

SCRA INCOME AND EXPENSE STATEMENT as of 3/15/97

BEGINNING BALANCE

CHECKING \$1,295.05
 SAVINGS \$942.81
 CASH ON HAND \$73.51
 \$2,311.37


INCOME

ARRL Income \$62.00
 Initiation \$6.00
 Dues \$1,554.00
 Monthly Raffle \$54.25
 Quarterly Raffle Income \$205.00
 Refreshment Income \$19.40
TOTAL CHECKING INCOME \$1,900.65

EXPENSES

ARRL MEMBERSHIP (\$314.00)
 Badges, New Member (\$58.05)
 OVERHEAD
 Officer's Expenses (\$32.00)
 Refreshment Expenses (\$15.00)
 Quarterly Raffle Expense (\$161.24)
 REPEATER


Maintenance (\$149.66)
 Short Skip Expenses (\$189.25)
 Transfer to Cash on Hand (\$10.65)
TOTAL EXPENSES (\$929.85)
 BALANCE, CHECKING \$2,265.85
 BALANCE, SAVINGS \$942.81
 CASH ON HAND \$84.16
TOTAL CASH \$3,292.82



ARDCO
 ELECTRONIC SUPPLIES

345 West College Ave, Santa Rosa, CA 95401 (707) 527-8000

STEVE BASHAM
 Manager



HSC Halted specialties co.
 Electronics • Prototyping Supplies • Computers • Lasers

George Shedore
 Manager
 KS6W

PHONE: (707) 792-2277
 FAX: (707) 792-0146

Next Meeting:
 April 2
 HOMEBREW!

BRECKENRIDGE, JOHN WB6FRZ
 574 WILD OAK DR
 WINDSOR, CA 95492

BULK RATE
 U.S. POSTAGE PAID
 SANTA ROSA, CA
 PERMIT NO. 658

Sonoma County Radio Amateurs, Inc.
 PO Box 116
 Santa Rosa, CA 95402-0116
 ADDRESS CORRECTION REQUESTED



Short Skip



Club Station
W6LFJ

Sonoma County Radio Amateurs, Inc.
 PO Box 116, Santa Rosa, CA 95402-0116

Repeater Station
WB6PVS

146.730MHz ● 224.48MHz ● 441.375MHz

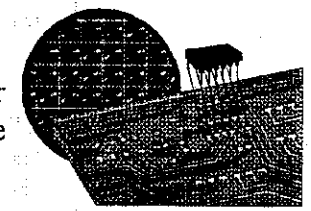
Volume 22 #4

April 1997

HOMEBREW CONTEST

April Meeting

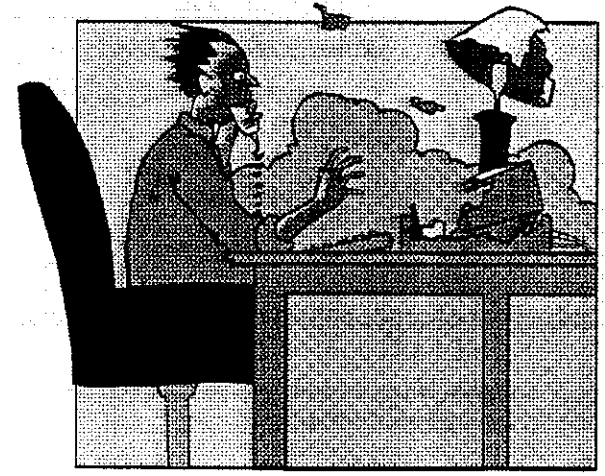
Come one, come all! And bring your favorite project. It's time for the annual Homebrew Contest.



The rules are simple. **YOU** build it, **YOU** bring it. There will be two project categories, Large & Small. "Large" projects took longer than 15 hours to build, "Small" projects took less than 15 hours to build (you probably could have figured that out). Photographs, printer listings and QSL cards are all good to bring, especially if you need a U-Haul to move it. But it doesn't have to be complicated. A weekend project might generate more interest than a mammoth undertaking.

Judging criteria will include how well the work was documented, workmanship (or workwomanship, if you prefer), utility, originality and anything else the judges can think of. Speaking of judging, that will be handled by the esteemed champions of last year's contest.

Don't miss this meeting. Even if you don't enter a project, it's always fun seeing what can be done!



LICENSE EXAM SCHEDULE

There will be a SCRA VE Session April 12 at HP Santa Rosa, 1400 Fountain Grove Parkway starting at 9AM. All license classes will be served.

WHAT TO BRING:

- ✓ A photo identification or two non-photo IDs.
- ✓ Your original and a photocopy of your current license (if you are currently licensed).
- ✓ Any original valid CSCE's and photocopies.
- ✓ Radiotelegraph license, if held (see VE).
- ✓ Medical Exemptions (see VE).
- ✓ Exam fee of \$6.25 -
 (cash - exact change is appreciated, or check to ARRL/VEC) except Novice license, which is free (Elements 1A & 2).

For more information contact Bill Kinder KO6ZG @ 894-9591.

Other upcoming exam sessions:

- April 26 @ 0900 - VOMARC, 996-6461
- May 17 @ 1700 - SMRS, 762-9414
- June 7 @ 0900 - MARC, 415-883-9789

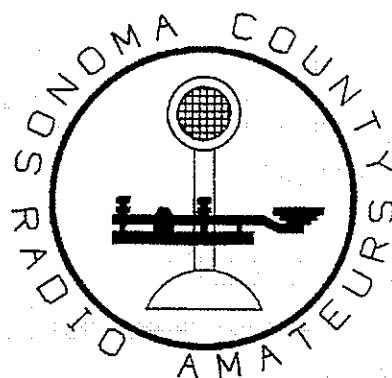
For schedules & information on North Bay Exams call the SCRA Hotline 707-579-9608 or check into the SCRA Website @ <http://cds1.net/scra>

OFFICERS FOR 1997

PRESIDENT:	Steve Carniglia	KV6A	546-7370
VICE PRESIDENT:	Rick Reiner	K6ZWB	575-4455
SECRETARY:	Steven Feil	KD6CJR	579-8346
TREASURER:	Joel Nadler	KJ6LF	545-1782
MEMBERS-	Bill Hillendahl	KH6GJV	538-0331
AT-LARGE:	Claude Jones	AB6OL	527-8593
REPEATER CHAIR:	Kelly Cureton	KD6CJQ	837-9434
ACTIVITIES CHAIR:	Dave Willey	KD6KWM	577-0191

SHORT SKIP STAFF

EDITOR:	Claude Jones	AB6OL	527-8593
(submissions) →	3612 Banyan Street, Santa Rosa, CA 95403-1557		
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	Fax	938-4772	
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CIRCULATION:	Ken Harrison	N6MHG	
AUDIO TAPING:	John Breckenridge	WB6FRZ	
	Laurel Meyer	KC6FKX	
	Bob Phillips	N6RMW	
SWAP SHOP EDITOR:	Ken Harrison	N6MHG	539-2701



Club Meetings

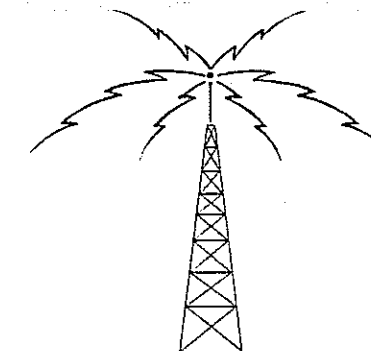
7:30 pm, 1st Wednesday each month at the Hewlett-Packard plant in Santa Rosa. (See map below) All are welcome.

TUESDAY NIGHT NET

Check into the Tuesday night SCRA net on the 146.73 repeater at 7PM. You will hear the latest Amateur Radio Newsline broadcasts, announcements of SCRA activities and a Swap Shop.

Activities Committee:

Public Service	--open--		
Public Relations	Steve Carniglia	KV6A	579-9608
QSL Mgr	Fred Leoni	N6YEU	431-8202
TVI/RFI	Al Bloom	N1AL	538-7115
Antennas	Lee Dibble	KE6EAQ	
Awards	Steve Lund	K6UM	823-4544
RACES RO	Merl Pfeiff	N6VUC	584-3898
Field Day	Steve Carniglia	AT6A	579-9608
Swap Meet	Rick Reiner	K6ZBW	575-4455
Education	Greg Gordon	AC6VJ	
VEC Exams	Bill Kinder	KO6ZG	894-9591
Badge Chair	Fred Leoni	N6YEU	431-8202
Refreshments	Steve Corey	N6WMW	
Raffle at meetings	Greg Cowles	KE6FXK	
Membership lottery	James Cureton	KD6GSF	
Packet BBS	Jim Andrews	KC6PJW	795-2163
Fox Hunt	Dave Willey	KD6KWM	577-0191



Repeater Control Op's

Kelly KD6CJQ	837-9434
Hoppy WD6CKP	542-6750
Steve KV6A	579-9608
Jim N6PTM	823-7947
Merl N6VUC	584-3898
Ken N6MHG	539-2701

Application for membership in SCRA

Name _____ Callsign _____ License Class _____
 Address _____ Phone _____ Date _____
 City _____ ZIP _____ E-mail _____ () New () Renewal

SCRA Dues: The renewal date for SCRA dues is March 1st. Dues are \$18/year for individual and \$27/year for families. The new member initiation (badge) fee is \$6/person. Dues for new members only are prorated at \$1.50/month for individuals and \$2.25/month for families, starting at renewal time.

ARRL dues: \$31/year, \$25 over 65 with proof of age. (Under 21 rates require application form).

Make checks payable to **SCRA**

I WOULD LIKE MORE INFORMATION ABOUT:

- () Public Service Events
- () RACES or ARES Emergency Services
- () Taking a Novice or Technician class
- () Teaching a Novice or Technician class
- () Taking an upgrade class
- () Teaching an upgrade class
- () Helping with SCRA Flea Market
- () Acting as club Net Control Station
- () Helping with VEC license exams
- () Field day, other operating events
- () Helping with *Short Skip* Newsletter
- () Other _____

SCRA Dues:
 Individual \$18, Family \$27 + _____
 Initiation fee \$6.00 + _____
 Prorate discount _____ X _____ - _____
 (# months) (rate)

ARRL Dues:
 \$31 or \$25 if over 65 + _____
 Additional donation to SCRA: + _____
 Total dues: _____

Name Badge Information (new members)

Fill in exactly as you want it to appear on your badge.

Callsign _____ First Name _____

City _____

AUTOSLOT REQUEST: Licensed SCRA members are entitled to a repeater autoslot. Fill in the information below to apply. For further information contact Kelly KD6CJQ at 837-9434.

Phone Number: _____ Is this your home phone? () Yes () No

SCRA HOTLINE 707-579-9608
 WWW <http://cgs1.net/scra>

Next Meeting: April 2
 Program: *Homebrew Contest*

We invite you to attend our next monthly meeting (see below). Membership in SCRA is open to anyone interested in Amateur Radio. If you would like to join, there is a membership application in this issue.

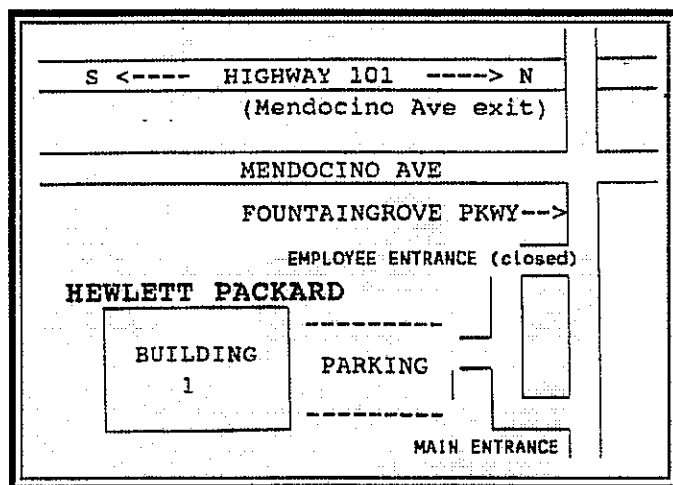
SHORT SKIP ADVERTISING RATES

Business Cards: \$10

\$11 First 1/4 Column
 \$3 Additional 1/4 Columns
 (\$32 Full Page, 1 side)

Pre-printed inserts: \$32/sheet

Guaranteed circulation: 200/month



The *Short Skip* is published monthly by the Sonoma County Radio Amateurs. Permission to reprint articles is granted, provided the source is properly credited. Items printed do not necessarily represent the views of the SCRA and/or its editors.

HANK'S SWAP SHOP

Currently hosted by Ken Harrison, N6MHG
539-2701 or ken@cds1.net

Sellers: Please let me know when your items have sold!

FOR SALE

•MFJ 1278B Packet TNC w/software. \$150. •MFJ 921 2m/220 antenna tuner. \$150. (new!) •Smart Tuner SG-230. \$400. (new!) Contact Jim, KD6WIS @ 707-928-6944

•Yaesu FT-10R mini 2m HT. 5 watts. \$175. Contact James, KF6DHB @ 707-578-4098 or email: jamesd@sonic.net

•A99 10m vertical antenna. \$50. •Code Practice Tapes. Novice thru General. Radio Shack. \$10. Contact Chris, KF6IVC @ 707-579-2145

•Yaesu FT-10-A16D mini 2 meter HT. 2.5 watts w/ owner's manual, box, belt clip, hand strap, antenna, RH-1 case protector. Looks and works like new! \$225. Contact Joe, KE6LNQ @ 707-763-2637 or email jberkman@sonic.net

•Kenwood TS430S HF Transceiver w/ filters, mic, manual. \$500. Contact Frank, KD6KVL @ 707-935-1935

•Kenwood TS940S HF transceiver •Kenwood MC-60 microphone •Kenwood SP-940 speaker •Barker & Williamson VS300A manual antenna tuner. Package deal for \$995. or best offer! Contact Steve, WV6X @ 707-829-5405 or email sjrp@wco.com

•Kenwood TS-530S HF Transceiver 160-10M WARC w/mic, spare finals. MFJ-949E antenna tuner. Gap Vertical HF antenna - Challenger DX \$650 FOR THE WHOLE BALL OF WAX! Contact Mike, KF6ALB @ 415-359-3793

•Yaesu FT-101E w/ VFO, YC-601 digital display and scope. \$525. Collins KWM-2A, 3 pieces: Transceiver (round label), controller (wings label), and power supply (wings label). \$1000 or best *higher* offer. Heathkit Scope. SB-610. \$75. Hallicrafter Receiver. Model S38B. \$100. •Realistic DX300 Shortwave Receiver. \$80. Swan wattmeter, model WM3000, 0-2000 Watts. \$45. Drake WH7 Wattmeter. 0-2000 Watts. \$45. 13.8 V./20 Amp power supply. GSC, made in USA. \$65. Shure 444 desk mic. \$40. /offer. Astatic D-104 unamplified mic. (best offer). Contact Joe, KO6PS @ 707-546-6839

•Yaesu FT-2400, 50 Watt 2m Mobile. \$225. Homebrew 2m Base Antenna & •Cushcraft R5 HF vertical base antenna. \$200. Contact Marie, KI6QY @ 707-664-1978

•Heathkit DX-35 Transmitter. \$50/bo. Signal Corps BC-312-M Short Wave Receiver. \$85/bo. Contact William, KE6KSK @ 707-433-2245

•Kenwood TS-450S HF Transceiver with mic. \$750. Contact Mike, N6DBZ @ 707-823-0697

WANTED

•Wanted: Kenwood DSP-100, digital signal processor. Contact Andrew @ 415-656-3516

•Wanted: Geiger Counter. Condition not important. Contact Art, W6LGQ @ 707-762-2132

•Wanted: Vibroplex Deluxe Blue Racer bug. Must have the narrow chrome base. Contact Sam, WN6W @ 707-575-0400 or email: sbrewer@prodigy.net

•Wanted: Kenwood TW4000A Dual Band Mobile. Contact Lynn, KD6TYL @ 707-928-6944

•Wanted: Kenwood TS440S matching speaker; Wanted: Kenwood Interface IC kit - the IC-10, for computer control of the TS440S. Need the instruction manual, all cables and software. The two IC's are not necessarily needed. Contact Jack, W6MZ @ 707-526-6769 or email: w6mz@worldnet.att.net

BOARD MINUTES ... continued from page 4

Bill KH6GJV: Death Valley, Field Day, Alcatraz and Public Service pretty much have the time slots full for Spring and Summer for activity. Transmitter Hunts are every third Saturday at 9:00 at Piner.

Dave KD6KWM: Requested a typical schedule for putting on classes. None exists.

Public Service: The Public Service event for April and May were reviewed. See Club Meeting notes for more info.

Merl N6VUC: Emergency Preparedness Show at Coddington is Apr. 25, Steering committee is April 14.

Respectfully submitted by Steven Feil, KD6CJR, Secretary.

SHORT SKIP AUDIO TAPING PROGRAM

by John Breckenridge WB6FRZ

A Brief History

Beginning in October 1992, I undertook the task of reading the Short Skip onto cassette tapes and mailing them to visually-impaired hams and other interested parties. This service, beginning it's 5th year, has been continuous since then.

The Purpose

The goal of this service since its inception has been for the SCRA to provide free audio tapes of our monthly newsletter to the blind and visually-impaired, whether or not they were licensed, or club members. An interest in amateur radio and club events were the only criteria for receiving audio tapes.

How It Works

I mail an audio cassette in a special plastic mailer to the person who is to record next-month's Short Skip. The newsletter is printed and mailed. When received, the person who received the tape records the newsletter and returns the tape to me. I copy the tape and mail them to the recipients. After listening to them, the recipients mail the tapes back to me for re-recording of the next month's newsletter. The U.S. Post Office provides free delivery service for all our tape mailings. Aside from the initial expense in 1992 for some postage, plastic mailers and audio tapes, there is now no cost to the club.

Who Is Involved?

The two very hard-working and under-acknowledged members of this team who alternate the monthly task of recording the Short Skip onto audio tapes are: Laurel Meyer, KC6FKX, and Bob Phillips, N6RMW. They are the unsung heroes of the program. I do, however, gratefully acknowledge the monthly listing of their names and mine in the Short Skip under "Short Skip Staff." I started the program. My role for some time now, has been to manage the audio recordings, copy the masters, mail the tapes to the interested parties, and communicate with the SCRA Board of Directors.

How It's Going? How Many Now Get Tapes?

The first recipient (October, 1992) was Pat Malone,

KD6MAZ. Since then, the monthly mailing recipients eventually increased to a total of 8, and has been decreasing steadily due to moves, non-interest, and death. The two recipients that still remain are Pat Malone, KD6MAZ, and Charles Piazzi, AC6IS.

SCRAPS

We are still looking for a new Public Service Coordinator. However, in the interim I will list the dates of the public service events that are scheduled for April and May. So check your calendars and see if you can't help on one of these events.

On Sunday April 13, the Super Cities Walk is scheduled in Santa Rosa. The time of this event is from 8:00 AM to about 2:00 PM. We will need 11 operators to fill all the positions.

The next event is the Wine Country Century Bike Tour on Saturday May 3rd. It is a 1-- - 60 Kilometer ride with a 200 option. It starts at 6:30 AM and finishes about 5:00 PM. We will need 21 operators for this event. There are both AM and PM shifts for the SAG Wagons.

The last event on my list at this time is the Human Race on May 10th. The ham radio operators will be helping with the bicycle segment of this event. It starts about 7:00 AM and usually finishes by noon. It is at Anadell Park and the operators are sagged to their location by one of the park rangers.

If you are interested in helping the participants to have a safe and enjoyable outing sign up to help. It is a lot of fun and you will enjoy yourselves while helping others. So sign up and spend the day in the fresh air and hopefully in the sunshine. You will become one of a select group and can proudly wear your T-shirt showing that you have helped with on of the public service events.

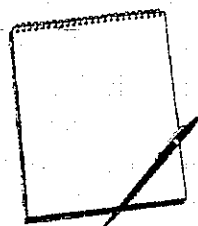
If you are willing to help give me a call at 707-664-1978 and sign up. Hope to see you there.

My thanks to the hams who have already offered their services on these events.

-73, Marie KI6QY

SCRA MINUTES

March 5, 1997

Submitted by Secretary
Steven Feil KD6CJR

The March 1997 meeting was called to order by President Steve Carniglia KV6A at 7:35 PM at HP Fountain Grove. Other officers present were: Vice President Rick Reiner K6ZWB, Secretary Steve Feil KD6CJR, Treasurer Joel Nadler KJ6LF, Members-at-Large Claude Jones AB6OL and Bill Hillendahl KH6GJV, Activities Chairman, Dave Willey KD6KWM and Public Service Chairman UNFILLED.

Visitors/New Members: There was 1 visitor present. New members include:

New Calls/Upgrades: KF6IVC

The minutes for the February meeting were approved. KK6WN/KM6XO

The Treasurers report by Joel Nadler KJ6LF is as published in Short Skip.

Activities Committee Report, by Dave KD6KWM: Bill KH6GJV reported on the progress of the Death valley trip. More information is elsewhere in Short Skip. Dave solicited help for Education Chairman position. Rick K6ZWB reported on the construction class that is starting this month. There will be a VE session on April 12 at HP. Call our info line at 579-9608 for more help.

Repeater Committee Report, by Kelly KD6CJQ: 440 is back on the air with new controller. Courtesy tone will be changing on 440. Antenna has been tilted toward Petaluma to better cover that area.

Public Service Committee Report. Marie stood in and asked that someone come forward to fill the position and offered her help. Coming events are Super Cities walk on April 13th, Wine Country Century the beginning of May, and the Human Race May 10. The Emergency Preparedness show is April 25.

RACES report by Merl N6VUC: Steering comm. meeting on April 14, 1900 County Center Drive at 7:00.

It was reported that Marlo KE6CR is now a Silent Key.

Net Control for April will be Phil KF6GNH.

Joe Senft was honored for his work on the antenna ordinances. A plaque will be presented at a later time.

Ken N6MHG told us about a Radio Control show in May and asked if anyone would help with a booth since one of the R/C bands is in the 6 meter band and Am. Radio can be used for

tracking lost plane and rockets.

Darlene KD6GCK asked for help in sending someone to the Emergency Response Institute in May.

Jim KE6VGV encouraged anyone who could to pay extra on their dues to better help support the club.

Jim KE6FSK announced an opportunity to provide public service in Rohnert Park on April 19.

Steven KD6CJR announced the upcoming KZST Book drive. An informal poll indicated about a dozen individuals interested. This is a great way to support the club as we get to keep \$10 from each book sale and you get great discounts on a ton of services.

Greg Gordon AC6VJ has offered to be our Education Chairman.

The program for the evening was presented by KV6A. The topic was GPS and its uses.

The raffle was conducted by Rick K6ZWB. Prizes were provided by ARDCO and HSC. Please patronize these fine establishments to show our thanks for this support.

The quarterly raffle prize was a GPS unit. It was won by Steve KV6A.

James pulled Brian N7MOE for the membership lottery. He was present and got the loot.

The meeting was adjourned at about 9:40 PM.

Board Meeting Minutes

March 12, 1997



The March 1997 Minutes of the Sonoma County Radio Amateurs board meeting held at the Bank of the West on Marlow Rd. Members of the board present were: Vice President, Rick K6ZWB; Secretary, Steven KD6CJR; Treasurer, Joel KJ6LF; Members-at-large, Claude AB6OL and Bill KH6GJV; Activities Chairman, Dave KD6KWM and Public Service Chairman, Vacant. There was also 1 other SCRA member present. The meeting was called to order at 5:40 PM by President Vice President, Rick K6ZWB.

Rick K6ZWB: The first choice for a Field Day Site is not available. Several other sites were considered, but none of them will prove adequate.

Steve KD6CJR: Board officially endorses and supports the KZST book drive.

Joel KJ6LF: Repeater and Club calls are due for renewal. Lots of membership renewals coming in.

-Continued Page 6



SATELLITES

by Bill Waters AC6MA



The SPACE AGE can be said to have started on October 4, 1957, the day the Russians launched their first satellite, Sputnik I (in Russian, Sputnik translates into "traveling companion"). This simple satellite weighed about 185 pounds, and carried only a thermometer and a rudimentary radio transmitter. Since that momentous date thousands of satellites, carrying ever-more-sophisticated payloads, serving the human race in numerous ways, have been launched and successfully orbited.

Any attempt to classify satellites according to function is necessarily arbitrary, but some degree of classification is useful. The following list is far from complete, but does list the more useful types of vehicles:

- ✧ low-altitude reconnaissance
- ✧ research missions of all types
- ✧ communications
- ✧ navigation
- ✧ weather monitoring
- ✧ medium- and high- altitude reconnaissance
- ✧ deep space exploration
- ✧ astronomical, including planetary landers and orbiters
- ✧ human life support, such as the Space Shuttle or Space Lab

The detailed size, weight, and physical structure of satellites are dictated by the individual mission, but there are some common characteristics, such as:

- ✧ Operation is in an almost perfect vacuum
- ✧ Operation can be in the full glare of, and exposed to the solar wind from the sun, or deep in the earth's shadow, or cyclically from one to the other.
- ✧ The general structure consists of a mechanical framework, a number of subsystems designed to assure proper operation of the vehicle, and certain PAYLOAD hardware, computers and software peculiar to the individual mission. Few satellites are designed to serve more than one purpose.
- ✧ The vehicle must survive severe shock and vibration during launch and injection into final orbit, as well as other environmental demands associated with the weather at the launch site and transportation from the place of manufacture to the launch site.
- ✧ The design must include some provision for disposing of the satellite at the end of its useful life. If it is feasible, the vehicle should be reusable.
- ✧ The mechanical design must be compatible with whatever launch vehicle will be used to place the vehicle into space. For example, the cargo bay of the Shuttle is about 15 feet in diameter and 60 feet long, and can carry up to about 30,000 pounds.
- ✧ There must be equipment on board that permits the vehicle to be controlled from the ground.

Satellites are launched from the earth and maneuvered in the space environment through the use of rocket engines of varying

sizes. In all cases the force that provides the propulsion, or push, comes about by the expulsion of hot gases from the exhaust end, or mouth, of the rocket nozzle. A very large engine, such as those of the Saturn or Titan launch vehicles can generate a steady thrust of several million pounds, lasting for several minutes. By contrast, the small engines used to cause the antennas of deep-space research satellites to point at the earth may produce a thrust of only a fraction of one pound, and then only in pulses lasting a few milliseconds each (but capable of repeated pulsing).

It can be said that space operation from the earth is just barely possible. By this several things are meant, i.e.:

✧ The force of gravity being what it is, and the capabilities of rocket fuels being what they are, the weight of the payload of any space vehicle is a very small fraction of the combined liftoff weight of the launch vehicles, their fuel, and the payload vehicle. For example, a large Intelsat communications satellite, weighing in at about 1300 pounds, may be launched by a rocket/fuel combination weighing 2.5 MILLION pounds at liftoff. If the force of gravity was 20% or 30% greater, or if the best rocket fuels were 20% or 30% less effective, it would be incredibly more difficult to launch ANYTHING into orbit around the earth.

✧ For most space operations no repairs or replacements are possible after liftoff, so everything must work properly, and all the possibilities of failure must have been accounted for, and the reliability of everything associated with the mission, every nut, bolt, screw, resistor, IC, capacitor, rocket valve, or whatever, must do its job and keep doing it whenever called upon, with incredibly little room for malfunction.

✧ The cost of space operations is so high that, with a few exceptions, only governments (and well-heeled ones at that) can afford any beyond very simple missions; so far the only viable commercial space operations have been confined to those involving communications, where a strong demand for the service creates also a substantial steady revenue. On the other hand, significant space operations are indeed within the financial means of the many countries that have contributed over these past 38 years. And, it goes without saying, the amateur radio community has found ways to get its own vehicles designed, built and launched, cost or no cost!

A chapter of the story of space development that is of special interest to radio enthusiasts deals with the advances in the communications field, much of which has taken place through the efforts of those to whom amateur radio operation is also a hobby. Included in this area are reductions of the noise figure of microwave amplifiers, development of high-reliability transmitting tubes and solid-state devices, large steerable antennas, automatic tracking systems, and digital modulation/demodulation techniques. More will be said on these topics in later articles.

For a brief description of the various types of space vehicles listed above, see the next issue of Short Skip.

12 Store Buying Power!



HAM RADIO OUTLET

WORLDWIDE DISTRIBUTION

Look for the
HRO Home Page
on the World Wide Web
http://www.hamradio.com

ANAHEIM, CA 92801
933 N. Euclid St.
(714) 533-7373
(800) 854-6046
Janet, WA7WMB, Mgr.
Near Disneyland

BURBANK, CA 91506
2492 W. Victory Blvd.
(818) 842-1786
(800) 854-6046
Eric, KAGIHT, Mgr.
Victory Blvd. at Buena Vista
1 mi. west I-5

OAKLAND, CA 94606
2210 Livingston St.
(510) 534-5757
(800) 854-6046
Mark, KE6OPF, Mgr.
I-880 at 23rd Ave. ramp

SAN DIEGO, CA 92123
5375 Kearny Villa Rd.
(619) 580-4900
(800) 854-6046
Tom, KM5K, Mgr.
Hwy. 163 & Claremont Mesa

SUNNYVALE, CA 94086
510 Lawrence Expwy. #102
(408) 736-9496
(800) 854-6046
Ken, K1ZKM, Mgr.
KDM@HAMRADIO.COM
Lawrence Expwy.
So. from Hwy. 101

NEW CASTLE, DE 19720
1509 N. Dupont Hwy.
(302) 322-7092
(800) 644-4476
Bob, WN3K, Mgr.
RT.13 1/4 mi., So. I-295

PORTLAND, OR 97223
11705 S.W. Pacific Hwy.
(503) 599-0555
(800) 854-6046
Earl, KE7OA, Mgr.
Tigard-99W exit
from Hwy. 5 & 217

DENVER, CO 80231
8400 E. Iliff Ave., #9
(303) 745-7373
(800) 444-9476
Joe, KD8GA, Mgr.

NEW LOCATION!

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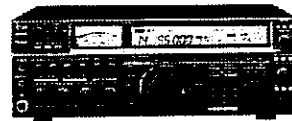
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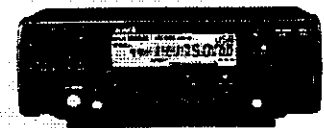
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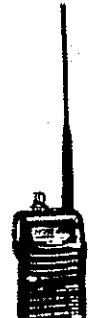


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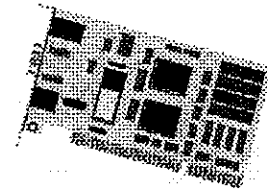
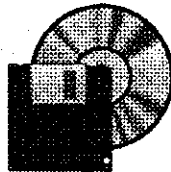
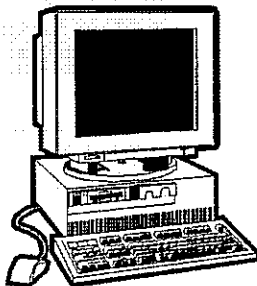
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