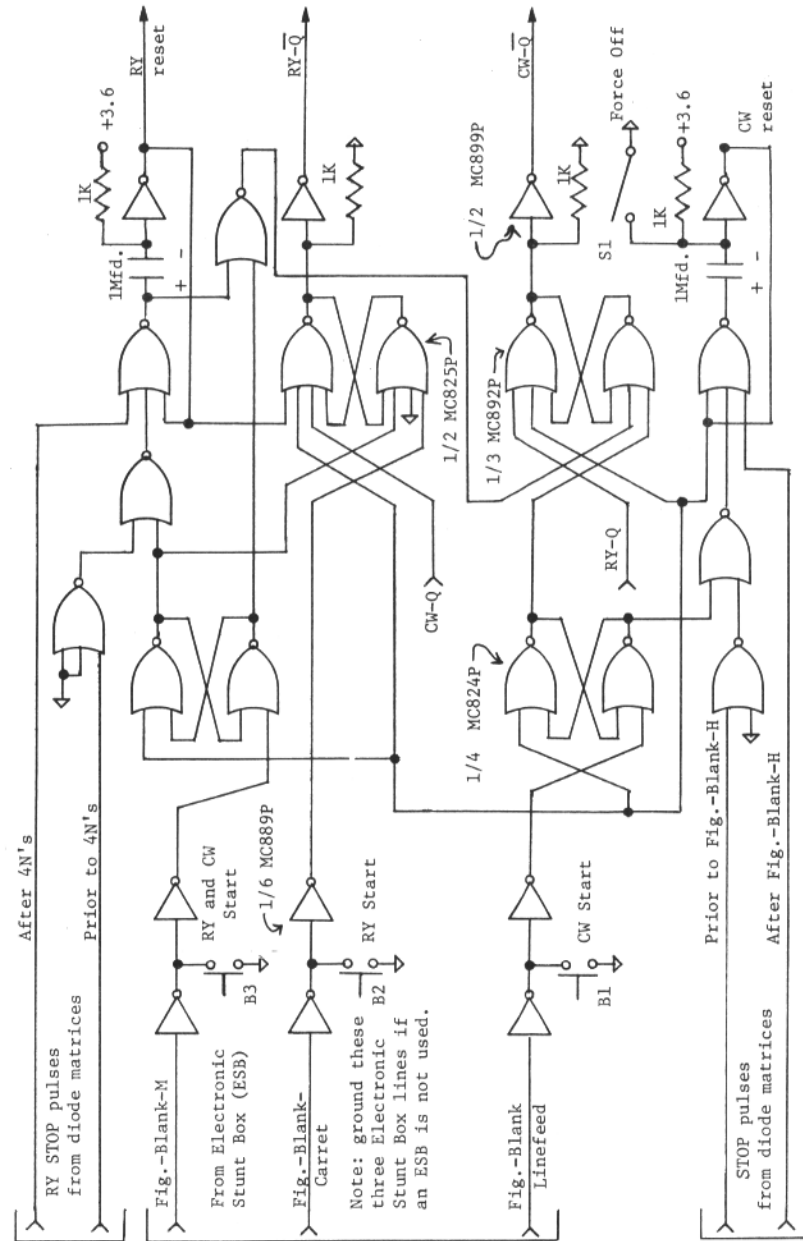


Fig. 6. A very versatile RTTY-CW Control circuit. 1-MC825P, 1-MC899P, 2-MC892P, 2-MC824P. The 1k resistors are part of the dual-buffer (MC899P) I.C. packages; one need not add them externally as discrete components. The N's and the "Fig.-Blank-H" are not sent if B1 or B2 are pressed.

RTTY theory & applications.

RON 'RG' GUENTZLER, W8BBB
Route 1 Box 30
ADA OHIO, 45810



2METER PRE-AMP

I recently had need for a small, mechanically - stable, well - shielded, low-noise, 2 meter preamplifier.

The first three requirements were met by using a Pomona 2397 "Black Box" (Allied #885-0582, \$2.25). It is a cast aluminum box measuring 2.2 x 2.8 x 5.7 cm. Because of the small size, direct wiring rather than a printed circuit was used; this may partially account for the good noise figure obtained.

There are three important contributors to the NF (Noise Figure) of a preamp:

1) **The gain of the preamp and the NF of the stage following it.** This preamp has a gain of 15 db which is adequate so long as the unit it is feeding is reasonably good; I normally use this preamp with a converter having an NF of 3.5 dB.

2) **The transistor.** The RCA 3N159 has a respectable NF rating. It is selected by the manufacturer to have a maximum NF of 3.5 dB and a typical NF of 2.5 dB at 200 MHz; the performance will be better at 147 MHz. The 3N200 has specifications that appear worse, but they are obtained at 400 MHz; at 147 MHz it is as good as the 3N159.

3) **The input circuit.** The best transistor is worthless unless a low-loss input circuit is used. The best input circuit coupling arrangement is the "tapped capacitor" and the worst is link coupling. A good coil must be used. This circuit uses the JFD LC374 (Allied #827-1084, \$4.05.) It is a combination of a piston capacitor and an air supported, silver plated coil.

The circuit is shown in Figure 1 and a partial parts layout in Figures 2. C2 and C3 provide the input coupling and present the proper "turns ratio" for impedance transformation as well as providing most of the capacitance for resonating the input circuit. They should be silver micas. L1 and C1 are the JFD LC374. C1 is used mainly to physically support L1 and one transistor lead, but

it does provide a means for adjusting the resonant frequency of the input circuit. If all is proper, the input circuit should resonate with C1 near to its minimum capacitance.

A dual-gate MOSFET was used because it does not require neutralization (so long as adequate shielding, etc., are provided); this eliminated one coil and a lot of trouble. The 3N159 is the lowest noise RCA unprotected dual-gate MOSFET; because it does not have internal gate protection, caution in handling should be observed. Of the RCA protected dual-gates, the 3N200 appears to have the best NF specification. Dual-gates from other manufacturers might be just as good, or better - if you are unsure, use the RCA devices - they are good. (Don't use the 40673!)

The 3N200 has higher input and output capacitances than the 3N159. This circuit was optimized for use with the 3N159. One 3N200 was used in place of a 3N159; the NF was the same, but the input and output tuning required less capacitance. If a 3N200 is going to be used, you might want to use an 8 pF silver mica for C2 and a 12 pF silver mica for C3; although the values shown did work with the 3N200, they "just made it" at 147 MHz.

Several dual-gate MOSFETS were tried, first in a preamplifier using an "ordinary-type" input coil, and then in this preamp using the JFD tank. Typically, the NF was 0.9 dB lower in this circuit; e.g., 3.0 dB in the first circuit, 2.1 dB in this circuit. (Both circuits used the tapped capacitor arrangement. The difference between the tapped-capacitor and link-coupling was dramatic!)

As can be seen in Figure 2, C4 and C5 are button mica capacitors. They support two of the transistor leads. Their values may seem small, but these values approximately series-resonate the transistor lead inductance.

The value of R1 was optimized to give minimum NF with 10 V dc supplied to the preamp. However, if other considerations are important, it can be increased

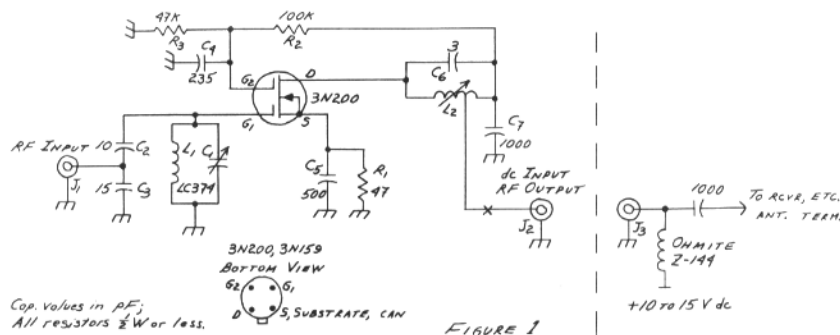


FIGURE 1

Parts List

- C1 - See L1
- C2 - 10 pF silver mica.
- C3 - 15 pF Silver mica.
- C4 - 235 pF mica button
- C5 - 500 pF mica button.
- L1 - JFD LC374 tank circuit (contains C1).
- L2 - 6 turns #22 enamel on a 5 mm diameter slug-tuned form; tap at 1 turn

in value. All resistors are 1/2-watt carbon, but 1/4 watt, or smaller, might be better from a physical size standpoint.

The output tank is a conventional slug-tuned coil, 5 mm in diameter, with 6 turns of #22 wire, taped 1 turn from the "cold" end. Depending upon the coil form and slug characteristics, C6 might have to be changed in value to obtain the proper resonant frequency.

It was considered undesirable to provide a separate "input" for the dc feed because of the small physical size of the preamp. Therefore, dc power is fed thru the output coax. An arrangement for feeding the dc into the coax is shown on the right side of Figure 1. If direct dc feed is desired, C7 can be replaced by a feed-thru capacitor (Centralab FT-2300, Allied #748-3508, \$0.75); then, a 1000 pF ceramic capacitor should be inserted in series with the output connector at the point indicated by an "X".

In order to assure good contact between the coax connectors and the box, the threads in the connector flanges were drilled out, and the box was drilled and tapped for 4-40 machine screws; the screws projecting thru the box provided a good means for obtaining good points. The most difficult part of the construction was mounting the connectors; the Pomona box can be obtained with connectors, but the cost is relatively high.

Alignment is quite simple, Adjust C1 and L2 for maximum signal; then adjust C1 for minimum noise figure. (Note that tuning can be accomplished from the out-

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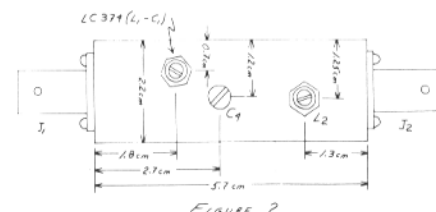


FIGURE 2

side with the cover on.) If noise measuring equipment is not available, the approximate minimum NF can be obtained by tuning C1 on the low frequency side of resonance (run the piston into C1); either tune for approximately a 10% decrease in output signal or turn the piston into C1 about 1/2 turn.

The good results were obtained by using the Pomona "Black Box" (actually, it is blue), the JFD tank, and the "tapped-capacitor" input circuit. If you are not willing to buy the JFD tank circuit, the Pomona box, and a good transistor, don't bother building the preamp!

References:

1. James K. Boomer, W0VDC, "Noise Considerations in Receiver Design," QST, Vol. 49, No. 6, 1965 JUN, pp. 45-49.
2. Donald W. Nelson, WB2EGZ, "Deluxe MOSFET Converters for Six and Two Meters," Ham Radio, Vol. 4, No. 2, 1971 FEB, pp. 41-47.
3. William A. Rheinfelder, DESIGN OF LOW-NOISE TRANSISTOR INPUT CIRCUITS, Hayden Book Co.: New York 1964.

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RTTY-DX

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



Hello there . . .

The big event since our last meeting here was the 1st SARTG World - Wide DX Contest. It came off on schedule of course but the band conditions were deplorable. To a great extent however, this negative factor was more than made up by the number and enthusiasm of the participants. So much so, in fact, that at times the big signals from YBOAAO, EA8CI, and 9J2ED, were impossible to copy due to the tremendous number of callers right on their frequency. Finally Fred, YBOAAO got things under control by announcing that he would only answer calls off his frequency. After that the terrific din finally subsided and Fred started to work stations in rapid order, and also the lower powered stations had a better chance of getting him. What we are really trying to say is that the rare DX stations would do well NOT to use the "transceive" concept on RTTY, but to use the split frequency method and spread the boys out a bit. It is amazing how much faster stations can be worked.

This contest had a real built in advantage for stations on the North American Continent. With each district of W, VE, and VO, counting as multipliers there was a potential multiplier of 19 PER BAND from these areas alone. It was a real good opportunity to rack up the multipliers on 80 and 40 when the DX bands went dead. Unfortunately we don't think that many took advantage of the opportunity as it was difficult to find a station on those two bands the few times we listened there. Of course the full potential could not be realized but all US districts were in the Contest plus a few of the Canadian provinces.

In spite of the poor general conditions a partial list of the prefixes either printed here or told about after the Contest indicates that some pretty high scores will be posted when the final results are in. Here are some that were available on one or more bands. CE-CR6 - DL - EA8 - EI - F - FG7 - FO 8 - FY7 - G - HA - HB - HK - I - IS - IT - JA - KH6 - KL7 - KZ5 - LA - LU - OB - 14 OCTOBER 71

OK - ON - OZ - PA - PY - PZ - SM - SV - VE - VP7 - VK - VU - W - YBO - YV - ZL - ZS - ZS3 - 4X4 - 9J2 - 9Y4. OB8V caused some head scratching for a minute until Paul indicated he was in Peru and to QSL via W9DY. The Contest also had three stations active from Hawaii and from Mexico which is something of a record for a Contest. So, all in all, it looked like a good time (!) was had by all involved and we look forward to another next year around the same time.

In a recent letter from KH6AG, Paul informs us that he will shortly be putting three new countries on RTTY from the Pacific area. He plans to visit KC6, both East and West Carolinas and also KG6S, Saipan. He will be using a Mite, and a FT-101 that Gin JA1ACB will be bringing to Okinawa early in September. Definite dates are not known at this time but it will certainly pay to point the beams toward the Pacific occasionally in the coming weeks.

Gin tells us that Okinawa National KR8AG is planning RTTY activity shortly and that a Japanese ham is planning to get on from the newly designated JD Island group. We hope to have more on this later.

We certainly sat up and took notice the other evening when TI2JFP printed out on the page, but the blood pressure lowered considerably when the tail end had a /W6 designation. It seems that Jorge works for UPI in Los Angeles and got a station set under the reciprocal licensing deal. He did promise to put Costa Rica on RTTY one of these days when he returns.

After many years as the only active station on RTTY from Chile, Henry, CE3EX has finally been able to confirm that country for himself. Just recently Pedro, CE3GK, became active and after some initial difficulties he is doing a job on the bands. QSL's can reach Pedro at --

Alcantara 91
Santiago, Chile

WAC certificates were awarded this
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month to --

Nr. 163 Joey Lengton ZS6BBL
Nr. 164 John Fail KL7GRF

Joey of course needs no introduction as she and OM Jan, ZS6BBK have certainly kept South Africa on the active list both for QSO's and Contests. Joey is the third XYL to receive the Award. First was Sonia, PY2SO, Nr. 73, then Gwen, VE3AYL, Nr. 100. We are also grateful to Jan and Joey for sending in some excellent photographs of the South African gang which we have passed along to Dusty for early publication.

John, KL7GRF, is Executive Officer on a Coast Guard vessel up in Alaskan waters and sends along some very important news for all you RTTY-DX fans. John has sent a complete radio station to George, VK9GG who is located at Medang, New Guinea. This includes a Model 15, a ST-5 TU, a HRO 60, and a Viking Valient transmitter. At this writing this is all on a ship between Seattle Washington and Medang. It is estimated that George should possibly be getting things assembled by late September or mid October. John mentions that he would like to obtain the following to complete the station. A Model 14 TD, a Model 14 Reperf, and two Series Governed motors. If anyone can help contact John at --

John E. Fail
Box 1196
Petersburg, Alaska 99833

John will also be QSL Manager for VK9GG.

During the Contest W9DDD/HK3 was quite active to give the boys a much needed multiplier. John will be in Bogata for a few years where he is a representative for the Ampex Corp. He has indicated that at some future date he will endeavor to get some RTTY gear to San Andres HKO and give the boys a new one on RTTY. QSL's will reach him at --

John Koster
Apartado Aereo 11455
Bogota, Colombia

Larry, K1LPS, and formerly KG6NAA, is in Spain at this writing but unfortunately he is "grounded" as at the moment reciprocal licensing has not been installed. He continues to keep up with things by listening and we hope that the situation will change soon so that he can get back on the air. In the meanwhile you fellows can get in contact with him as follows --

Larry L. Filby
Patrol Sqdn. 11
FPO New York, N.Y. 09501

Another fellow that is away from
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home base is Uli, DK3CU. His work has kept him near Munich for some time and he only gets back to Hamburg on occasional weekends. Uli recently received the WAS Award from the ARRL indorsed for RTTY and is one of the very few in the world to get this Award.

It is our pleasure to be able to announce that the first station to confirm RTTY-DXCC under the rules previously announced is --

Nr. 1 Arthur Blave ON4BX

Congratulations to Arthur and he will shortly receive an engraved plaque to commemorate this historic occasion. The final confirmation was 101 out of a total of 104 submitted.

At the beginning of the year it seemed that DXCC could still not be accomplished in 1971. Jean, FG7XT indicated that he had made it but to date has not furnished the necessary information. The tremendous increase in activity from new countries has made it possible this year and now that the barrier has been broken; who will be next? Please keep in mind that confirmation must be in accordance with DXCC Rules and the ARRL Countries List and that cards or other proof of contact must be submitted to Dusty at the RTTY Journal or to myself.

The President of the Amateur Radio Club of McGill University, Montreal, Canada writes to say that to Commemorate the 150th Anniversary of the University, and the 50th Anniversary of the Amateur Radio Club they plan to use the special call sign VA2UN during the coming CARTG Contest. A special certificate will be issued and 2 or more IRC are requested to cover costs and mailing. They still need a few things to round out the RTTY station so an inquiry to Club President will get a quick response as to their needs. Dave Weiner, VE2DCW is the man at --

Amateur Radio Club, VE2UN
McGill Univ. 3480 McTavish St.
Montreal 112 Que. Canada

Shortly after you read this the CARTG Contest will be coming up. This Contest has traditionally been the start of the RTTY contest season and one of the most popular. So flex the fingers, oil the machines and be on tap at 0200 GMT October 16th. The prizes this year are terrific so get in there and try to win one. Imagine, 20 beautiful Plaques and Medallions plus Certificates, something for everyone. LET'S GO!

73 de John

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It has been a long, hot, dry summer and one thing after another has kept us from being on the air very much. We have just installed three speed gears on the 28 printer but so far had no chance to try it out on any other than 60WPM speed. As far as we know there has been no further action on the proposal before the FCC to allow unlimited speeds for amateur RTTY. We do understand that some Canadian stations are on faster speed and also some Mars nets but so far we have not printed them.

We have been fortunate in receiving several good articles for future issues. However we still need those shorter articles to balance off the variety and fill those vacant pages or partial pages that appear after the main article has been pasted up in the dummy.

Anyone planning to order parts directly from the TELETYPE CORPORATION is advised that their Service Parts Division has been moved to a location remote from the main plant at Skokie, Ill. The new address to use is: Teletype Corporation, Service Parts Division - Org. 1441, 1325 Pratt Boulevard, Elk Grove Village, Illinois 60007. The phone number is 312-593-1500. (Manuals should still be ordered from the Skokie plant.)

One activity far removed from RTTY that has kept us busy the last month was having a greenhouse built in our back yard. Believe me the green keys are easier to manipulate than the green thumbs. There is no question that any blooms this winter will be the most expensive flowers available. Too bad we don't live in Hawaii where we could pick some orchids off the trees. However we are NOT raising orchids and if we can produce a sweet pea bloom will consider it a major DX accomplishment.

Don't forget the big CARTG DX contest, full details were in last month's issue. See you on the band.

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Another shipment of RTTY Binders, Red with Gold lettering is in stock. The last two shipments of binders have increased in price and with the added postal increase we have been forced to raise our price to \$3.00 each in the US and possessions, \$3.50 in Canada and Mexico. We regret that custom regulations make it impractical to ship binders to other countries.

BACK ISSUES---

New subscriptions and classified ads are cash in advance as we have no method of 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. If available, back issues may be ordered at 30¢ each at time of subscription. The Journal is mailed about the 20th of the month preceding the dated month.

1966 - Aug. - Sept. - Oct. - Nov. - Dec. (5)

1967 - None

1968 - Mar. - May - June - Sept. - (4)

1969 - May - July - Sept. - Oct. - Nov. - Dec. - (6)

1970 - Jan. - Feb. - (2)

1971 - January-April-May-June-July-September-(6)

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'DUSTY' DUNN - W8CQ
Editor and Publisher

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Teletype 'Doughnuts' the 88mh Toroids-

from MARS 'MONTHLY SIGNAL' by AAGGYJ

Teletypers make liberal use of a small doughnut shaped toroid coil -- a device that is somewhat of a mystery to some Amateurs. It need not be -- it is very simple inductance. They were originally employed by the various telephone companies as loading coils and adapted to teletype applications by the early ham radio-teletypers.

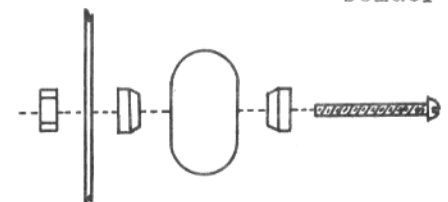
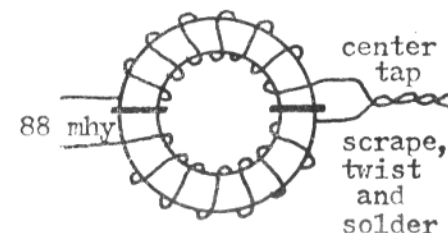
The core of a toroid is made of powdered iron suspended in an insulating and binding substance which is pressed into the form of a ring and cured with heat. The winding is wound around the ring, with the conductor passing through the hole in the "doughnut" with each turn. The toroid has found other applications in Amateur Radio in recent years, but we will concern ourselves with only the 88 milihenny variety at this time.

The finished 88 mhy toroid is usually a little over an inch in diameter and about one-half inch thick. There are two windings, separated by two small cardboard or plastic barriers, with one wire end on each side of both barriers. Each coil if measured alone has an inductance of about 22 to 25 mhy and a d.c. resistance of 4.2 ohms. In telephone practice, these toroids are used to load the line to compensate for the capacity between the wires of a "pair." They are connected in series with the line, one coil -- on the same toroid -- in series with the other leg. In Amateur use the coils are almost always connected in series-aiding, in which case the inductance is quadrupled and should measure about 88 to 92 mhy. In some applications, the center-tap of the coil may be used. The Q of these toroids is very high, measuring over 100 at 1,000 Hz.

An interesting property of a toroidal inductor is that it has a very low external field. This makes it possible to build filters that are very compact and may be mounted within one-eighth inch of a metal chassis; may be stacked with only one-eighth inch separation with practically no interaction; and at audio frequencies require no shielding.

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Mounting can be done very simply by placing a screw through the center hole and supporting the coil between a pair of bakelite or plastic washers. The author uses ordinary faucet washers -- they make an excellent mounting for these small toroids. Mount them so that the beveled faces of the washers are toward the coil. One precaution must be taken. BE SURE THAT ONLY ONE END of the screw touches the metal chassis. If both ends should touch metal, a complete loop -- or a shorted turn -- would result, and the inductance would be changed.



The 88 mhy toroids are available from many commercial sources, some of whom advertise in the various Ham publications. Prices may range from about 25¢ to 50¢ apiece, depending upon the quantity ordered. One word of caution though -- be sure you order the "un-potted" variety. They are nice and clean with gleaming enameled wire, while the potted variety is covered with a pitch or tar compound.

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CLASSIFIED ADS Rates-\$1.- 30words. ADDITIONAL Words 3¢ ea.

CLOSING DATE FOR ADS- 1st of month.....

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

SALE; COLLINS R390A/URR; Good. \$1,000. 11/16" tape; 40 rolls-\$5.00 huge quantities. Yaesu FT 101; Mint: \$390. G.S. Naniwada, JA1ACB, 3-4-8 Izumi - Hoya, Tokyo 188, Japan.

WANTED; MANUAL For Navy OCT-2 (3) RF monitor. This is the unit described in RTTY from A to Z. R. Kurtz, WA6MZX, 147 Glenhaven Way, Chula Vista, CA. 92011

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

SALE; MITE TELETYPEWRITER SET. Send, receive, miniaturized self contained printer with standard commercial keyboard, english characters 76 characters per line and friction feed. For general purpose use, power supplied, line sensors, heating elements and carrying case. Keyboard may be slid into storage or operating position, or removed completely, by addition of power pack, it may be operated independently as a self-powered unit or receive during power from the page printer. Contains electrical "receive/send-receive" switch; by addition of a key it may also provide parallel baudout output. Used, good, \$140. ea. Atlantic Surplus Sales, 580 3rd Ave. Brooklyn N.Y. 11215

TYPEWRITER RIBBON REINKER. Hand operated model now only \$3.50. K575 or K764 Ink available at all National Cash Register Co. stores at 75¢ per tube. Walter Nettles W7ARS-8355 Tanque Verde Rd. Tucson, Ariz. 85715

TELETYPE PICTURES FOR SALE. Vol 1 \$1.00. Vol 2 \$2.00. Vol 3 \$1.50. All for \$4.00. Perforated tapes available. 200 different pictures. W9DGV-a. 2210-30th Street, Rock Island, Illinois 61201.

TT107b/FG REPERF. TTY 60-75-100 WPM. For automatic typing and reperfing of TTY mags. from 60 cvc/e power source. 7/8" chad tape, synchronous motor, Kleinschmidt model 112, used, excellent, \$50.00 each. TT100B/FG page printer, send receive. Kleinschmidt model 150, friction or sprocket feed, keyboard, synchronous motor, Auto carriage return, 60-75-100 wpm, used, excellent \$75 each. Atlantic Surplus Sales, 580 3rd Ave. Brooklyn, N.Y. 11215

FOR SALE: MITE KSR (60-66-75-100 WPM) \$225. Mite RO (60-66-100 WPM) \$125. Both in mint condition. \$300 for the pair. CV89A/URA-8 modified with TTL/2 type bandpass filters (wide and narrow), channel filters (170-425-850 shift), ATC/DTC and CRT cross display. \$150. Solid State dual diversity CV483 (XN-1) URA-17 Terminal Unit. \$100. Collins late model 51S1 Receiver. Spectrum Analyzer. Panoramic Model SB-8B. Make offer. UHF (220 MHz to 450 MHz) high power linear amplifier. Model AM-1365/URT. Mint. Make offer or trade. Want 28 KSR or 28 ASR, TTL/2 or ST-6. Hank W6SKC, South Pasadena, Calif. 213-799-5886.

WANTED: COMPONENTS of SCM or control data typetronic 2816/7816 system. Readers, punches, T-330 magnetic tape units, etc. Fred Hatfield, K8YDU, Box 27100, Columbus, OH. 43227. Also want flexowriters etc.

EPOXY DIODES - 1000 Volt PIV at 1.5 Amp. 24c each p/d. 88 Mhy Centertapped unpotted toroids. \$1.50 for 5 p/d. Send stamp for list. M. WEINSCHENKER BOX 353 IRWIN, PA 15642.

PERFORATOR TAPE, 11/16" wide, 8 dia., 2" core, buff, \$8.00 per case of 40 rolls. Paul Davis, 1830 Toefer Rd. Akron, OH. 44312.

SELLING OUT WAREHOUSE FULL of teletype & facsimile machines, parts and equipment. Loads of electronic equipment and computers. No fair and reasonable offer refused. No list or catalog available. Saturday or Sunday by appointment. Week days 10-4. Goodman, 5826 S. Western Ave., Chicago, Ill. 60636. (312) GR 6-8200.

TWO MODEL 19's, 85.00 and 75.00 ea. including TTY, TD and Table. Three Model 14's, typing re-perforator, \$40.00 ea. Three projection TTY, \$48.00. ea. contains 2 TTY's. lenses, cabinet, etc. SASE for complete list. Paul Davis, 1830 Toefer Rd., Akron, Ohio 44312.

SALE: MODIFICATION KITS. Reinker for Model 14 typing re-perforator. Consists of the following: Mounting bracket; Inkwells (2); nylon ribbon; Replacement felt pads (24); plastic tool; stainless steel tool. All packaged in plastic case. \$1.60 ea. postpaid in cont. U.S. W. H. Craig, Box 947, Grayson, Ky. 41143

SAROC SEVENTH ANNIVERSARY January 6-9, 1972. Advance Registration \$9.00 per person entitles registrant to SAROC Special room rate \$12.00 per night plus room tax, single or double occupancy, effective January 4 thru 12, 1972; tickets for admission to technical seminars, HAM RADIO MAGAZINE and SAROC Happy Hour Thursday, SWAN ELECTRONICS and SAROC Social Hour Friday, HY-GAIN/GALAXY ELECTRONICS and SAROC Champagne Party Saturday, Buffet Hunt Breakfast, Sunday. Ladies who register will receive transportation for shopping tour, luncheon and Crazy Hat program at the New Union Plaza Hotel downtown Las Vegas, Saturday, Advance Registration, with Flamingo Hotel mid-night show, two drinks, \$14.50. Advance Registration, with Flamingo Hotel Dinner Show (entrees Brisket of Beef for Turkey) no drinks, \$17.50. Tax and Gratuity included except for room. Frontier Airlines SAROC group flight package planned from Chicago, St. Louis, Omaha, Denver, send for details. Fifth National FM Conference, ARRL, WCARS-7255, WPSS-3952, MARS, meetings and technical sessions scheduled. Accommodations request to Flamingo Hotel, Las Vegas, Nevada before 15th. December. Advance Registration to SAROC, Southern Nevada ARC, Inc., Box 73, Boulder City, Nevada 89005, before 31st. December.

TELEFAX FACSIMILE TRANSCIVER: desk type W.U. model 6500A, 5" drum O/A diam. 12"x 13"x 7" synchronous motor, operating condition, used good, \$11. each. Model 28LBXD Trans- distributor, used good, \$60. each. Teletypewriter Signal Distortion Test Set TS2B/JTG transmits four test signals, R.Y. space or standard test message. Portable in wooden chest, manual and wiring diagram included, used good, \$35. each. Wetted relay WE. 275 B or C \$1.25 each W.E. 255A relay \$1.25 each. Atlantic Surplus Sales, 580 3rd Ave. Brooklyn, N.Y. 11215

AUTO-CR-LF KIT, M15-19, \$27.50; Tape winder (windup) \$12.50, gears galore (shifts, too). Quantity discounts on above - also 74913, 78509-10, 80165, 91287, many more. SASE for list. Wanted LXDS, any condition; all parts, Model 32-33. Typetronics, Box 8873, Ft. Lauderdale, Fla. 33310 W4NYF.

FOR SALE: 2.5 KC LOW PASS Filter, Ampex #166798-10 UOL #BF-599, \$5.00. International code of signals Vol#2 radio (new) US Navy Dept. \$2.50 postpaid. Linemans and cablemans handbook, McGraw Hill (new) 1964 edition, approx. 500 pages \$5.00. PP. E.F. Johnson 153-18 air variable Capacitor, good for KW. \$10.00 PP. Wanted ST-6 must be in good shape. prefer local deal. L.F. Carbaugh, WA30JF, PO Box 398, New Cumberland, Pa. 17070.

SOLID STATE RTTY TERMINAL UNIT Model FS-1. Completely wired and tested and built on a 5x6" circuit board, using top grade components throughout. This hot solid state unit features a 500 ohm input, tuned filters (standard mark and space frequencies-(2125-2975) or 2125-2295) please specify when ordering). Reversing switch, output for scope monitoring, and drives selector magnet directly. Unit can be mounted according to your needs. Power requirements 12 VDC @ 65 MA. Factory warranty and repair service available on all our models and kits. Model FS-1A completely wired and tested. \$39.95. Power supply for above, solid state, regulated 12 V 1 amp. \$14.95. Bob- Frank Electronics, 407 Ritter Rd., Harrisburg, Pa. 17109

MODEL 28KSR, 60 WPM, excellent condition. Real "Mouse" unit has all the automatic and special functions \$300. Model 28 (AN/UGC-25A) RO printer with three speed transmission. Very clean and in good condition. \$150. or best offer. All FOB Atlanta-E.W. Sleight, K4DJC, 4165 Williamsburg Dr. College Park, Georgia. 30337. (404) 766-4050.

GEAR SETS; for model 14 TDs, Sync 1800 RPM, 60WPM felt clutch, unused \$5.00 set. Gear sets (2) for model 14 re-perforator, sync 1800 RPM 60 WPM, used excellent \$4.50 per set. Teletype sprocket wrench 5/16 with 12" long handle unused \$1.00 each. Tuning fork; 120VPS unused \$2.00 each. Atlantic Surplus Sales, 580 3rd Ave. Brooklyn, N.Y. 11215

SALE MODEL 28 REPERFORATOR, TTY with type wheel LPR35 11/16 tape, chadless or fully perforated. Hand wheel shaft with knob, and auxiliary mounting, used excellent \$45. each. Model 28 Transmitter distributor LBXD-9 high speed 8 level, used excellent \$50. each. CV89A/VRA8A frequency shift converter, audio type with blower, used excellent \$95. each. AN/SRR-13A receiver set 2 mHz to 32 mHz in 5 bands, reception capabilities A1, A2, A3, F2 & F4, 115VAC. 60 and 400 CPS, single phase, used excellent \$210. each. Atlantic Surplus Sales, 580 3rd Ave. Brooklyn, N.Y. 11215

WIREWOUND Pots, 2.5K, 25W loop current ad-just; 95c each, 2/\$1.50. Standard 11/16" PERFORATOR tape. 10 rolls - \$1.50. 40 rolls for \$4.95 FOB Paramus. Polar relay sockets, latest type, with contact filters. Regularly \$1.25, now only 95c postpaid. Spectrum Display Units, built-in 3" scope, rack mount, 110vAC, 60Hz - \$18.50 FOB. Simplex/Stromberg DATE-time stamps. 110V, 60Hz. As is. Ideal for traffic or logging. \$18.50 each, FOB. Jim Cooper, POB 73, Paramus, NJ 07652.

MERCURY WETTED high speed keying relays. Several dozen Western Electric 275C, SPDT. Ideal for ICARUS or any RTTY keying. \$2.50 each. Frank Stewart K5ANS, 222 Lanus Street, Gainesville, Texas 76240

HIGH POWER COMPONENTS - Johnson 2KW rotary inductors, #226-3 22.5uh. \$20, #226-5 13.5uh. \$15; Johnson 250-C-70 250mfd 7KV variables \$5; 100mfd 3KV oils \$20; D. R. Kelley, WAOTJR, 1490 Yaqui Drive, Florissant, MO. 63031

SALE: 6 AND 2 METER HC-6/U xtras--all frequencies and 6-8 MHz FT-243 xtras \$1.00 each. Sase for list. Mac Robbins, WA3KDJ, Hamerschlag A307, P.O. 766, Carnegie-Mellon Univ. Pittsburgh, PA. 15213

MAINLINE TT/L-2 CAN be supplied with both the high and low tones. Now for the first time the J & J AFSK solid state generator is available with both the high and low tones if specified when ordering. Space/One deluxe solid state RTTY demodulator with 850/170/ 425 shifts. Contains all the latest features of a sophisticated TU. Introductory offer \$250. FOB. J & J Electronics, Canterbury, CT. 06331.

J & J IS NOW OFFERING a repair service for terminal units. FM transmitters, Receivers aligned, repaired or converted to amateur use. J & J Electronics, Canterbury, CT. 06331

WANTED Excellent condition model 19 ASR with table: Machine must have sprocket platen and motor stop. Would prefer to pick up if reasonable distance. WA9JQJ 219-665-2901, W. Doctor, Rt 5 Box 164, Angola, Ind. 46703

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

WANTED: #195154 GEARSHIFT For Model 28 ASR. Also need M28 LPR-9 Reperf. For Sale - Model 28 TD LBXD, excellent. 60 WPM with cover, \$90.00 FOB. Larry Kleber, K9LKA W9CPD, Belvidere, Ill. 61008.

TOROIDS: LOWEST PRICE ANYWHERE!! 40/ \$10.00 POSTPAID. (5/2.00). 44 or 88mhz. center tapped. Mite miniature UGC41KSR page printer, Completely reconditioned, SPECIAL \$175. 32KSR page printer also completely reconditioned by experts ... \$225. Model 15KSR printer \$65. 1800RPM Sync motor with baseplate \$7. Gears for all machines ... 14Tee Dec \$25. TDA2A Distortion Test analyzer \$50. 14 reperf with cover, working \$30. Ribbons, Tape, supplies, Stamp for list. Van W2DLT 302R Passaic Stirling, N.J. 07980

ELECTRONICS BOOKS - DIRECT CURRENT CIRCUIT ANALYSIS THROUGH EXPERIMENTATION (\$4.95) - ALTERNATING CURRENT CIRCUIT ANALYSIS THROUGH EXPERIMENTATION (\$4.95)-SOLID STATE CIRCUIT ANALYSIS THROUGH EXPERIMENTATION (\$6.60). These popular and outstanding works by Ken Fiske (WA6SSO) and Jim Harter (WA6SQE) are currently meeting with such tremendous success, in colleges and trade schools nationwide, that EDUTRONICS felt that the amateur fraternity would also appreciate the opportunity to purchase them. The unique manner in which the authors have combined a text and laboratory manual to give the reader an unparalleled number of detailed examples, complete with clear concise illustrations, makes them a natural for the ham library. So thoroughly has each subject been covered that the Solid State manual alone has been accepted as a practical designer's handbook. Both discrete and integrated circuit components have been used in the design of power supplies, amplifiers, oscillators, etc. These publications are suitable for both beginners and advanced alike. Order the complete set for \$13.00 or order individually but please hurry since the publisher has only released a limited number. Add \$0.25 for postage and handling fees for each book ordered. Calif. residents add 5% sales tax. Please allow 3 to 4 weeks for delivery. Send check or money order (No C.O.D.'s) to EDUTRONICS BOX 487 LOMITA, CA 90717.

RIBBONS TAPE REINKERS ... Fresh ribbons for all teletypewriters, box of 12 individually wrapped \$3.50 POSTPAID. Reinker for 15/19 \$1.00 POSTPAID. 11/16" tape \$8.00/case/40 rolls. Toroids 40/ \$10.00 POSTPAID. Machines, supplies, stamp for list. Van W2DLT 302R Passaic Stirling, N.J. 07980 (201-647-3325 after 10 p.m.)