QEX June 40 1985 $1

The ARRL Experimenters' Exchange

Spread Spectrum Day at the FCC

May 9 was indeed spread-spectrum day at the FCC. The Commission approved limited spread-spectrum operation in the Amateur Radio Service under General Docket No. 81-414. Permission to operate is delayed for one year "to give the amateur community time to develop initial voluntary interoperability standards as they have done recently in packet radio." The Washington, DC-based Amateur Radio Research and Development Corporation (AMRAD) has been the core group in spread-spectrum experimentation. They have already held an exploratory meeting about formation of a standards committee. League participation in, or sponsorship of, a spread-spectrum standards committee is a matter to be decided by the ARRL Board, which meets next in late July.

Spread spectrum will be limited to amateur frequencies above 420 MHz. Only frequency-hopping and direct-sequence modes are authorized. Hybrid techniques (involving both spreading techniques) or other spreading modes are prohibited. Power output is limited to 100 watts. Only certain code sequences which are authorized must be from the output of one binary linear-feedback shift register (which may be implemented in hardware or software). Only the certain code sequences specified in the Report and Order may be used.

AMRAD has been experimenting with spread spectrum since 1981 under Special Temporary Authority (STA) granted by the FCC. They have reported good results frequency hopping the Williams frequency synthesizer (**QST**, April, 1984). The synthesizer is now available in kit form from A&A Engineering, 7970 Orchid Drive, Buena Park, CA 90620, tel. 714-521-4160, for $156.90. A&A also has the controller kit for $59.65. -- W4RI

West Coast VHF/UHF Conference

A talk on TR switching by Chip Angle, N6CA, opened the show. Terry Cummings, WA6WCB, discussed GaAs FETs and their applications. "Radios on a Chip" were presented by Box Zavrel, W7SX. I brought back some state-of-the-art FM subsystem and mixer chips which are perfect for a universal 30-MHz IF microwave receiver. Jim Eagleson, WB6JNN, gave a talk and demo of OSCAR and amplitude compandored single sideband (ACSSB). Jim and his group have circuit boards for plug-in adaptation of virtually any rig. I had an opportunity to speak to the audience about the need for, concept, and format of the new UHF/microwave book. Here were a few impressions I got from the group:

Establishment of VHF/UHF/microwave beacons should be promoted by the ARRL with frequency coordination from the outset. Weak-signal experimenters felt that band plans should put beacons further away from the low end than at present. It appears that strong and/or spectrally impure beacons have disrupted band openings out west.

The "ARRL's new attitude" toward promotion of VHF and above was perceived as a powerful force in revitalizing a tired hobby. Concern was expressed about the lack of young blood entering the hobby and later, the RF industry.

There was positive interest, among the Californians, in microwave bands 10 GHz and above.

As editor of the ARRL's forthcoming UHF/microwave book (now in the writing and editing stages), I was particularly pleased to have the opportunity of seeing a number of contributors to the book. I also encouraged potential authors to submit VHF/UHF/microwave articles for QST. -- W1LJ

Correspondence

Crystal Oven Control

About 1959, I learned of a concept for crystal oven control I've not seen since. Change of state, solid to liquid, is coupled with a change in volume because of molecular alignment changes at the melting point. If a mass of material is heated in a container thermally coupled to a crystal holder, the change in volume coupled by a diaphram to a pile of carbon disks results in a resistance change to control the oven heater. A dual oven was used, the inner oven at a higher temperature, which resulted in very close control (approximately 0.001°C). Will someone advise if this product is still available? What would you recommend for the solid-liquid state change materials? I'm not sure, but the firm was possibly in California, under the name of Robert Shaw Fulton Controls. — D. J. DeWitt, 604 W. 26th, Anchorage, AK 99503.

Packet Radio Adapter for IBM PC Software Available

My article, "A Packet Radio Adapter for the IBM PC," (**QEX**, January 1985), has brought a large number of inquiries. Most question the availability of software to support the 8273 adapter.

Software is available from my club, Hamilton and Area Packet Network (HAPN), that supports the VADCG protocol and provides a full range of host support features. We ask for a $15 contribution to our club for the software. Send a formatted diskette and mailer to VE3LNY at my address below. The diskette includes source code. The protocol driver is written in PC-assembler and the host support programs in CI-C86 C.

Unfortunately, AX.25 is not yet available for this adapter. We would like to hear from anyone who might be interested in converting the software to AX.25. You should have a good working knowledge of the AX.25 protocol and PC-assembler programming. — Jack Botner, VE3LNY, 35 Wynford Hts. Cr. #1708, Don Mills, Ontario, CANADA M3C 1L1.

AMTOR Error

There is a small error in the copy of my report to the FCC that was published in the March issue of **QEX** on page 8. The report deals with my operation of an AMTOR station on the HF bands under an FCC Special Temporary Authorization (STA).

At the bottom of page 8, right column, last line, the word "unattended" should be changed to "attended." When corrected, the report should read: "Only twice was abnormal operation noted on that frequency [the frequency used by unattended stations, pbn]. Both were from an **attended** station where the operator had sent a lengthy broadcast message (CQ) and then forgot to disengage the transmitter."

Thank you for publishing the report. I hope it encourages other interested parties to support the League's petition for unattended operation of Amateur Radio stations. — Paul Newland, AD7I, P. O. Box 205, Holmdel, NJ 07733.

Update on the TI GaAs FET S3030

The Texas Instruments GaAs FET (S3030) used in the preamplifier in December 1984 **QEX** is not available in the U. S. It is built by TI in Germany and sold in Europe. -- Chuck Hutchinson, K8CH, Technical Dept. Manager, ARRL.

Another Look at Power Sharing Between Two Transformers

The problem posed by W2MLO has exercised my mind at various times in the past, particularly since I gained access to a large quantity of very high quality filament transformers resulting from the demolition of two RCA TRT1 video recorders. My problem was to use these transformers with their 115-V primaries on our 230-V, 50-Hz mains supply; fairly obvious is that the primaries of a pair should operate in series to preserve the turns-per-volt ratio. Running the secondaries in series made it possible to ensure that the load was spread evenly, or at least in proportion to the ratio of the actual secondary voltages. (The temptation to use the common junction of the secondaries as a center tap, must be resisted to ensure that at least the current is equal in both secondaries. If this is not done, thermal runaway can take place as a result of relatively minor imbalances in the system.) Using this principle, a 12-V dc supply was built and used over the past two years with satisfactory results.

The misgivings I have over the W2MLO circuit stem from the number of ways in which a thermal runaway situation can arise, plus a distinct feeling of disatisfaction over using dissipative elements to equalize the load sharing. I assume that the load will be more than a single transformer can handle — otherwise there would be no reason to use two! An open circuit in either of the two primary or secondary circuits will leave the other overloaded with disasterous results, as will problems in either of the two rectifier bridges. Short circuits will have the usual unhappy effects. If a two-phase supply (230-V phase to phase) is available, a more failsafe scheme can be envisioned. Connect the primaries in series across the 230 volts, but do not connect the common point to the neutral. Connect the secondaries in series, again leaving the common point floating. Rectify with a bridge rectifier. At this point, we have twice the required voltage at half the required current, so we use a switching regulator to reduce the voltage and increase the available current. This scheme should be failsafe to open circuit faults, at least as energy efficient as the published parallel scheme, and no more susceptible than any other to short circuit faults. We save a couple of resistors and a rectifier bridge at the expense of the switching regulator circuitry; even this may be of little consequence if regulation was intended to follow the original circuit. Exar, and some second sources, make a rather nice chip holding most of the circuitry necessary for the implementation of the switching regulator and publish an excellent application note on its use. (XR1524 or LM3524; perhaps there is an expert out there who could write an article on the design of switching regulators.)

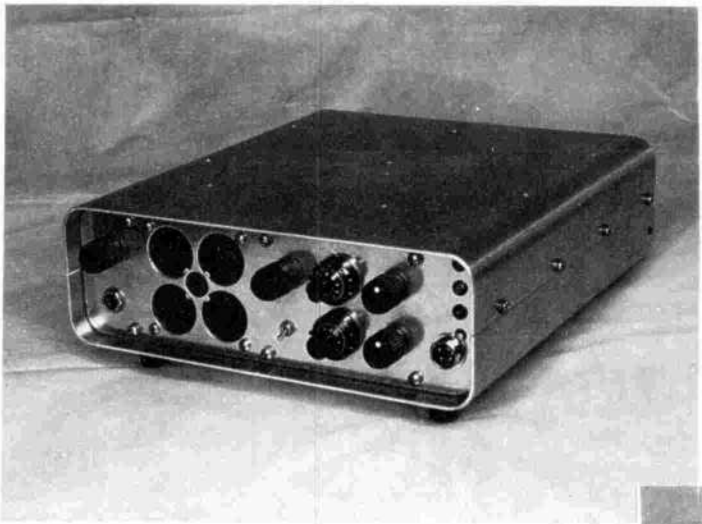
Finally, I would like to take this opportunity to congratulate the **QEX** staff on its production. It is definitely my sort of Amateur Radio publication — down to earth, mathematical where necessary, and timely. Gloss and slick we do not need. When I can no longer justify the expense of ARRL membership and **QST**, **QEX** will still be worth twice its present price to me. -- Llew Amon, ZL4LI, 700 Castle St., Dunedin, NEW ZEALAND.

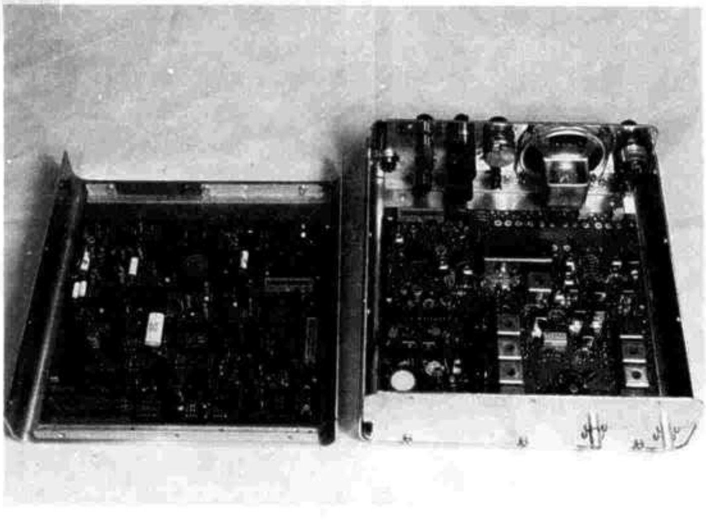
A Report on ACSSB Progress

Here is a quick update on the progress of my version of the ACSSB effort. As seen from the two photographs, I do have some hardware assembled, and shall be wiring the ACSSB transceiver soon. If there is any interest, I can supply some drawings on the homemade cabinet. I had it cut and bent locally, but finished the metalwork myself. The cost of the bending job was about $20 for each of four such boxes.

I am initially providing two crystal channels using 13.6511 MHz +0.0025%, 30 pF, parallel mode rock for the band segment 144.26 to 144.30 MHz, and a similar rock at 13.8367 MHz to cover 145.93 to 145.965 MHz. The first channel is for terrestrial communications and the second is for AO10 operation.

I plan to get the receiver operation going first so I can listen to "the voice," WA2LQQ, on AO10, then go for the transmitting. -- Dick Jansson, WD4FAB, 1130 Willowbrook Trail, Maitland, FL 32751.





Putting the Azden PCS 3000 on Packet

By Frank Roberts,* VE3FAO

The Azden '3000, a 2-m FM transceiver, appeared to be a good choice for packet radio because of its state-of-the-art design and pin diode switching (2.0 ms). It did, however, take more effort than expected to interface the rig to a modem for the terminal node controller.

If you own an Azden '3000 or have access to one, the following information should assist you in your effort to interface this transceiver to a modem for packet radio.

I. Receive Data (Audio Out)

The audio output directly from the AF amplifier proved unsatisfactory to drive a 202 type modem. There is a sharp roll off at about 2 kHz resulting in the 2200 Hz tone being half the amplitude of the 1200 Hz tone.

The audio output of Q201 at C241 made a good choice to extract the receive data signal. This was fed through a 0.1 capacitor to the external speaker jack (Fig. 1).

Procedure

A. Delete the green wire between J703 pin 1 and the "internal" side of the speaker switch.
B. Disconnect the red wire from J703 pin 2.
C. Connect the red wire to the "internal" side of the speaker switch.
D. Add a 0.1 capacitor from the audio out of Q201 to J903 pin 1.

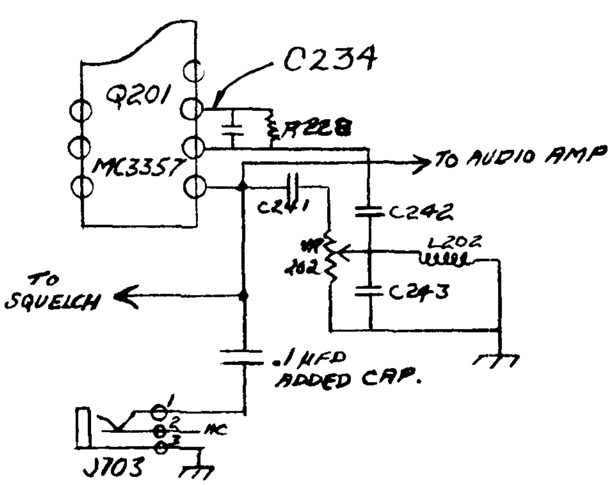


FIG 1
AZDEN RECEIVER

II. Transmit Data (Audio In)

The transmit data signal was wired directly to the microphone input, and the output amplitude resistor of the modem (Pin 3 of XR2206) adjusted to present the same levels to the input amp as the microphone. The problem with this arrangement is that the TNC sends flags continually in an idle state and a switch must be introduced to select either the TNC or the mike. This proved inconvenient since I kept forgetting to throw the switch when going from voice to data. The cure was to wire transmit data to the PTT switch inside the microphone case (Fig. 2).

Procedure

A. **Caution:** Disconnect the 13.8-V line inside the Azden control head and tape. (Red wire at Pin 6 of J106.) If this is not done, 13.8 volts will be applied to the microphone cartridge.
B. Open the microphone and locate the white wire which is unattended. (This is the 13.8-V supply intended for the touch-tone option.)
C. Connect this white wire to Pin 3 of the push-to-talk switch (Fig. 2).

To introduce the transmit data line and also

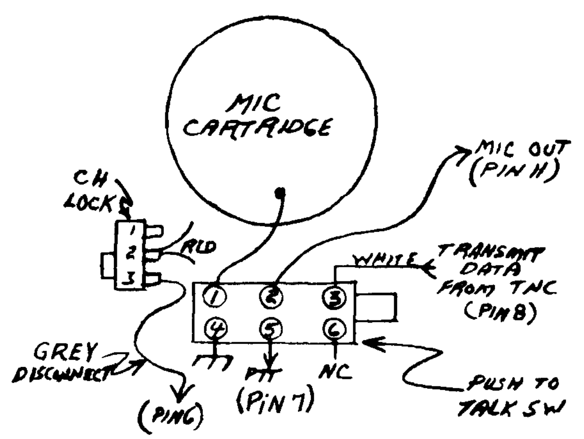


FIG 2
INSIDE MICROPHONE

*27 Willis Dr., Brampton, Ontario, CANADA L6W 1A8

access the squelch and PTT lines, it was necessary to build a junction box with two 12-pin connectors matching the Azden's microphone connectors and a plug for the external speaker jack wire according to Fig. 3.

III. Carrier Detect (Squelch)

The first attempt to tap the squelch circuit proved unsatisfactory. Since the Azden scanning circuit introduces a 3-second delay into squelch, scanning is not resumed between transmissions. It is necessary to tap this circuit prior to the delay and bring the squelch signal out through the microphone connector. I chose to eliminate the key lock feature to free up Pin 6 of the connector, so the squelch signal could be brought out.

Procedure

A. **Caution:** Disconnect the lead-to-channel-lock switch in the microphone and tape (gray lead on Pin 3, Fig. 2).
B. In the control head, unsolder the yellow lead to Pin 1 of J106 (closest to R117) and tape. This is the channel-lock or key-lock signal.
C. Add a jumper from the vacant Pin 1 of J106 to Pin 4 of J108 (cathode side of D108).

IV. Request to Send (Push to Talk)

The PTT addition was straight forward and can be wired to Pin 9. It was necessary to add a jumper between Pin 2 (ground) of each connector in the junction box so the PTT switch on the microphone should operate (see Fig. 3).

From this point all signals required for the modem are available in the junction box. Use shielded cable between the junction box and modem.

No attempt was made to jumper any of the functions normally found on the Azden microphone for operation in packet mode. All these functions operate normally except channel lock when the microphone is connected directly to the Azden.

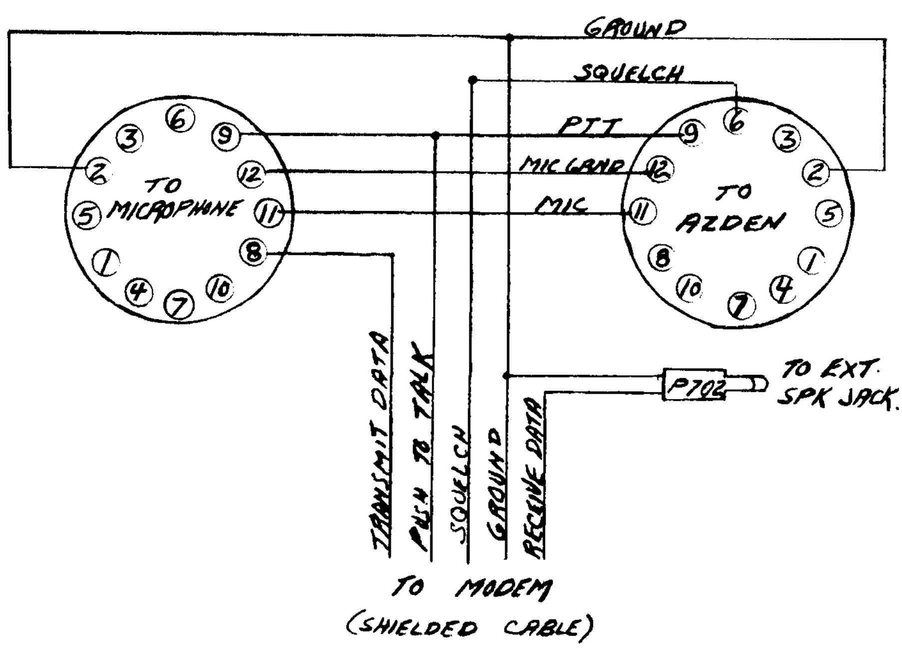


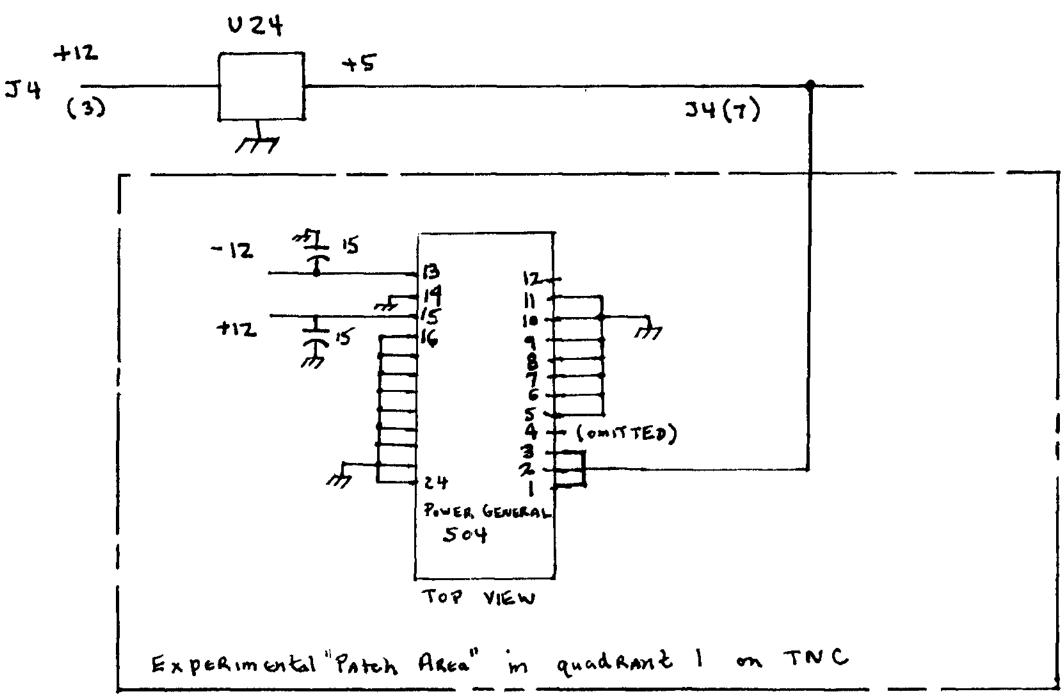
FIG 3
JUNCTION BOX

TAPR TNC Modification for 12 V Use

By Robert Ball, WB8WGA

I have modified my TAPR TNC for 12-V portable operation by installing a Power General dc-to-dc converter chip to generate the ±12-V source for the EIA and analog circuitry. The circuit, as shown on the data sheet, can be referenced below.

I removed U22 and U23 from the board since they are no longer needed. Note the power dissipation in U24 increases about 4 watts, but the supplied heatsink is adequate if mounted properly on the chassis. The board will still operate properly from 12 volts. If you desire to leave the 12-V source connected while operating from the ac supply, a diode should be provided in the +12-V lead connecting to J4. The TNC draws about 1 amp from a 13.5-V power source.



Book Review

By Maureen Thompson,* KA1DYZ

Videodisc and Optical Memory Systems
by Jordan Isailovic. Published by Prentice-Hall, Inc., Englewood Cliffs, NJ. First edition, 1985. Hard-bound, 7 x 9-1/2 inches, 350 pages. $32.95.

You have just purchased a new VCR at your local home entertainment center. Rushing home in excitement, you cannot wait to connect it to your TV to record a favorite program. With all switches set at their appropriate position, everything is go. What happens inside the unit though? How does it grasp and record the signals?

The recording of a videodisc is usually performed by a laser and playback is done on the basis of various pickup sensors, either optical or capacitive. The disc is usually a metallized plastic, representing an inexpensive memory medium of very large capacity. At present, a disc provides 30-120 minutes of TV programming in color with stereo sound reproduction. For computer applications, they are nondestructive memories with a capacity of over 30 million bits. These numbers may be easily surpassed within the next few years. The VCR is only one such system using this new technology, but one that many can relate to. In the first edition of Mr. Isailovic's book, he reviews the application possibilities of a videodisc not only for entertainment, but in medicine, military services, and so on.

The concepts underlying videodisc system applications are new, but the ideas date back to the late 1800s. Thomas Edison in 1877 made the first recording and playback of voice on a wax cylinder. Optical videodisc development has roots dating back to the late 1950s.

Mr. Isailovic's book consists of seven chapters and considers theoretical, as well as practical, aspects of the videodisc systems and optical data storage systems. Originally written as a sixteen-chapter publication, the material had to be broken into two separate books because of publishing constraints. Taking a look at each individual chapter of the first in a series, chapter 1 is a short survey of the book -- the basic problems and principles. The videodisc is compared with the videotape and optical read/write discs. TV signal recording: standard format versus extended play, optical versus capacitive discs and videodisc standards are examined. A comparison of present and future uses of these systems are also made.

Chapter two discusses various recording processes. A comparison of optical and capacitive systems are reviewed in general, and then separately. The videodisc is considered from the production point of view. Different techniques of mastering are described.

Having constructed pits in the form of a spiral track upon the disc surface, an accurate means of reading the information is necessary. Chapter three contains the principles and descriptions of the basic optical playback system. The functioning of the basic servo systems is also given.

The development of a low-cost capacitive videodisc system is based on three basic designs: the grooved disc, a capacitance stylus (incorporates a metallic electrode deposited on it), and a 450-r/min disc rotation speed. Chapter four is basically an instant replay (no pun intended) of chapter three, except it is in the area of capacitive playback systems, with emphasis on the pregrooved system and a flat disc.

The fundamentals of optics, very important for an understanding of the science of videodiscs and memory systems, are presented in chapter five. Broken down into three sections, it includes geometrical optics, physical optics and spectroscopy.

Chapter six takes a look at a controversial topic in Amateur Radio circles -- noise in the system. System impairments usually mean that the output signal differs from the input signal, and videodiscs are no different!

Optical videodisc technology includes the storage and retrieval of random-access graphics on videodisc, as well as storage of digital information. Chapter seven concludes the book by examining optical data storage (draw, write once/read many times, and so on), programmable and erasable.

As a newcomer to this area, I found one inconvenience. A glossary of terms, associated with this new technology, does not appear anywhere in print. As I came across a new word, I could not easily reference its meaning at the end of the chapter in which it had been introduced, or at the end of the book. I did have a dictionary of electrical/electronic terms at hand, but this does not mean everyone reading the book will be as lucky as I.

An informative introduction starts each new chapter, sometimes including the history of the topics for discussion, as well as various concepts. A complete list of references and appendices, where appropriate, accompany each chapter. This is useful for the reader who would like to research the subject further. Overall, the book was a complete work of how videodiscs and optical memory systems function — from start to finish. The text layout is well done with numerous figures, graphs and some photos, depicting different processes. Well-drawn illustrations and block diagrams of various systems appear throughout the book. I would recommend Mr. Isailovic's book to anyone interested in this subject area.

*QEX Assistant Editor

Bits

Project OSCAR — ACSSB Level 1 Compandor

A set of printed circuit boards is available from Project OSCAR to provide ACSSB Level 1 through OSCAR 10. These boards provide both compression and equalization during transmission and de-equalization with expansion during reception.

By using ACSSB Level 1, a net increase of 10-20 dB in signal-to-noise performance is obtained with signal levels normally encountered via OSCAR 10. This processing **will not** improve signals that are already too weak to copy by experienced operators, but it **will** greatly improve the copy and quality of reception of moderately weak stations.

On stations 8-12 dB above the noise level, this improvement is about 5-15 dB...increasing with increasing incoming SNR. Signals arriving at 12-18 dB above the noise will produce "near full quieting" when processed at both ends. Signals above 18 dB are, for all practical purposes, "full quieting."

Please note: Level 1 processing provides companding and equalization only and will not improve rapidly fading signals. We are working on a second add-on unit to provide a pilot tone for AGC purposes, but this is not part of the current adapter. These second units will require the Level 1 boards, however.

Prices: (Donation...all excess to go to satellite projects.)

1) Level 1 Adapter PC Board (Double sided, plated through holes, commercial grade.) This includes 10 page documentation package including parts lists, schematics, layout, and parts sources with stock numbers. (TX and RX on one 3.8 x 3.5" PCB.) **$15.00**

2) Level 1 Adapter PC Board Set (As above except **two** 1.9 x 3.5" PC Boards for use in individual Pomona 2902 die-cast boxes or equivalent. Allows totally separate TX/RX functions for individual radios.) **$15.00**

3) Extra Boards (1) or Sets (2) **$10.00**

4) Extra Documentation Package **$1.00**

NAME:________________ **CALL:**________________

ADDRESS:________________ **CITY:**________________

STATE:________________ **ZIP:**________________

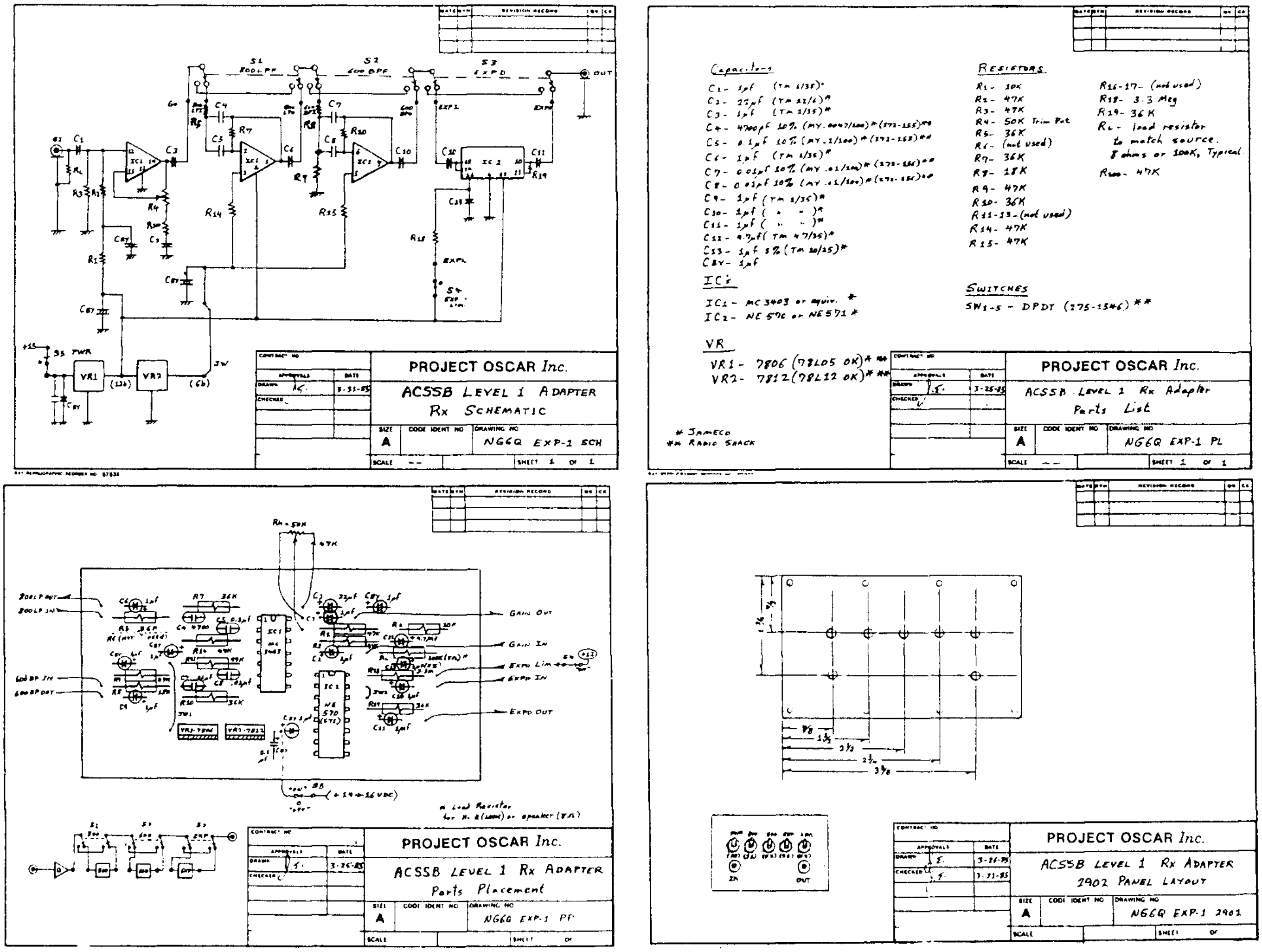
UNIT	QUANTITY	COST	TOTAL
1)	______	$15.00	______
2)	______	$15.00	______
3)	______	$10.00	______
4)	______	$ 1.00	______

TOTAL__________

(Allow 3-5 weeks delivery)

SEND TO: PROJECT OSCAR - ACSSB 1, 15 Valdez Lane, Watsonville, CA 95076

A sample of the documentation for the ACSSB Level 1 Adapter PC Board is shown below. For complete information on this project, contact: Project OSCAR — ACSSB 1, 15 Valdez Lane, Watsonville, CA 95076.



1/4-size documentation sample

QEX Subscription Order Card

American Radio Relay League

Newington, Connecticut, U.S.A. 06111

QEX, The ARRL Experimenter's Exchange is available at the rates shown at left. Maximum term is 12 issues, and because of the uncertainty of postal rates, prices are subject to change without notice.

For 12 issues of QEX
in the U.S.
☐ ARRL Member $6.00
☐ Non-Member $12.00
in Canada, Mexico, and U.S. by First Class Mail
☐ ARRL Member $11.00
☐ Non-Member $17.00
Elsewhere by Airmail
☐ ARRL Member $21.00
☐ Non-Member $27.00
Remittance must be in U.S. funds and checks must be drawn on a bank in the U.S. Prices subject to change without notice.

☐ Renewal ☐ New Subscription

ARRL Membership Control # ____________

Name ____________ Call ____________

Address ____________

City ____________ State or Province ________ Zip or Postal Code ________

Profession: ____________ Signature ____________

Payment Enclosed ☐

Charge to my ☐ Mastercard ☐ VISA ☐ American Express

Valid from ________

Account # ____________ Good thru ______ MC Bank # ________

Signature ____________ Date ____________

QEX1 385

Call for Papers

AMSAT, The Radio Amateur Satellite Corporation, Inc., has issued a call for professional papers reporting original work and/or significant findings in the field of low-cost satellite engineering, space communications, space sciences and related social value issues. A list of suggested topics is provided below. The list is not comprehensive.

Accepted papers will be published in the premiere edition of The AMSAT Technical Journal, which has a publication date of December 1, 1985. Approximately 12 to 15 papers are anticipated to be published in the premiere edition.

Papers are due before August 1, 1985 and should be mailed to: AMSAT Technical Journal, P. O. Box 27, Washington, D. C., 20044.

Suggested topics include:

Telecommunications including telemetry encoding schemes, command and control, ranging, tracking, modem design, modulation schemes, communications theory; analog voice processing techniques such as ACSSB; digital voice encoding techniques such as LPC-10, APC and CVSD modulation; packet radio techniques with emphasis on higher order networks; intermeshed terrestrial and space-nets; gateway/teleports; application/adaptation of cellular mobile radio switching technology; mobile satellite communications; solid-state power amplifiers for space use; very low noise preamplifiers; antenna design including active phased arrays; use of SHF and above; computer sciences applications including tracking programs with emphasis on speed and graphics capabilities; telemetry processing, analysis and display; orbit modeling and optimization techniques; space sciences including ionospheric physics, geo-magnetics; mechanical engineering; thermal engineering including active and passive thermal control systems, structures; propulsion systems with special emphasis on low-risk, low-cost approaches; active and passive attitude control systems, radiation hardened systems; reliability engineering and modeling for space applications; system architecture; social-value issues; emergency communications; geo-synchronous concepts; inter-satellite crosslinks; power conditioning systems; ultra-high efficiency, long-life solar cells and specialty coatings; advances in battery design.

Papers must contain a one paragraph abstract and be limited to 10 pages maximum including graphs, tables and references. An author's guideline information sheet is available from AMSAT at the address above. Papers submitted for consideration should not have been previously published. Specific exceptions can be made in certain special cases.

Papers will be refereed by a distinguished panel of experts. Each referee will be an expert in his field.

In addition, an outstanding group of professionals has been named to ensure the authenticity and accuracy of materials appearing in The AMSAT Technial Journal. Those already named to the Editorial Advisory Board include:

Dr. Mario Acuna, LU9HBG, NASA
Dr. Thomas A. Clark, W3IWI, NASA
Dr. Martin Davidoff, K2UBC, Catonville College
Dr. Al Dayton, KA4JFO, International Mobile Machines
Dr. John DuBois, W1HDX, Dytron-Thermologic
Dr. Owen Garriott, W5LFL, NASA
Mr. Richard Jansson, WD4FAB, (retired from Martin-Marietta)
Mr. Phil Karn, KA9Q, Bell Communications Research
Mr. Jan King, W3GEY, Skylink, Inc.
Dr. Perry Klein, W3PK, Washington Cable
Dr. Robert Leonard, KD6DG, SRI International
Dr. Robert McGwier, N4HY, Auburn University
Dr. Henry Magnuski, KA6M, Gamma-Tech
Mr. Harold Price, NK6K, PACSAT
Dr. Steve Robinson, Hahnemann Medical Center
Dr. Cleyon Yowell, AD6P, The Aerospace Corporation

New Publication on Bilateral Sensorineural Deafness

The cochlear prosthesis is a potential solution for patients handicapped by severe bilateral sensorineural deafness. This book presents a multidisciplinary approach to the development of the cochlear prosthesis (implant) from an international group of authors representing eleven prosthesis projects in six different countries. The book combines both basic science and clinical papers pertinent to the field and stresses the coding required in converting auditory signals, especially speech, into electrical signals delivered to the auditory nerve by several different approaches. Towards this end, basic science sections in auditory neurophysiology and speech science are presented stressing those aspects pertinent to cochlear prosthesis coding. The damage-risk problem is addressed by bench and animal studies that consider the topics of cochlear and neural damage produced by physical implant trauma and/or electrical stimulation. The clinical results from each prosthesis group are presented for evaluation by the reader.

Price: $100.00, published May 1983 (Vol. 405 of the **Annals**). The Conference was held April 14-16, 1982. ISBN: 0-89766-202-4, 532 pages, 45 papers plus Round-Table Discussion. For further information and an order form, contact: The New York Academy of Sciences, 2 East 63rd Street, New York, NY 10021.

Intel Announces Two New EPROMs

A new generation of high-density EPROMs and programming module are now available from the Intel Corporation. The 27512 EPROM is a powerful byte-wide 512-kbyte device that is compatible with JEDEC-approved EPROM densities up to 256 kbytes. The 27513 EPROM is an upgraded 512-k design featuring paged addressing. Both are based on Intel's proven HMOS II-E technology and use industry-standard 12.5-V programming voltage. Benefits consist of improved performance, lower power dissipation and much faster programming times.

Intel's iUP FAST 27/K Programming Module, with the U1 upgrade kit, allows programming of the new EPROMs in 6 minutes or less. The same modules offer similar savings for 2764A, 27128A and 27256 EPROMs. It allows you to employ a familiar software interface on your existing development tools. Programming is available on-line for all Intel development systems from the iPDS™ on up to the NDS II, or, off-line using the iUP 201A Universal PROM Programmer. For further information on the 512-K EPROM family and programming module, contact the Intel Corp., 3065 Bowers Ave., Mailstop SC6-713, Santa Clara, CA 95051.

The TSC7650 — A New CMOS Operational Amplifier

During the last quarter of 1984, Teledyne Semiconductor announced a new CMOS operational amplifier -- the TSC7650. The TSC7650 chopper stabilized op amp practically removes offset voltage error from systems, and is a direct, pin compatible replacement for the GE/Intersil ICL7650 amplifier.

The 5-µV maximum offset voltage specification represents an improvement 15 times over the industry standard bipolar OP07E. The 0.05-µV/°C maximum offset voltage drift specification is 25 times lower than the OP07E. The TSC7650 premium specifications eliminate the need for Vos trim procedures, periodic readjustment and system errors caused by faulty or misadjusted trim potentiometers. The performance advantage is achieved without the additional manufacturing complexity and added cost caused by laser or "Zener Zap" offset voltage trim techniques.

The TSC7650 nulling scheme corrects dc offset voltage error and offset voltage drift with temperature. Offset nulling voltages are stored on two user supplied external capacitors. The applied input signal is never disconnected from the main amplifier. This eliminates output switching spikes. The nulling method keeps Vos errors low throughout the TSC7650 operating temperature range. Laser and "Zener Zap" trimming correct for Vos errors at only one temperature.

Complementing the low Vos errors is a 10 pA maximum input bias current specification. System error sources are further reduced by 120 dB minimum open loop voltage gain, common mode rejection and power supply rejection specifications. A 1-V common mode signal causes only a 1-µV Vos change. Operating from a ± 5-V supply, the common mode voltage range extends from -5.0 V to 1.6 V minimum. Slew rate is typically 2.5V/us. The TSC7650 is internally compensated for unity gain operation.

The precision TSC7650 is available in plastic and hermetic 8-pin and 40-pin DIP packages for the 0°C to +70°C and -25°C to +85°C operating ranges. Pricing for the low offset voltage TSC7650 is shown in the table below.

Teledyne Semiconductor is a leading manufacturer of high-quality data acquisition integrated circuits. The product line includes CMOS analog-to-digital converters, voltage-to-frequency converters, interface logic circuits, operational amplifiers, LED and LCD display drivers, microprocessor peripheral interface circuits and power MOSFET drivers. Teledyne Semiconductor's manufacturing plant and headquarters is located at 1300 Terra Bella Ave., P. O. Box 7267, Mountain View, CA 94039-7267. For further information on this product line contact: David Gillooly, Marketing Manager, tel. (415) 968-9241.

Part No.	Package	Temp. Range	OEM Price 1-24	25-99	100-999
TSC7650CPA	8-Pin Plastic DIP	Commercial	4.13	3.30	2.75
TSC7650IJA	8-Pin CerDIP	Industrial	8.55	6.85	5.70
TSC7650CPD	14-Pin Plastic DIP	Commercial	4.13	3.30	2.75
TSC7650IJD	14-Pin CerDIP	Industrial	8.55	6.85	5.70

Devices are available for samples with delivery in 6-10 weeks.

QEX: The ARRL Experimenter's Exchange is published by the

American Radio Relay League
225 Main Street
Newington, CT 06111 USA
telephone 203-666-1541

Larry E. Price, W4RA
President

David Sumner, K1ZZ
Executive Vice President

Paul L. Rinaldo, W4RI
Editor

Maureen Thompson, KA1DYZ
Assistant Editor

Geoffrey H. Krauss, WA2GFP (VHF+ Technology)
Associate Editor

Lisa Fuini
QEX Circulation

The purposes of QEX are to:

1) provide a medium for the exchange of ideas and information between Amateur Radio experimenters,

2) document advanced technical work in the Amateur Radio field, and

3) support efforts to advance the state of the Amateur Radio art.

Subscriptions are available to ARRL members and non-members at the rates shown on the QEX Subscription Order Card inside this issue.

All correspondence concerning QEX should be addressed to the American Radio Relay League, 225 Main Street, Newington, CT USA 06111. Envelopes containing manuscripts and correspondence for publication in QEX should be marked: Editor, QEX. QEX subscription orders, changes of address, and reports of missing or damaged copies may be marked: QEX Circulation. Members are asked to include their membership control number or a label from their QST wrapper when applying.

Both theoretical and practical technical articles are welcomed. Manuscripts should be typed and double spaced. Please use the standard ARRL abbreviations found in the January 1984 edition of QST. Authors should supply their own artwork using black ink on white paper. When essential to the article, photographs may be included. Photos should be glossy, black-and-white positive prints of good definition and contrast, and should be the same size or larger than the size it will be when printed in QEX.

QEX: The ARRL
Experimenters' Exchange
American Radio Relay League
225 Main Street
Newington, CT USA 06111

Nonprofit Organization
U.S. Postage
PAID
Hartford, Conn.
Permit No. 2929