QEX 26 April 1984

The ARRL Experimenters' Exchange

OSCAR 10 Packet-Radio Teleport Experiments

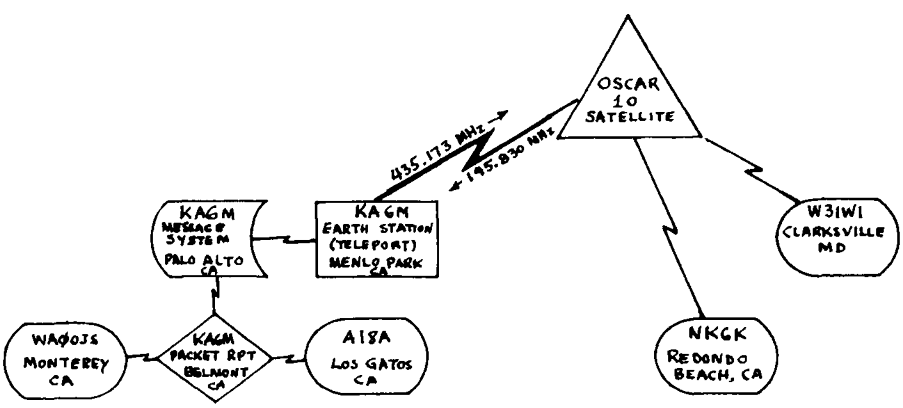
On Sunday, March 11, 1984, on orbit 560 of AMSAT-OSCAR 10, several stations successfully demonstrated the interconnection of two packet-radio stations with intermediate links using a terrestrial packet repeater and two satellite ground stations. This is probably the first all digital interlinking experiment performed on the special service channel for AMICON (AMSAT International Computer Network). Involved were:

Tom Clark, W3IWI, Clarksville, MD
Hank Magnuski, KA6M, Menlo Park, CA
Harold Price, NK6K, Redondo Beach, CA
Jim Tittsler, AI8A, Los Gatos, CA
Ron McMurday, WAØOJS, Monterey, CA

The first contact at 1900 UTC was between W3IWI and WAØOJS. Tom was working with a very low, on-the-horizon pass, and only a short fragment of text made it in both directions because of the limited time available. At 2005 UTC, NK6K successfully chatted with AI8A for about 10 to 15 minutes in what almost seemed like a local QSO.

The (virtual) circuit is shown below.

During each contact text was transmitted in both directions. Error-checked AX.25 connections were maintained between the two satellite stations between the KA6M message system packet port and the outlying users (WAØOJS and AI8A). However, over the modem link between the message system in Palo Alto and KA6M's home station in Menlo Park, no packet protocol was employed. Equipment included a mixture of Tucson Amateur Packet Radio (TAPR) and Vancouver Amateur Digital Communications Group (VADCG) terminal node controllers (TNCs). A total of five TNCs had to be properly connected for all this to work. Not suspecting that anything special was going on, Ron and Jim connected to the message system expecting to pick up their mail. Instead, they found that they were connected directly to stations in remote geographic areas via satellite. -- Thanks KA6M



Wind and Solar Maps Needed

ARRL Technical Advisor, John S. Belrose, VE2CV, would like some help in locating a source of averaged wind- and solar-energy maps for the United States. He has information for Canada. Jack's address is: 3 Tadoussac Drive. Aylmer, Quebec, Canada J9J 1G1.

Communications Software for TRS-80^{R} Model 100

Edward Krome, KA9LNV, is looking for Model 100 software. The address is: 1023 Goldfinch Road, Columbus, IN 47203. If it's directly related to Amateur Radio, QST On-Line column conductor, Stan Horzepa, WA1LOU, would also like to know about it.

Correspondence

The Osborne Computer and RTTY

More than fifteen years ago I was active in RTTY, but because of relocating from one state to another, I decided to rid myself of all the material and equipment related to it. Consequently, my sources for information and equipment are now non-existent. I recently purchased an Osborne Computer that I would like to use with this mode, but am unable to locate information specifically for this model. If there is anyone with experience in this area, I would be more than happy to correspond directly with them. - J. Don Corley, WA5KTX, First Presbyterian Church, 1220 Pine St., Arkadelphia, AR, 71923.

Direction Finding and VHF Propagation

This letter is in regard to Dave Borden's Data Communications column, issue no. 23. I own two Doppler Systems' direction finders and they are certainly well designed and work efficiently. My only complaint about their equipment is on the front end. My opinion is that the people at Doppler Systems know a lot about digitals, but little on RF design.

I wish to point out that the DF operates well in the countryside where obstructions are minimal, or in a city where you have a line of sight with the transmitter you are looking for. I do not recommend use of the equipment in a large city with many tall buildings or hills. Certainly you cannot track a mobile transmitter if the DF is also mobile and travelling in streets with buildings.

I have found the equipment to be suitable for tracking repeaters and proper antenna orientation. In the case of offending transmitters, it is possible to track them with a mobile DF if they are fixed, but almost impossible to locate if they are mobile themselves.

In short, the equipment is useless if used in an environment with too many obstructions (buildings and hills) and the readers should be advised of this. This is not a design fault, but the nature of VHF propagation. - Luis E. Suarez, OA4KO/YV5, Apartado 66994, Caracas 1061-A, Venezuela.

Articles on Digital Audio

A QEX subscriber recently submitted a letter asking us to print articles on digital audio as it relates to Amateur Radio. If anyone has done experiments or research in this area, let us know. We would be happy to see your ideas and results.

QEX Back Issues

In the twenty-fourth issue of QEX, we advertised that single copies were available from issue no. 1 to present for $1. This was in error. The actual reading should be that Hq. will be happy to supply you with single copies of QEX back to issue no. 1 for $1 each (U.S., Canada and Mexico) or $2 each (elsewhere). - KA1DYZ

In Search of a Definition for the Use of Fiber Optics

I am looking for a good description of the operation of fiber optics as used in the Kenwood R-2000 all-coverage receiver, the Racal General Coverage receiver and the ICOM 751 transceiver. These units use a similar system for tuning and employ the use of a fiber optic system instead of a tuning capacitor for determining frequency. I'd like to find out how it operates, particularly the "fast", "medium", and "slow" tuning rates. - M. L. Gibson, W7JIE, 1215 N. 28 Pl., Renton, WA, 98056.

Programs for the HP-85 Computer

Perhaps you folks can be of assistance to me. The Hewlett-Packard HP-85 computer serves as a work horse in my engineering business, however, there are times when it would be useful and enjoyable as a computer terminal for CW, ASCII or AMTOR. I have approached the Hewlett-Packard sales offices on this subject, but this produced nothing. Other computer/electronic businesses I visited reminded me that the percentage of amateurs who own HP computers is so small that development of software interfaces is simply out of the question, economically. They are probably correct.

I am at a loss as to why there are not more HP users -- it would seem to be a natural. It has an excellent built-in printer, CRT and high-speed tape drive. It is physically small with many keyboard functions, adequate RAM/ROM capability and is equipped with a standard RS-232 interface jack.

My knowledge of computer makeup is limited and I do not desire to dig into the "works" as I use it in the office. Perhaps there is someone acquainted with an amateur who has been using his HP-85 successfully for Amateur Radio purposes. I would be happy to learn of sources of programs for this computer. -- Frank G. Burford, W7ELH, Rte. 2, Box 260-A, Clearwater, ID, 83539.

(continued on next page)

(Correspondence continued)

A New Circuit for the 1960 WV Bug Revisited

QEX would like to thank all the readers who responded to Scott Williams', AE6U, letter in the January 1984 issue (no. 23). Because we have received a good response, it is not possible to print all the letters in this column. We will, however, share a few solutions with you. Remember AE6U was trying to locate a circuit to run his 12-V, 2-meter radio from his 1960 VW Bug's 6-V electrical system.

Within the past five years, an article appearing in either Ham Radio, QST or 73 described how a couple of hams solved the problem of connecting their 12-V, 2-meter radio in a bus they were reworking. Essentially, they used a classic multi-vibrator circuit with a rewound transformer that included small feedback windings to convert 12-V dc to 12-V ac. It also rectified, filtered and voltage regulated it to produce isolated 12-V dc.

To satisfy a friend's need to have 12-V dc in a Model A Ford that had 6-V dc positive ground, I built this power supply with a rewound transformer. It stepped up the voltage as well as isolated it. I wish I had known about this back in my 6-V VW days -- it works well.

For our friends at QEX, there is no reason why the same system wouldn't work for 24-28-V rigs. It sure beats the old series-parallel circuit. - Ralph E. Herzler, WA8WBP, 408 Liberty Rd., Sturgis, MI 49091.

I used to own a 1966 VW and operated the radio, tape player and two-way radio from two 6-V to 12-V inverters. They were purchased from J. C. Whitney & Co., 1917-19 Archer Ave., P. O. Box 8410, Chicago, IL 60680. Most that I have seen are rated at 2 A at 12 V. I have seen some rated at 4 A, but 3-A units were fairly common. - Kenneth E. Neidig, K4IPG, Hallmark Estates, Naomi Dr., Rt. 6, Box 811, Morristown, TN 37814.

Australian Article Reprint

On page 5 of this issue, you will find a reprint of an article from the Wirelesss Institute of Australia's, Amateur Radio magazine. The article, "A Practical Digital Control Unit for the ICOM720A," originally appeared in the November 1983 issue and describes the use of a calculator to convert the ICOM720A to a general coverage transceiver.

Subscription information for Amateur Radio can be obtained by writing: P. O. Box 300, South Caulfield, Victoria 3162, Australia.

Comments on the Sony 2002 Receiver

I enjoyed your lead article on the Sony 2002 receiver. It is a fantastic box! Here are a few bits of information about the unit for the readers.

1. Sony has a service manual available for the 2002. It was mentioned in a previous issue of QEX, (no. 24), but I feel it is worth mentioning again. The number of the manual is 8310247-1 and costs $4 plus $.75 shipping. Write to the Sony Consumer Products Dept., P. O. Box 20407, Kansas City, MO 64195.

2. The European equivalent of the 2002 is the ICF-7600D. As far as I can tell, it is the same unit with a multivoltage ac adapter included (the plug has to be changed for U.S. outlets).

3. I'd be interested in a portable active antenna for the unit that I could use when travelling. Any reader input? [You could call A. W. Industries in Maryland for this information and ask for the Sony Parts Division. Their telephone number is (301) 322-1000. - Ed.]

4. The first IF filter (XF1) is a good candidate for better selectivity. It looks like a simple 2-pole crystal filter. There may be enough room for a cascade of that filter, but it looks too cramped with chip capacitors, resistors, transistors and coils -- that's how they get it so small.

This state-of-the-art receiver is no doubt an excellent example of what future ham rigs will look like. - Bob Gobrick, WA6ERGB/Ø, 14311 W. Virginia Dr., Lakewood, CO 80228.

Symbols of the Resistor Color Code

When a staff member recently plugged the "Commodore C64 Color-Code Program" (Feb. 1984, no. 24) into his computer, not much happened. The reason? He had skipped over a few print symbols because they were blacked out on his copy.

I wrote to Mr. Biggs, K9MUJ, about this and he kindly responded. I had questioned symbols appearing in lines 15, 30, 70, and 4565 through 4620. Because there might be readers who have had the same program problems, I am printing K9MUJ's letter. - KA1DYZ

The first symbol in line 15 is the Commodore key and number 4. This sets the color of the letters appearing on the screen to a dark grey. (Black blurs the letters on a color monitor.) The second symbol in the line is the "clear home" key. This, of course, clears the screen and homes the cursor.

The symbol in line 30 is the "CRTL" key and number 1. This sets the resistor outline color to black. Line 70 again uses the Commodore and number 4 key to set the print color on the screen to dark grey.

The symbols in lines 4565 through 4620 are indeed "reverse on" and "reverse off" keys. - John A. Biggs, K9MUJ, Lemco Corp., 608 Joliet St., LaSalle, IL 61301.

A Wide-Band Instrument Amplifier

By Clint Bowman, * W9GLW

This circuit was devised especially for the purpose of increasing the sensitivity of a 10 mV/cm oscilloscope to 1 mV/cm. However, its input-output characteristics also make it useful for a variety of amplifying tasks where a gain of 10 from DC to 70 MHz might be of help.

An LM733H (or CH) is used as the gain block in this circuit and is defined as a video amplifier with differential or single-ended input and output capability. Its gain can be easily adjusted from 10 at 120 MHz to 400 at 40 MHz with fixed or variable resistors placed between terminals 9 and 4 or 10 and 3. This device is readily available at a cost of about one dollar and is manufactured by several suppliers including National Semi-conductor, Signetics and Motorola (MC1733).

For my use, I designed the circuit for a single-ended input and output with a single 40673 FET-input interface. This would assure high impedance. I also included a single emitter follower 2N2369A for a comparatively low-impedance output. This addition at terminal no. 6 results in a single-ended input with differential output. With the addition of another 40673 placed at terminal no. 2, I could achieve both differential input and output.

*P. O. Box 282, Prospect Heights, IL 60070

The wide-band coverage of this amplifier requires some isolation between input and output as well as separation of positive and negative supply circuitry. Double-sided board stock is used with the LM733C mounted on side no. 1 with leads Nos. 6, 7 and 8 fed through the board to side no. 2. The 40673, input circuitry and negative supply components are mounted on side no. 1. The 2N2369A, output circuitry and positive supply parts are mounted on side no. 2.

The board measures about 3-1/2 in x 3-3/4 in and is mounted in an aluminum box. A line cord exits from the rear and BNC connectors are mounted on opposite side-walls.

The 1.0 M capacitors in the positive and negative supply leads are tantalum. Since the 6.4-V Zeners are non-standard, 6.2-V devices may be substituted as they are more readily available.

The 5-k trimmer should be adjusted for best balance and output amplitude. This is a one time adjustment so it need not be a panel mounted control.

This amplifier should be satisfactory for observation of digital waveforms up to at least 7 MHz and perhaps higher. Because gain controls and attenuators have not been included, care must be taken to avoid overloading if true waveforms are to be observed when using this circuit with an oscilloscope. (Fig. B appears on page 9)

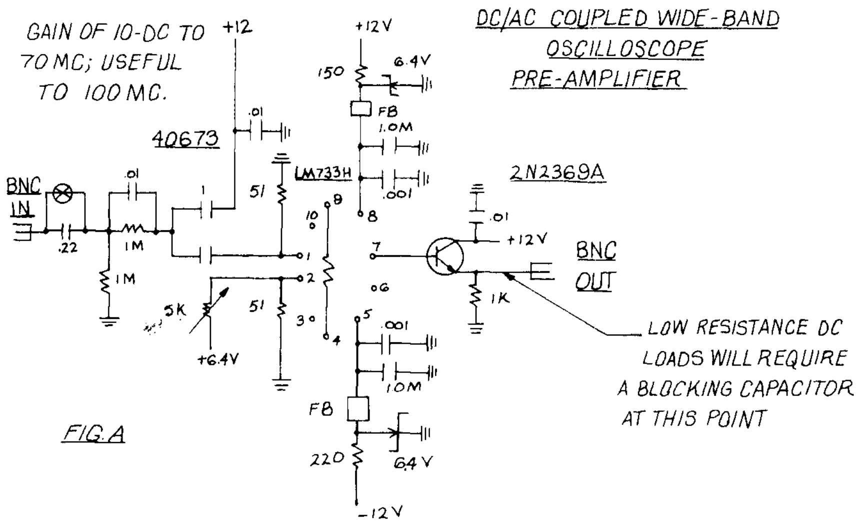


FIG. A

A PRACTICAL DIGITAL CONTROL UNIT FOR THE ICOM720A

By Bob Young, * VK4BRY

The unit to be described is built around the keyboard of a discarded desk calculator and uses only seven digital integrated circuits. When connected to the IC720A via the accessory socket it interfaces with the transceiver's internal central processing unit (CPU) and permits immediate selection of operating mode, VFO A or B and frequency or alternatively, the variation of any one of these operating parameters on its own. The controller also incorporates the facility to override the housekeeping circuitry of the CPU which includes the inbuilt inhibit of the transmit mode for frequencies outside the amateur bands, thus making the IC720A a true general coverage transceiver.*

The process of encoding the internal CPU by means of the controller is as simple as entering a ten digit number on a calculator. Having the control unit connected to the IC720A does not in any way interfere with normal manual control of the set if desired. Description of the keyboard controller is somewhat simplified if it is considered in two parts. ie the keyboard binary code generator and the logic board.

THE KEYPAD LOGIC GENERATOR

This part of the control unit is built quite simply by wiring the appropriate keys of a discarded calculator keyboard to facilitate the generation of the binary codes corresponding to the numerals 0 to 9, the address code specific to the CPU of the ICOM transceiver, the two VFOs and the five available operating modes, ie upper side band, lower side band, AM, CW, and RTTY. In addition a key is required to activate the RT control line and a switch to enable or disable the RC line as required (the RT and RC controls will be dealt with later).

Data is encoded in 8421 BCD. This data is generated by using the various keys of the calculator keyboard to ground the cathodes of discrete diodes in an array connected to four data lines denoted D8, D4, D2 and D1. The two examples shown in the circuit below will, I am sure, preclude the need for further explanation. The type of diode used is not critical. I used 1N914s because they were the cheapest available.

The IC720A handbook does not provide any coding information. It does, however, identify the access points of the accessory socket although the method of identification gives very little indication of the function of the various lines. Those of relevance are as follows:

4 Data Bus Lines identified as DB8 PIN 24
DB4 PIN 23
DB2 PIN 22
DB1 PIN 21

4 Data control lines
Data Bus Control Input PIN 16
RC Control Input PIN 18
$\overline{RT}$ Signal Line PIN 20
$\overline{DV}$ Data Valid Line PIN 19
+13.8V (Switched) PIN 2
Ground PIN 8

As was pointed out above the handbook does not furnish any encoding data and at this stage I would like to express my gratitude to Garner Annett VK3NZZ for his article in ARA Vol 5 No 3 in which he describes in detail, not only the relevant data codes but also the message format and control level data for the CPU. The encoding table below furnishes the data necessary to wire up the diode array for the keyboard.

* 9 Boblynne St., Chapel Hill 4069, Australia

DATA UNIT ON KEYPAD

	DB8	DB4	DB2	DB1
Address Key	1	1	1	0
USB Key	0	0	0	0
LSB Key	1	0	1	1
AM Key	1	0	0	0
CW Key	0	1	1	0
RTTY Key	1	1	0	0
VFO A Key	1	0	1	0
VFO B Key	1	0	1	1
0 Key	0	0	0	0
1 Key	0	0	0	1
2 Key	0	0	1	0
3 Key	0	0	1	1
4 Key	0	1	0	0
5 Key	0	1	0	1
6 Key	0	1	1	0
7 Key	0	1	1	1
8 Key	1	0	0	0
9 Key	1	0	0	1

To the astute observer it will be evident that in a number of instances the same binary code is used for two different entities, for example 0000 denotes numeral 0 and also Upper Side Band. The encoding sequence takes care of this anomaly.

THE LOGIC BOARD

A full circuit diagram is provided and clearly identifies all relevant data and control lines. I do not propose to discuss the circuit function in detail; however, a list of the functions it carries out may be of interest.

1 Suppression of key bounce.
2 Generation of control levels necessary for programming or reading the CPU.
3 Sequencing of control levels where necessary and
4 The provision of a visual indication of the data on the Data Bus Lines and the logic level of the $\overline{DV}$ line.

Layout is not critical, all components are cheap and readily available. Construction should not present any problems providing one observes the rules relating to the use of CMOS and TTL integrated circuits. My unit was assembled on a piece of veroboard. There is no reason why CMOS ICs cannot be used throughout if desired. I would, however, make the point that if this is done, the power supply level must not exceed five volts. the CPU in the IC720A tends to malfunction when presented with Logic Levels in excess of those normally available from TTL.

ACCESSING THE CPU AND MESSAGE FORMAT.

It is assumed at this stage that the diode array and logic board have been assembled and interconnected and that routine circuit checks have been made. I would suggest that it is most important to ensure that every key to be used on the keyboard generates the correct binary code when depressed.

STEP 1 Depress and release the address key, then depress and release the RT key. If all is well, the $\overline{DV}$ indicator (green LED) will be lit and so also will be the red LEDs associated with the DB8, DB4 and DB2 lines.

This procedure places the address data bit on the Data Bus and raises the Data Bus control line to a logic 1. Releasing the address key allows the Data Bus control line to return to logic 0 and depression of the RT key places a logic 1 on the RT line allowing the indicator LEDs on the Data Bus Line to read the last bit of data (the address) sent to the CPU. NB. Some form of readout at this point is necessary. The process of addressing the CPU takes a finite time dependent on the state of the internal houskeeping circuit and at times it may be found necessary to repeat the actual address procedure. I mention this point specifically because it will be of relevance to those interested in further developing the controller to the stage of having multiple memory and scan facilities.

Step 2 The remaining data is entered into the CPU simply by pressing the appropriate keys in the correct sequence which is as follows:

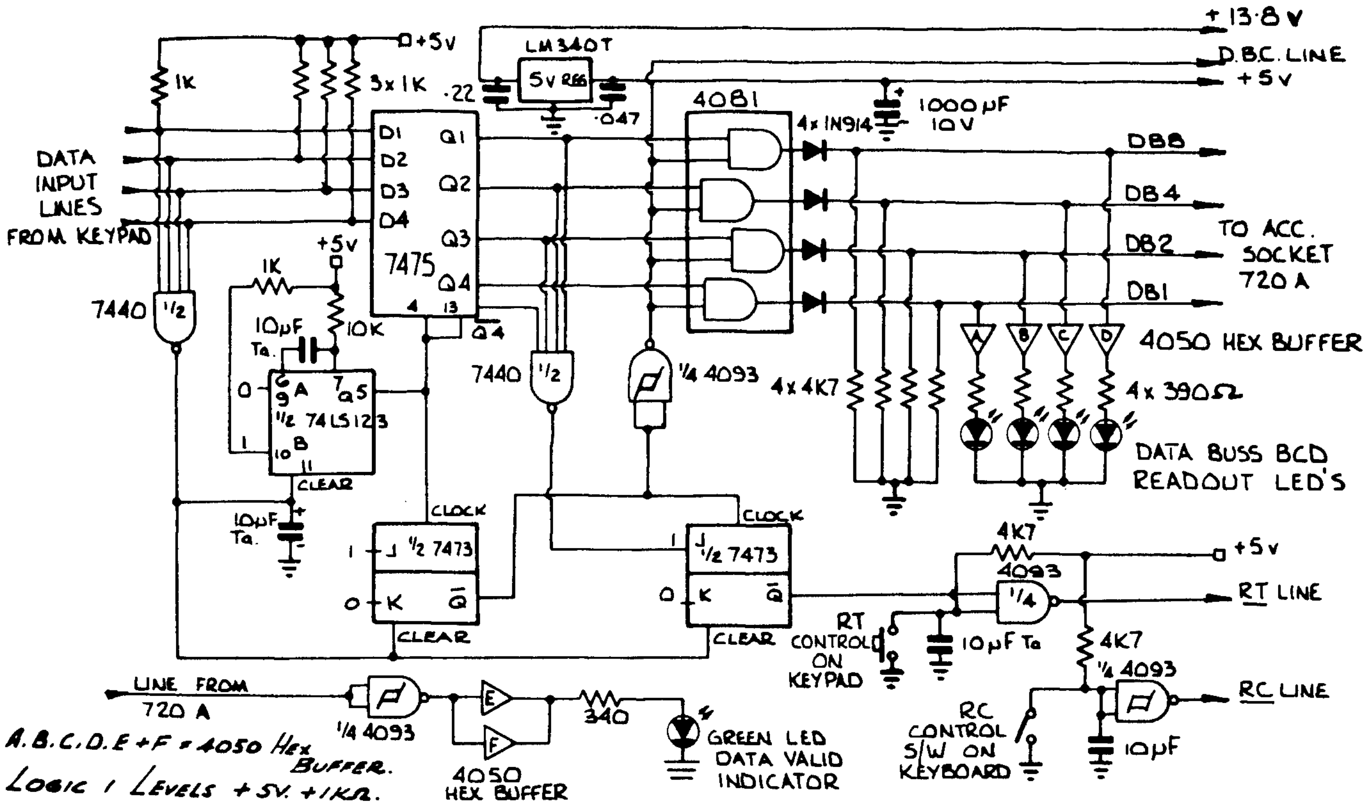
1 Desired mode ie USB, LSB, AM, CW, RTTY.
2 Desired VFO (A or B) and
3 Six digits in descending order of significance in order to define the desired frequency of operation. At this stage a glance at the digital readout on the IC720A will show that the transceiver is now ready for operation on the frequency that has just been keyed in. The desired VFO and mode of operation may not be as required. The explanation for this will be given later.

The entry of a data bit into the CPU requires the following:

a The appropriate data bit must be placed on the Data Bus lines
b The Data Bus line is then raised to logic level 1
c Step (b) having been achieved, the RT line is raised to logic level 1 and
d The RT and Data Bus Control Lines are simultaneously returned to logic 0.

The logic circuitry does exactly this each time a key is depressed and released except that in the case of the address key the RT line is held at logic 0.

Note With respect to the entry of the actual frequency data, the first digit entered will define tens of MHz thus if you wish to enter a frequency of say 7.065.0 MHz be sure to enter the digits 070650. If you fail to do this the CPU will be confused, you may be confused and the readout on the transceiver will suggest that it has suddently become a VHF rig! You will also find that the receiver has gone very quiet. In the event of such an error, one merely has to readdress the CPU and encode the correct data.



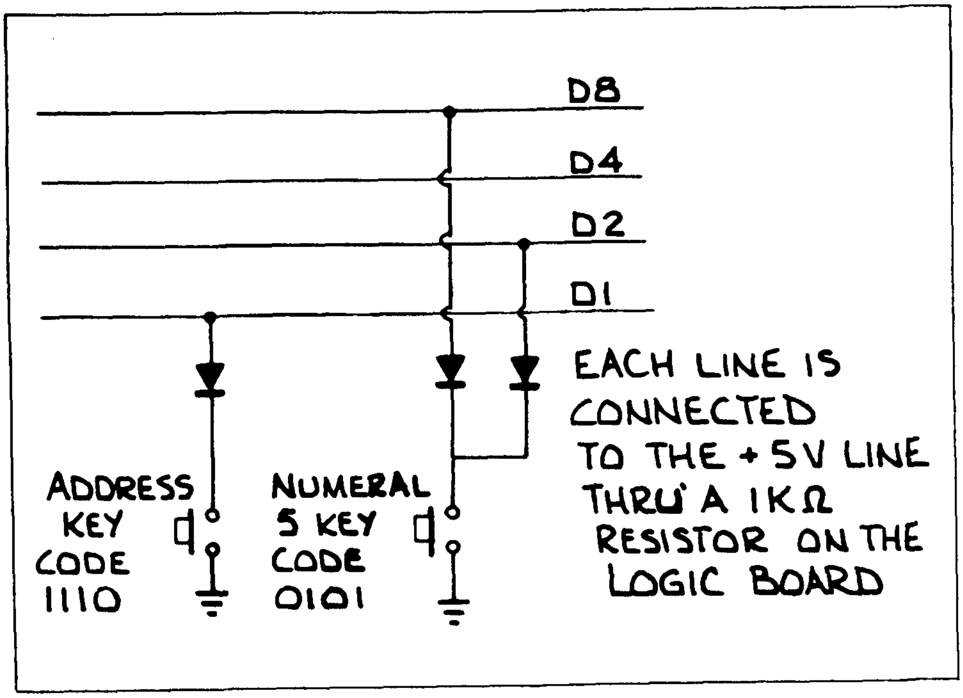
Logic Board * indicates connection to ACC SKT of 720A.

THE RT CONTROL KEY

Once the CPU has been accessed (step 1) repeated actuation of the RT key steps through, in normal sequence, the data stored in the CPU. With each operation of the RT key a specific data bit in the CPU will be displayed in BCD form by the red LEDs wired to the Data Bus Lines. By way of example, let us assume that the set is tuned to lower side band, VFO A and a frequency of 7.050 MHz. You wish to operate on upper side band VFO A and 14.050 MHz. Access the CPU by depressing the address keys and RT keys in turn, then depress and release the upper side band key, VFO A is OK therefore press and release the RT key. The digits 1 and 4 have to be entered at this stage, therefore depress the appropriate keys in sequence. The remaining four digits do not need to be changed therefore press the RT key four times. Clearly it is just as easy to encode the CPU in full each time but for those interested in further development in understanding of the true function of the RT line will be important.

THE RC LINE SWITCH

The CPU incorporates an internal houskeeping circuit which in normal operation takes into account the setting of various buttons on the front panel of the set, for example VFO A, VFO B and the various buttons to define operating mode. When the RC line is held at logic 0, priority is given to the internal housekeeping circuitry, ie if the buttons on the panel are set for lower side band and VFO B and an attempt is made using the key board to change operating mode VFO and frequency it will be found that although the frequency will change to the one desired, the set remains with the mode and VFO functions unaltered and in complete correspondence with the setting of the buttons on the front of the set. Setting the RC line to logic level 1 overcomes this difficulty. With the RC line at logic 1 the keybord has priority and the CPU will process data exactly as it is encoded from the keyboard. As a matter of interest setting the RC line to logic level 1 also serves to disable the inhibit on transmit mode for frequencies outside the amateur bands.



THE $\overline{DV}$ LINE

Essentially this line is used to furnish a visual indication that data is valid at each step of the encoding process. In short, if the green LED goes out you have made a mistake, or a malfunction has developed.

A FEW POINTS WORTHY OF NOTE

1 With the circuit provided the time constant for the debounce function is perhaps a bit long. Providing the encoding process is carried out slowly and deliberately, there will be no problem. If however one tries to rush the encoding procedure the results, to say the least, will be quite confusing.

2 When the controller was first put into service it seemed a good idea to encode the required data and then access the CPU on the assumption that when necessary, the next data entry could be fed to the CPU starting with the mode key. To put it simply, the CPU did not go along with my "good idea". It was noted that after about one minute the DV indicator LED would go out and that the CPU could no longer be accessed in the normal way. Further, manual tuning of the trasceiver appeared to be lost also. Experience has shown that no harm is done to the equipment but when such an impasse results it becomes necessary to switch off for about thirty seconds and start all over again.

3 A hint for those interested in adding memory and/or scan functions to the control unit. As it stands at present, the encoding problem has been reduced to one of sequentially activating and deactivating ten simple switches. There is one snag; it is necessary to check that the first two operations have in fact accessed the CPU before encoding can begin.

To make full use of the memory function of the IC720A a permanently active back-up power supply for the CPU is required. Apart from the obvious risk of fire and equipment damage resulting from a supply failure occuring in the absence of the operator, even the briefest loss of line voltage results in loss of data in the memory. The controller described facilitates rapid selection of any desired mode of operation, VFO and frequency and virtually obviates the need for the one memory function dependent upon a back-up supply. It should be possible to construct a controller such as the one described for somewhere near the cost of the back-up power supply providing, of course, a suitable keyboard can be salvaged from some other equipment. The controller makes operation of the transceiver substantially easier, and with minor modifications could be an invaluable aid to a blind operator.

AMTOR in Australia

By S. E. Molen, * VK2SG

After reading several articles on AMTOR by Peter Martinez, G3PLX, interest was displayed by a small number of Australian amateurs to start our own system. All agreed that it was complicated and not fully understood.

Further enthusiasm blossomed with the visit of Alan Pampling, G3RSP/MM, on board the container vessel ACT 1. He had brought along his AMTOR system and was carrying out the first long-distance tests with G3PLX. This demonstration convinced at least two Australians that AMTOR was a viable proposition, whereupon they airmailed orders for their own system.

On June 27, 1981, the first AMTOR signal was transmitted from Australia by the author. Contacts were with G3RSP/MM at 0421 Z, G3PLX at 0623 Z and Christian Gerber, HB9BDM at 0710 Z. The following day, Clive Harman, VK3BUS, was contacted for the first VK/VK AMTOR contact, and it was believed Gordon Dowse, VK2AGE, had been active prior to this date. At any rate, AMTOR was now alive and well and living in Australia.

* 13 Pendle Way, Pendle Hill 2145, Sydney, Australia

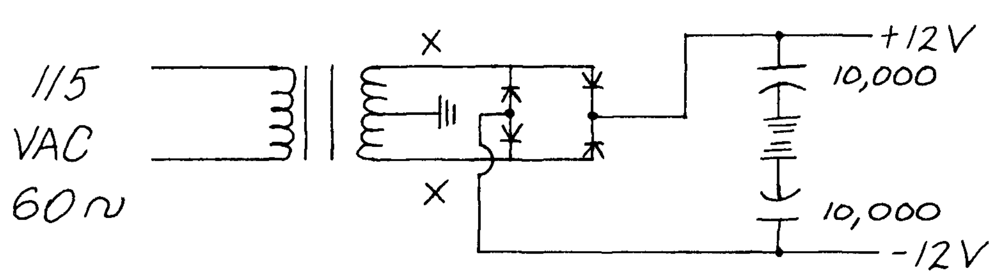
The above mentioned were the first three active stations on the continent. Each was impressed by the accuracy of the system and they proceeded to expound the virtues of AMTOR. Numerous demonstrations were presented and I went so far as to take my AMTOR gear mobile to VK4 and VK5 to prove the unit's versatility. This new mode proved itself on the road because it works well with low power and under poor conditions. I ran 30-W input to a three-ft helical aerial and maintained contact with Europe, Japan, Philippines, USA and Australian stations during my six-week trip.

Since 1981 there has been a considerable amount of interest in this mode, but lack of equipment in this part of the world has hampered further development of AMTOR in Australia. We hope to overcome this hurdle in the near future.

Currently, there are 17 stations operating on AMTOR, many of them use computer driven systems with others using normal RTTY equipment to operate the AMTOR Mk 2 board. Out of these amateurs, Rod Maslan, VK2DAY, acquired an Mk 2 board that he successfully inserted into his Telereader CWR685 E. The unit now sends and receives CW, RTTY, ASCII and AMTOR. This modification is being investigated for other dedicated RTTY units.

(continued from page 4)

FIG. B



X-X 18 VAC LOADED AND LOW LINE

Bits

Tenth Annual Eastern VHF/UHF Conference

The 10th Annual Eastern VHF/UHF Conference will be held May 4-6, 1984, at the Sheraton Tara, Exit 1, U.S. 3, Nashua, New Hampshire. The program features a Friday night hospitality room, technical talks by well-known VHFers, "rap sessions" for the various VHF/UHF bands, noise figure and antenna measurements, and other activities. To preregister, send $14.50 to Rick Commo, K1LOG, 3 Pryor Rd., Natick, MA 01760 before April 29. Registration at the door is $20.00. The Saturday night banquet is $15.00, also payable before April 29.

Room reservations should be made directly with the hotel. A block of rooms has been reserved for the conference; be sure to mention the "Eastern VHF/UHF Conference" when making your reservation. The room rate is $69 single, $81 double, per night. The "Merry Weekend" package provides two night's lodging plus several meals for $159.95. These rates are exclusive of the 7% New Hampshire room tax. There are numerous other motels within a five-minute drive of the Sheraton with cheaper rates for the economy-minded. ($69 is quite inexpensive for a hotel the quality of the Sheraton in the Greater Boston area.) A number of alternative restaurants are also located nearby.

Conference Chairman this year is Tom Kirby, W1EJ, ably assisted by the committee members from previous years, plus some new volunteers. Additional volunteers are always welcome. Address inquiries to: Lewis D. Collins, W1GXT, 10 Marshall Terrace, Wayland, MA 01778. Tel. (617) 358-2854 (before 10:00 PM).

Motorola Technical Literature Catalog

The Motorola Guide to Technical Literature can be obtained by writing: Motorola Semiconductor Products, Inc., P. O. Box 20924, Phoenix, AZ 85036. Data and handbooks that might be of interest to QEX readers are listed below.

Book #	Book Title	Unit Price
DISCRETE PRODUCTS		
DL110	RF Data Manual	$ 6.00
DL125	Rectifiers and Zener Diodes Data Book	3.75
DL126	Small-Signal Data Book	6.25
INTEGRATED CIRCUITS		
DL120	Microprocessors Data Manual	N/A
DL132	8-Bit Microcomputers	N/A
DL133	8-Bit Microprocessors	N/A
DL134	M68000 Family	N/A
DL105	CMOS Integrated Circuits (Series C)	4.00
DL129	High-Speed CMOS Logic Data	4.00
DL113R2	Memory Data Book	3.25
DL121R1	TTL Data Book	3.75
DL122R1	MECL Data Book	3.50
DL128	Linear and Interface Data Book	6.00
HANDBOOKS		
HB205R1	MECL System Design Handbook	3.50
HB206R1	Voltage Regulator Handbook	3.75

New Products from Motorola

In late February 1984, Motorola announced the availability of their revised RF and Microwave Selector Guide and Cross Reference (SG46R2). It contains updated information concerning Motorola's broad line of RF semiconductors.

In addition to existing lines of RF Power and Small-Signal transistors, hybrid amplifiers and tuning diodes, the selector guide contains descriptions for 40 newly introduced parts. These include:

* New dual-gate GaAs FETs for low-cost operation at 1 GHz or less.

* State-of-the-art 800 MHz discretes and hybrids for cellular, base station and mobile radio designs.

* Unique RF TMOS Power FETs with high-gain, improved high-order IMD characteristics.

* Superior fine-line, bipolar, small-signal transistors for enhanced gain and NF performance.

The components are designed for various uses such as land mobile, military, avionic and marine radios; CATV distribution networks, radar and electronic warfare systems; microwave communication links; and electronic instrumentation. Additionally, the guide includes an industry cross-reference that is the most current available.

As the first step in updating all Motorola RF literature, this comprehensive selector guide is particularly useful to designers, engineers and buyers. To order the free Motorola RF and Microwave Selector Guide by mail, indicate the number SG46R2 and send to Motorola Semiconductor Products, Inc., P. O. Box 20912, Phoenix, AZ 85036.

The Raster Memory System (RMS) Graphics Chip Set

The Motorola Microprocessor Division recently announced a new concept for graphics/text generation and display. A 2-chip set, the Raster Memory System (RMS) is composed of the MC68487 Raster Memory Controller (RMC) fabricated in HCMOS, and the MC68486 Raster Memory Interface (RMI), implemented in Motorola Oxide-Isolated Self-Aligned Implanted Circuit (MOSAIC) bipolar technology. This low-cost, high-resolution chip set contains a myriad of features to provide the control for high-quality CRT graphics. Its capabilities are so pervasive that the graphics quality is primarily dependent on the power of the MPU, the amount of memory available, and the sophistication of the software, not by any limitations within the RMS system itself.

The RMS has been designed for personal computer, videotex, games, workstation, computer animated graphics and word processing markets, and operates with most popular CRTs. It will drive monitors with a 50-Hz field as used in Europe, or with a 60-Hz rate popular in the U.S. There is a choice of resolutions up to 640 pixels per line, and up to 500 lines per screen. For text reproduction, screen resolutions of either 32, 40, 64 or 80 characters per line are available in full color. For graphics interpretation, choices of 256, 320, 512 or 640 pixels per line provide the needed definiton to fit a variety of applications. These choices are software selectable from internal horizontal and vertical resolution registers.

The RMS chip set has been designed to operate with Motorola's M6809 and M68000 class of microprocessors and is backward compatible with Motorola's popular MC6847/MC6883 existing graphics solution. The use of high-performance CMOS technology in the RMC permits many new enhancements. It can operate in either a bit-plane mode, where each pixel of display is governed by a unique location of RAM, or in one of six character-oriented modes called list modes. If one of the list modes is selected, the user can choose from 96 alphanumeric characters and 64 MOSAIC characters stored in the RMC's internal ROM. In addition to these, up to 32k dynamically redefinable characters can be supported. All of these character types can have attributes applied to them, such as color, underline, flash, invert, double high, and/or double wide.

The RMS chip set can simultaneously display up to 32 colors from its palette of 4096 colors. Color data selected is stored in a Color Mapping RAM that is addressed at the pixel rate as the video picture is generated. This system permits the programmer to use adjacent pixels that are slightly different in shade, as in flesh tones, or completely different, as in the reproduction of company logos.

The RMS has two screen definitions; the virtual and actual (display) screen. The virtual screen is larger so that the actual screen can be positioned anywhere within it. The effect is to be able to smoothly scroll in any direction without changing memory. Up to 1 megabyte of DRAM memory can be accommodated. It is possible to sync the RMS to an external source to allow overlay of RMS data onto an existing VCR or broadcast TV picture. Fixed are redefinable characters with unique attributes. Such object attributes as color, priority, shading and collision detection make them especially useful in game applications.

The RMI is a bipolar chip that provides high-speed interfaces between the external DRAM, MPU and RMC. It provides interface signals, red, green and blue for the MPU, DRAM and RMC, and synchronization signals to the monitor.

The price of the RMC and RMI is expected to be in the $20 range. Samples will be available in the 4th quarter of 1984 and production is slated for the 1st quarter of 1985.

Contact the Literature Distribution Center in Phoenix, 616 W. 24th St., Tempe, AZ 85282 for brochures or your local Motorola Sales Office for further information.

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

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

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