

# PACK RATS'



## PACK RATS

CLUB CALL: W3CCX

MT. AIRY VHF RADIO CLUB, INC.

# CHEESE BITS



MT. AIRY VHF RADIO CLUB, INC., PHILA., PA. ARNS  
50.2, 144.2, 432.1, 1296 MHZ, WR3ACD - Repeater, 222.98/224.58 MHZ  
Affiliated Club: AMERICAN RADIO RELAY LEAGUE  
Meetings: Third Thursday of Each Month at 8:00 P.M.  
Southampton Free Library, 947 E. Street Road  
Southampton, Pennsylvania 18966

VOLUME XXI

JANUARY, 1979

NUMBER 1

### THE PREZ SEZ

HAPPY NEW YEAR! Normally I would recap the events of 1978, showing what a terrific year the Pack-Rats had. But I won't since that might cause us to be complacent about 1979. Right now the club is really rolling. In the past month I have been to at least four antenna parties and helped numerous members with construction projects and station improvements; never having seen such a high overall level of enthusiasm. Much of this is due to the excellent January contest guidance of Harry Brown, W3IIT, but part is because the Pack-Rats really enjoy meeting a challenge and working together to meet that challenge.

The weekend of January 13th and 14th is the time for the VHF Sweepstakes. (Not the 20th and 21st as printed in QST). Those who attended the December meeting received their contest packages and heard the fine points of contesting expounded upon by the club's "experts". There was a 220 Mhz rig tune up session after the formal meeting and a great time was had by all.

Will YOU be on for the contest.. every point will count, so please try to get on and help as much as you can. Don't say "Theres no time", MAKE TIME... Don't say, "I have no rig", GET A RIG! Most of all don't be embarrassed to turn in a modest score. Do whatever you can and be proud to be part of the club effort. Five hundred points could be an awful lot if Rochester is four hundred ahead of us!

The January meeting is the "Crying Towel". Lets hope it does'nt get awarded to the club.

73 es gud luk,

Bill, W3HQT

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SWAP SHOP ITEMS - no charge.

DEADLINE FOR ARTICLES IS THE GENERAL MEMBERSHIP MEETING.

EDITOR:

W3CL, Harry B. Stein  
2087 Parkdale Avenue  
Glenside, Pa. 19038  
215 - 887-5052

PUBLISHER/SUBSCRIPTION MANAGER:

K3GAS, Doc Cutler  
7815 New Second Street  
Elkins Park, Pa. 19117  
215 - ME 5-1078

PRINTER:

WA3FOF, Ralph Alexander  
2600 Cheltenham Avenue  
Philadelphia, Pa. 19150  
215-276-4185

TYPIST:

WA3TEM, Marsha Lissauer

TRUSTEE OF CLUB CALLS: W3CCX-WR3ACD:

WA3AXV, Ronald Whitsel  
209 Frog Hollow Road  
Churchville, Pa. 18966  
215-355-5730

AWARDS CHAIRMAN:

W2EIF, Joseph Kilgore  
#5 Sunnybrook Court  
Stratford, N.J. 08084  
609-783-9478

CLUB HISTORIAN:

W3CL, Harry B. Stein

OFFICERS: 1978-1979

PRESIDENT: W3HQT, Bill Olson  
VICE-PRES: WA3NFV, Dan Mitten  
COR. SECY: WB3HHO, Paul Randolph  
REC. SECY: K3IGX, Dick Boyle  
TREASURER: K3GAS, Doc Cutler

DIRECTORS:

W3HMU, Tony Souza (Ex-Officio)  
W3IIT, Harry Brown (2 years)  
WA3JUF, Dave Mascaro (2 years)  
K3MWV, Dick Pierce (1 year)  
WB2SZK, Randy Bynum (1 year)

\*\*\*\*\*

MONDAY NIGHT NETS:

144.2 MHZ 7:30 PM  
50.2 MHZ 8:30 PM  
221.4/224.58 MHZ 9:00 PM  
1296.3 MHZ 9:15 PM  
432.1 MHZ 9:30 PM

NET CONTROL

W2EIF  
W3CL  
K3GAS  
W2EIF  
K3IUU

FRIDAY NIGHT ATV NET:

439.25 MHZ 7:00 PM

PACK RAT REPEATER - WR3ACD - 222.98/224.58

Churchville, Pa.

1-302-478-2757

AMATEUR  
and  
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Horsham, Pa. 19044



Bruce Clark

CALENDAR OF COMING EVENTS

Syllabus by Lee, K3MXM

A compendium of insight, analysis,  
opinion, bias and justifiable assaults

JANUARY

1979 - HAPPY NEW YEAR TO ONE AND ALL

- 1 ARRL Straight Key Nite - a good tune up for you..CW buffs.
- 6 Epiphany (Twelfth Night)
- 6-7 ARRL CD Party - Phone
- 11 Board of Directors Meeting - QTH - K3GAS, 7815 New Second Street, Elkins Park, Pa. Directors and interested parties ALWAYS invited...
- 13-14 THE CONTEST - VHF SS  
2300 Z 1/13 to 0400 Z 1/15 (1300 EST - 13th to 2300 EST - 14th)
- 18 Regular Club Meeting - Southampton Free Library 8:00 P.M.  
Crying Towel Session: The best and funniest meeting of our calendar year. The trials and tribulations of Murphy's Law.  
An open meeting to all - Raffle and Auction - Refreshments
- 20 For you Astrological Buffs - The Sun enters Aquarius 11.01 AM EST
- 27-28 S.E.T. - details December QST
- 27 Wrap Up Session - checking Logs, Counting Logs - etc. 10:00 A.M. ---  
QTH - Ron Whitsel, WA3AXV. COORDINATORS AND ASSISTANTS PLEASE TAKE NOTE.
- 28 Chinese New Year. A chance for more celebrating - if you are so prone...
- 27-28 For you lucky guys that head South. Miami Hamfest.

\* \* \*

You wonder where your taxes are going and spent...

The Department of Agriculture spent nearly \$46,000 to find out how long it takes to cook breakfast. In a study that will purportedly benefit the food service industry, the USDA invented something called a "time measurement unit" which equals 0.36 second. For what it is worth, it takes 960 TMU's to make French Toast - 22 TMU's to get the egg. 15 TMU to break it against the bowl, and so on.

Come on fellows, maybe we can help the USDA and not spend the taxpayers money. How about someone figuring out how long it takes in TMU's to turn on the rig, adjust it, call a couple CQ's and then for the real scientific part figure out the length of an answer and length of the QSO - naturally in TMU's... Idea borrowed partially from TB Modern Almanac...1979 edition.

\* \* \*

The true measure of a man is how he treats someone who can do him absolutely no good...Ann Landers...

\* \* \*

Did you know that WARA is adding another 2 meter frequency 147.72/147.12 planned to cover center city Phila. and all length of the Expressway A 160 foot tower is going up to implement this project.

NEW PRODUCTS OF INTEREST TO HAMS

By Lyn, W3NSI

1. YAESU 200 T/R: The Yaesu FT 227RA FM rig will soon be joined by a unit for the 220 Mhz band. The FT 127RA appears to be a duplicate of the 2 M version, as far as size and ratings are concerned. More later.
2. TIME STANDARD RECEIVER -LXK: The Elemek Co. is selling a very small receiver to use with the WWVB 60 Khz signal coming from Fort Collins, Col. Three outputs are provided: 60 Khz signal, 100 Khz signal, locked to the 60 Khz output, and the audio signal providing time code. Receiver operates from 12 VDC or 115 VAC line. Price \$99.50. 6500 Joy Road, E. Syracuse, N.Y. 13057.
3. ALLIANCE ROTATOR: The new HD73 heavy duty rotator should be of special interest to hams on VHF. It features two speed operation, making it possible to rotate quickly to the approximate position and then use the slow speed to zero on. Unit is equipped with a brake and will handle antennas with wind area up to 10.7 sq. ft. A type of lubricant is installed at the factory that is good for the life of the unit and rated for 120 to -20 F. Starting torque is 400 in. lbs. Price \$129. Alliance Mfg., Alliance, Ohio 44601

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VHF/UHF REPORT

By Jo, W2EIF

Not much to report on this time. There has been the usual activity on 50 through 1296, but have not heard any comments about any openings to speak of. There have been a few short ones on 50 Mhz. These short openings are normal for this time of year. Dave, WA3JUF is still scheduling K4QIF (Rusty) in Norfolk on 1296 at 9 PM each nite and they make it every time. Dave also has a short schedule Monday, Wednesday and Friday with WIGAN at 7:30 AM.

Have heard many Packrats getting ready for the contest on all bands. Contests may not be popular with some, but they sure get a lot of operators going as to making sure their equipment and antennas will do the job. Looks like it will be a good one this year.

\* \* \*

NOTICE

The Pack Rat Monday Nite 6 meter net on 50.2 MHZ will alternate from an AM net one Monday to a SSB net the following Monday. W3CL will be net control on the AM net; WA3NFV will control the SSB net.

\* \* \*

VOTED TO MEMBERSHIP

WB3CPW - Charles R. Cloud, Jr.  
1001 Skippack Pike  
Blue Bell, Pa. 19422  
215-646-6012

K3PHY - Wilmer T. Burns      XYL-Pearl  
3405 Whitehall Drive  
Willow Grove, Pa. 19090  
215-659-2259

APPLICATIONS FOR MEMBERSHIP

N3ACV, Jack Korpi  
1405 N. Keim St.  
Pottstown, Pa. 19464

N3NHX, Joseph F. Gardocki  
72 Meadow Lane  
Doylestown, Pa. 18901  
215-348-3504

K2KRC/3-WA3LJT,  
Frank H. Bremer  
175 W. Albanus St.  
Phila., Pa. 19120  
215-455-6576

\* \* \*

OFFICIAL BULLETIN NR 736 FROM ARRL HEADQUARTERS NEWINGTON CT DECEMBER 14, 1978 TO ALL RADIO AMATEURS BT: Attention Contest participants. The 32nd ARRL VHF Sweepstakes will be held at 1800Z Staurday, January 13, 1979 and ending at 0400Z Monday, January 15, 1979. Please remember the mailing deadline for logs to be submitted in the 160 Meter Contest is December 29, 1978. For the 10 Meter Contest logs must be mailed by January 5, 1979. Certificates for winners listed in recent issues of QST have been delayed at the printer but will be forthcoming. AR

SWAP SHOP

FOR SALE: Hammarlund HQ 145AX-New condx.  
FM det. installed. \$135. Clegg 22er FM  
Exc. condx. w/Mic and book, 9 channels  
30 watts output. Ac or DC operation. \$135.  
Two meter FM T/R Regency TMR8 8 channel  
scanner for 2 meters. Transmitter -6360 PA  
10 w output, 6 channels installed. With  
Mic. and book, in mohog, cab. ready to  
operate. \$125. Two meter FM T/R Vanguard  
4 channel rec. 4 chan. 6360 10 w output  
transmitter. Crystals installed, with mic  
and book, in mohog, case. Ready to operate.  
\$75. VHF UHF Receiver - consists of CV 253  
ALR 4 converter module tuning from 38 Mc to 1000  
Mc, plus IF audio power supply chassis which  
can be located under a table and controlled  
by a sep. control box. (supplied) Ready to  
operate. \$65.

CONTACT: Lyn Rowland, W3NSI  
Phone: 215-NE 2-4791

FOR SALE: Complete Collins line - 75 SSB, 32s 3  
plus power supplies, console/speaker & phone  
patch. Excellent condition. \$2500 or best offer.

CONTACT: ASA McCollom, AB30  
1827 Still Road  
West Chester, Pa. 19380  
Phone: 215-692-7785 after 6 PM

FOR SALE: Janel QSA-5 Pre-amp. \$25.  
LM Amp. -2 W. in - 140W. out (Class "C") \$150.  
Icom. 202 - 3W out transceiver, CW/SSB -\$175.  
All in mint condition. with manuals.

CONTACT: Bill Benner, W3KM  
Phone: 215-455-5754

FOR SALE: 23 channel CB transceiver, \$25.  
2 mtr. mobile transceiver model FRT 225B  
Tempo FMA - 8 channels, 25 W. \$150.  
CONTACT: George Hautenchild, W3KD  
Phone: 215-357-5091

FOR SALE: Triplett miniature model  
310 VOM (Manual) \$30. Brand new in  
carrying case.

CONTACT: Harry Stein, W3CL  
Phone: 215-887-5052

FOR SALE: Midland Synthesized 2 mtr. FM  
rig. 25W. WANTED: Perfect VHF  
location North of Phila. To rent or  
purchase.

CONTACT: Steve Simons, WA3WAS  
Phone: 215-RA 5-1135

WANTED: Hi voltage power xformer for  
2 KW linear amplifier - prefer approx.  
3000V. (110 or 220 Pri.)

CONTACT: Bob Stets, WB3JKG  
Fairless Hills, Pa.  
Phone: 215-945-7507

FOR SALE: 4 voltage output D.C. pwr.  
supply. 10-14V - 7 1/2A; 10-14V - 3A;  
5V. - 15A; 5V - 3A. All regulated &  
over-voltage protected \$30.

CONTACT: Walter Zumbach, WA3AQA  
Phone: 215-887-9517

ADD to W3NSI Ad... Simpson Model "A"  
2 Mtr FM T/R 4 channels with xtals  
installed. Mike and book. Exce. cond. \$70

ANNOUNCEMENT

The Warrington Area Repeater Association has established a special recognition  
award to be given annually to an outstanding Ham in the Delaware Valley. Congratulations  
to Joe Welch, K3CT on receiving the First Award on November 4, 1978 at the WARA Banquet.

ADVERTISEMENT

Drake "C" line - brand new T4XC, R4C, MS4, AC4 1,581 list - "Special" - Cost \$1,255.  
Kenwood TS820S - Brand new - Dig. readout. 1249 list "Special" Cost - \$966.  
Kenwood TR7400A, Brand new - 449 list - "Special" - cost \$366.  
Many VHF antennas at very good savings to Pack-Rat membership.  
Phone: 215-RE 9-8616 in Phila. or stop by QTH - 2823 Kensington Avenue, Phila., Pa.  
"Enter thru Dicks Hardware". City Communications Center. Upcoming special Bird  
Watt Meters - only to Pack-Rat Membership.

## TID BITS

The following members have been on the sick list and are now home and feeling better: K3MXM, Lee Cohen, K3DLS, Carl Croce, WA3EPS, Mort Mazer, K3GOZ, Herm Klein. Doc Sharpe, W3CLT making progress.

Nice to see K3DMA, John Taylor at our last meeting (in from Bermuda). Ron Allen, WA1NGR/3 showed up all smiles and ready for action. W0RSJ, Bill Murphy our outpost in Dodge City, Kansas has stirred up VHF activity out there. Brings best wishes from Chuck, K0ZZM in Colorado.

The new Pack-Rat Directories are now available. Thanks to Dick, W3FQD who processed the Masters and Ernie, W3KKN arranged the printing.

The Board of Directors had an FB meeting in December in the new home of Danny and Lucy Mitten, WA3NFV. I choose to refer to their house as a "Norman Rockwell" type located in Trumbauersville, Pa. (Near Quakertown) Good luck folks.

Best wishes also to the Wendy and Doug Simpsons (WB3KES) in their new home located in North Wales, Pa.

Thanks to W2EIF, Jo Kilgore, on getting out all of the VHF SS mail.

Harry Brown, W3IIT and company did a bang-up job preparing the Contest envelopes.

Dave Zimmerman, W3ZD and Dan Mitten, WA3NFV audited the treasurers books and reported to the Board that all was in order. A break-down of their report is available.

Jim Holt, N3AHI has accepted the appointment of the June VHF QSO Party Contest Chairmanship for the Pack-Rats.

Tony, K4AWS announces the VHF Space Net Contest will be held July 21, 22, 1979. Details later.

\* \* \*

## BLACK HOLES

In order for someone to understand a concept as complex as the Black Hole, one must understand a lot of physics first. Since most people reading this article will not have an intimate knowledge of the nuclear physics required, I have included them, and for all you self proclaimed nuclear physicist types, who would be bored by all the grammar-school stuff, I will indicate where you should start to read again.

To start out with, there are three different worlds that we will have to look into. The first world that we will have to visit is the one we live in. Things in this world are controlled by two of the great cosmic forces for the most part. The first of the cosmic forces that control our world is Gravity. Gravity is all around us, and we experience it all the time. It, however, is the weakest of all the cosmic forces. Gravity works in an interesting way. When you stand on the surface of the Earth, you are being pulled at the center of the planet. But, as you get further away from the Earth, the effects of gravity diminishes by the inverse square law. The inverse square law operates this way. If you are standing 2 meters from a candle, you will get exposed to "x" amount of light. If you move to a distance of 4 meters away from that same candle, the amount of light that you are exposed to will drop to 1/4 of what it was. When you move to a distance of 1 meter from the candle you will be getting 4 times the amount that you were getting when you were at the 2 meters, and 16 times the light that you were receiving when at the 4 meter distance. As you can see, the inverse square law falls off rather rapidly but with gravity, even though it is the weakest of all the cosmic forces, it is the one that has the longest reach.

You might expect that if you were to get twice as far from the surface of the Earth as you normally are, you might expect that the force of gravity would fall off and you would become lighter. That is assuming that you are about 2 meters tall, and you go to a point where your feet are now 2 meters above the ground that your weight would diminish to a point where you only weighed 1/4 what you did on the surface. Well, this is not quite true, because the force of gravity "acts" like it is pulling from the exact center of an object and in this case the object that you are pulling against is the Earth. So, if you do go to the 2 meter height you would be moving a very small distance away from the exact

BLACK HOLES  
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center of the Earth. Now if you don't believe me, go up a few flights of stairs and you won't notice any difference in your weight, although there is one and it is very small and hardly noticeable. A few grams at most, besides which, what weighed 1 kilo on the ground will be somewhat lighter on the second story level, but the difference is so small it is not really measurable.

Since we tried going up for a little bit, let us now look at going down. If you were to burrow into the Earth, getting closer to the center of gravity, you might expect that your weight would increase markedly as you got closer to the center of the Earth. You have two things happening: First you become part of the mass of the Earth, and secondly as you go towards the center, you have more and more Earth above you pulling you up as you go down. Therefore, as you get closer to the center, you would find that the effect of gravity to actually diminish somewhat. Until you got to the center of the Earth, where, if it were hollow, you would find that you are at a zero gravity zone, because you would have just as much of the Earth pulling upon you from all directions, in exact balance therefore you would feel no gravity at all.

Now lets go back to the surface of the Earth again. This time we are going to look at something called escape velocity. When you are standing on the surface of the Earth any object that is going to leave the Earth never to return, has to reach this magic number that allows it to pull away from the surface so it will escape the gravitational pull of the Earth. The escape velocity for Earth is 11.23 km per second, this translates to about 7 miles per second (for all you WAM types, 'We Ain't Metric!'). Now the center of the Earth is about 6,371 km below the surface. Now at this point we are going to talk about ballistic objects, this is an object like a bullet fired from a gun. When the bullet leaves the barrel of the gun, it has as much velocity as it is going to have, and it will never go any faster. In order for that bullet to leave the Earth never to return if it was shot straight up it would have to leave the muzzle at a speed somewhat greater than 11.23 km per second (to account for air friction), but this would be the minimum amount of speed required for it to travel, if it was going to achieve escape velocity. Now lets look at getting to a distance twice as far from the center of the Earth as we are now a height of 12,742 km above the center. Now two interesting things have happened, first if you were standing there in your space suit, you would only weigh one quarter as much as you do here on earth, and the next thing is that your bullet would only need only a muzzle velocity of 2.8075 km per second to achieve the escape velocity. Most objects in all three worlds work as ballistic objects, they receive one massive impulse of power and from there on they coast. Now when you start to talk about rockets a whole new set of problems arise. They are that as the rocket is accelerating (firing) it is losing mass. As it loses mass, it becomes easier for it to accelerate. Also, all this time it is moving further and further away from the Earth. As this happens, the effects of gravity become less and less, at first this is not much of a consideration, but the further you move away from the center of the Earth, the more pronounced this effect becomes. This is how a rocket, if it fired all the time, could achieve escape velocity at a slower rate than the 11.23 km per second required of a ballistic object.

The first two man made objects ever to leave Earth never to return were the Pioneer 10 and 11 space craft. These two, interplanetary calling cards, were launched a few years ago; and one of the primary reasons they left never to return was that they were acted upon by some outside forces namely, two of the planets, Jupiter and Saturn. In effect, an interplanetary game of pool was played, because the space craft were aimed so they passed well within the gravitational pull of the planets. As they passed in towards the planets, they gained speed greatly, and as they went past they were "sling-shotted" away with only a slight reduction in speed, of course all this required pin-point navigation, but never the less it has been done successfully.

The next of the great cosmic forces we will look into is the Electric Force. We owe a lot to the electric force. It too is all around us, but mostly it works for us. It powers the light that you are reading by, it does all the many wonderful things that we have learned to make electricity do for us, and then of course it does one more thing for us. It gives us life, it is the controlling force that enables us to think and control our muscles.

The electric force has its strongest effect down at the nuclear level, and its effects drop off rapidly as you leave the micro-world and come into our world. It is only because the electric force is so strong that it can be felt in our world.

It is now time to leave our world and travel to the micro world, where things happen in some different ways. So lets start with the simplest form of matter or element which is Hydrogen. Hydrogen is composed of one Electron which is a very small sub-atomic particle, and it carries a negative charge. The electron even though it is very small, carries a charge that is equal and opposite to the charge carried by the Proton, the other part of the Hydrogen atom. The proton is much heavier than the electron, about 1836.11 times heavier than an electron. In the way that things are arranged in the world of atomic physics, the electron orbits the proton, and the two normally never meet. Of course, this is the element hydrogen. To make the next element you have to add something new, the something new in this case is called a Neutron, it is just a little heavier than the combination of a proton and an electron, 1838 times the weight of the electron. The Neutron has no electrical charge, and to make the next heaviest element you need to have 2 protons, and 2 neutrons, which seem to help hold the nucleus together. Of course, you also need two electrons in orbit. For some reason all matter up to about atomic weight 20 can get by quite nicely on 1 Neutron for every proton in the nucleus. But above atomic weight 20 it takes more neutrons to hold the atom together, otherwise it will be unstable. And above atomic number 83 it doesn't seem to matter how many neutrons are in the nucleus the atom will always be unstable, and tend to break down into a simpler combination. This process is called fission, and it is the process in "A" Bombs, and also in conventional nuclear power plants.

Some interesting things about the micro-world, for starters there is proportionately a great deal of space between the nucleus and the electrons orbiting it, this space is empty, usually. Also most of the weight is concentrated in the nucleus. You can see how this would be when the proton is 1836 times as heavy as the electron and there is one electron for every proton in a balanced atom. Also, there is one neutron for every proton in most atoms. And of course, when you get into the heavier elements the numbers of neutrons increase further adding to the weight of the atom.

When working in the micro-world almost anything can happen if it happens fast enough. And the cosmic forces that are the ones in control are the strong nuclear force, and the weak nuclear force. The strong force is extremely strong. (See Table #1). But the strong force is limited to within the nucleus, as its powers drop off very rapidly. It is the force that holds matter together, and it is also the force that enables the Sun and the stars to blaze in the sky. The weak force is also called the "star-breaker", it is the cosmic alchemist, it changes the quality of matter but it is a weak force, and it takes time to work. The best way to think of the weak force is to think of a traveler crossing from border to border, and having to change his money before he can spend it. This is how the weak force operates. But it is a weak force though and it takes time to work.

Now lets move from the micro-world and into the world larger than us, the world of outer space. Here things happen on a different scale, but there are still happening to atoms, and the building blocks of atoms. For starters lets look at our solar system. It is composed of several planets. Let's look at how they might have been formed. One of the popular theories, at this time, goes like this.. Think of a vast dust cloud, held together because of gravity. Now think of this dust cloud with some rotational motion. Now you have a vast dust cloud that is spinning. The heavier elements would settle towards the center of gravity. The lighter elements would tend to go to the outer areas of the dust cloud. Now while all this settling is taking place, think of the following first, the dust particles are bumping into each other. If they are not moving too fast, they will tend to stick together, because of **their** mutual gravity. As the process continues, the dust particles grow into small rocks, and then eventually to boulders. As this process continues you have the heavier elements on the inner planets, and the lighter elements on the outer planets. That is the most likely way that our solar system was built.

As the mass of the planets grew, the pressure on the atoms increased pushing them closer together. This pressure causes heat. Of course, at the center of our solar system we have the sun. The reason it burns brightly is because the massive force of gravity



BLACK HOLES  
Continued

has pushed the atoms of hydrogen so closely together that they have had their electrons stripped away. As the pressure continue to increase the hydrogen fuses into helium, thus providing the heat, light and radiation of the Sun. This is essentially how the Sun got started. The thing that keeps it going is the enormous amount of weight that is still pushing toward the center. This pressure keeps the Sun from blowing apart and it also keeps the nuclear fire going. Lets turn our attention from the sun to the largest of all the planets, Jupiter. This planet is almost big enough for it to be a Sun, maybe just a small amount more of mass and it would have become a star. But there is some evidence of the same nuclear fire present in the Sun also being present on Jupiter, but at a much lower level. Also, Jupiter is much hotter than it theoretically should be, since it is so far from the Sun. Jupiter, being so large it is not nearly as dense as the Earth. The average density of Jupiter is 1.34 g/cm<sup>3</sup>. While Earth is 5.52 g/cm<sup>3</sup>. But the mass of Jupiter is 317.9 to 1 for Earth. And from this you can see that it is mostly made up of the lighter elements.

TABLE #1

FORCE	RELATIVE STRENGTH
Nuclear	10 <sup>3</sup>
Electromagnetic	1
Weak	10 <sup>-11</sup>
Gravitational	10 <sup>-39</sup>

As more mass is added to a planetary body, it becomes more and more compressed, and this compression ultimately takes it's toll on the individual atoms, as they are made of mostly empty space. And as they become more and more compressed, the empty space between the electron orbits and the nucleus becomes less and less. This is what happens in stars. But what about larger stars than our Sun? Well, lets look, first at the so called red giants; these stars are old stars. As the nuclear fuel is used up, they expand. When the Sun reaches the red giant stage, its size will be larger than the orbit of the Earth. But don't go running out to buy heavy duty airconditioners just yet, because this is not due to happen for about another 5 million years. So we have a little time left to us.

The reason for the expansion is that the nuclear fire is almost out of fuel, and as it expands, it is looking for more atoms of hydrogen to unite to make helium. As it runs out of fuel, it gets hotter; and when mass becomes heated, it expands. But as the furnace cannot sustain the expansion, so when it has gone out beyond the orbit of the Earth, it cools, and then collapses. When it collapses, the atoms are thrown together even more violently than before. And the electrons are thrown out or they combine with the protons to make neutrons. The neutrons, collapsing upon themselves, don't have any electrical charge to keep them apart; as the protons and the electrons do, and the mass becomes very small indeed. The only thing keeping them apart now is the heat of the star, and as this heat is radiated over a period of millions of years, the star gets darker and smaller, falling in upon itself making "Neutronium". This is essentially collapsed neutrons and is an extremely dense material. This is the death of an ordinary star. To give you an idea of the size relationship that is being covered here, a star the size of the sun is about 1.4 km across, if it was converted into neutronium it would be almost 1.5 city blocks across, but still have all the mass of the Sun, but now it is a neutron star. But what about the star that started off being much larger than our Sun? Well, these stars have one more stage to go thru, this stage is their collapsing down to one smaller thing. A Black Hole.

(Okay you all science freaks can start reading again)

It seems that the critical size for the direct conversion of mass from a neutron star to that of a Black Hole is about three times the mass of the Sun. And of course a Black Hole from a neutron star would be much smaller.

When the neutron star has lost all of its heat, and compressed so far, the star will collapse to the Black Hole. Black Holes are called just that because the escape velocity is actually higher than the speed of light 300,000 km per second. This means that even light cannot escape and thus the name Black Hole. The matter is so compressed, and gravity has become so strong, even though it is the weakest of all the cosmic forces it has total control.

BLACK HOLES  
Continued

Now how have we detected the existence of these Black Holes? Well, we can assume that when matter is being pulled into a Black Hole tremendous stress is being placed on it, the side nearest is being pulled in, the very atoms are being pulled apart. When this happens large amounts of energy is being given off. The highest form of energy that we know of is the "X-Ray". And we have found X-Ray sources in the area of suspected Black Holes. Another way that we have determined that these are Black Holes is that some stars seem to be in orbit around a dark twin. These orbits are rather large, lets say the distance from the Sun to Jupiter, and we can tell that there is something strange because of the orbital speed of the light companion, and also around some of these there is a large release of X-rays, sort of the death cry of matter.

Now what about the future? Well, these Black Holes are around consuming all matter, and as they do they become more voracious. One of the popular theories is that as two Black Holes come near each other they merge, and become one larger Black Hole. It is possible that all the mass in the Galaxy will be consumed by Black Holes, making one large Black Hole. And after a time the other great cosmic forces could serve to blow this Black Hole apart, and start out the "Big Bang" all over again. So it is possible that we live in a cyclical Universe, and that 15 Billion Years ago, you were reading these words, and in another 15 Billion years you might be reading them again. There really is no way to tell but it is something to think about.

By Monroe Raudenbush

FROM THE "KILOWATT" DE PENARC

The recent events in space prompted the printing of this enlightening article to usher in the New Year. The author is really our own Ralph Alexander, WA3FOF.

\* \* \*

The following was received from QST columnist "The world above 50 Mhz".....

" Best luck to all the Pack-Rats in '79. I enjoy receiving Cheese-Bits. Tnx

73,

Bill Tynan, W3XO

(Thank you, Bill)

\* \* \*

Before going to press..... Jim Perkins, W3SMK is back in the Abington Hospital. What gives Jim, are you trying for a degree in medicine... Come home soon!

\* \* \*

OFFICIAL BULLETIN NR 737 FROM ARRL HEADQUARTERS  
NEWINGTON CT DECEMBER 21, 1978 TO ALL RADIO AMATEURS BT

Radio amateurs who have bona fide tapes or transcripts of transmissions from WB6MID/8R3 Jonestown or WB6MNH/8R1 Georgetown are requested to loan these materials to the Federal Bureau of Investigation. Please give them to your nearest FBI office, or send to FBI in care of ARRL headquarters, 225 Main Street, Newington, CT 06111. Please mark the tapes/transcripts Jonestown. AR

\* \* \*

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