BITS,BYTES&PIXELS

LIMA 99/4A USERS GROUP

September 1994 Volume 10 #7

TI'S OFFICIAL EQUIVALENT OF "TEACH YOURSELF ASSEMBLY LANGUAGE"

described by Charles Good
Lima Ohio User Group

We had the blue book that came with the console and the "Teach Yourself Basic" cassette to help us learn TI BASIC. We had the "Teach Yourself Extended Basic" to help us learn XB. And TI gave us the EA manual to help us learn 9900 assembly language. The only problem is that the EA manual is not in any way an assembly language tutorial. It is a very complicated reference guide. For years TI owners have desired an assembly language course, and for years one has existed. TI's official assembly language tutorial was published not by TI's Consumer Products Group (which produced all 99/4A hardware and software) but by the company's Digital Systems Group. A copy of the first edition of this 1979 assembly language tutorial came to light at the 1992 Chicago faire and was acquired by Lee Bendick. Now I have been given a complete set of the second edition.

That's right, I said 990, not 9900. The only official TI module actually developed on a 99/4A system using the Editor/Assembler package was the game Hopper. All other assembly language software for the 99/4 and 99/4A was written on computers that used TI's 990 cpu, mostly on the 990/10 "mini computer". These computers had 64K of memory to play with, a 16 bit data bus to major peripherals, and were physically quite large. They had reel to reel tape drives the size of a tall somewhat narrow refrigerator with a big glass door you opened to get at the tape. The hard drives of 990 systems were the size of washing machines, and like washing machines in the spin cycle these hard drives took lots of time to get up to full speed when they were turned on. Card readers, type writer-like printers, and 8 inch disk drives were parts of these computers. The keyboard and CPU display included a box full of LEDs and switches. The LEDs could show memory and register contents and the switches could be used to alter these values. When you turned all these components on at once the room lights were likely to dim. As I write this article, one of these computers is sitting on the loading dock of the technical school laboratory building where I work waiting to be junked. This is the type of monsterous "mini computer" that was used for serious computing at the time the 99/4 "micro computer" was released in 1979.

What I have is the "990 Software Development Using the DS990 System Self Study Guide"; original issue 1 April 1979, revision 15 February 1982. I have the 1982 revision. This includes volume 1 and 2 of the self study guide (TI part numbers 2267627-9701 and 2267627-9702), a nice binder (TI part 2309913-0001) containing a set of 8 audio C60 cassette tapes recorded on both sides (TI part numbers 2309914-0001 through -0008, copyright 1979) that are keyed to specific pages in the self study guide, and the "DX10 Operators Self study Guide" (TI part 2267629-9701, copyright 1981) which describes the operation system (the DOS) used on the DS990 computer. All of these are published by TI's "Education and Development Center, Digital Systems Group".

9900 assembly language is a very large subset of 990 assembly language, containing 69 of the 990's 72 kinds of instructions. This means that almost everything learned about 990 assembly language in this official TI tutorial would be helpful in mastering assembly programming on a 99/4A system. This tutorial, with its accompanying audio tapes was probably used by TI to help train the programmers who wrote assembly code contained in 99/4A command modules. This is suggested by side 1 of tape 2 and pages 4-3 of the study guide which state, "This module covers the assembly language instruction set for the 990 computer family and the TMS 9900 microprocessor. This instruction set is upwardly compatible; in other words, programs you write for the TMS 9900 microprocessor can also run on the other members of the 990 computer family."

Each lesson is on an audio cassette tape. You are supposed to have the the study guide in front of you as you listen to the tape. Each lesson is divided into very short segments. You can stop the tape and replay these segments until they are understood. Some lessons are specific to the 990/10 computer hardware and DX10 operating system and describe use of the particular editor and assembler used on this computer. But at least half of the lesson pages and audio tapes are appropriate those interested in learning assembly programming on and for the 99/4A. In particular, the lession called "Instruction Set" (lesson 4) would be useful. This includes both sides of 3 of the 8 audio tapes and 174 pages of text. What you don't get in these lessons is specific information on programming the "bells and whistles" of a 99/4A such as color graphics, sprites, and music.

This rare documentaiton is available by copy or loan to members of the Lima User Group. We charge 3 cents per page for copying pages. Audio tape copying, on your blank tapes, is free.

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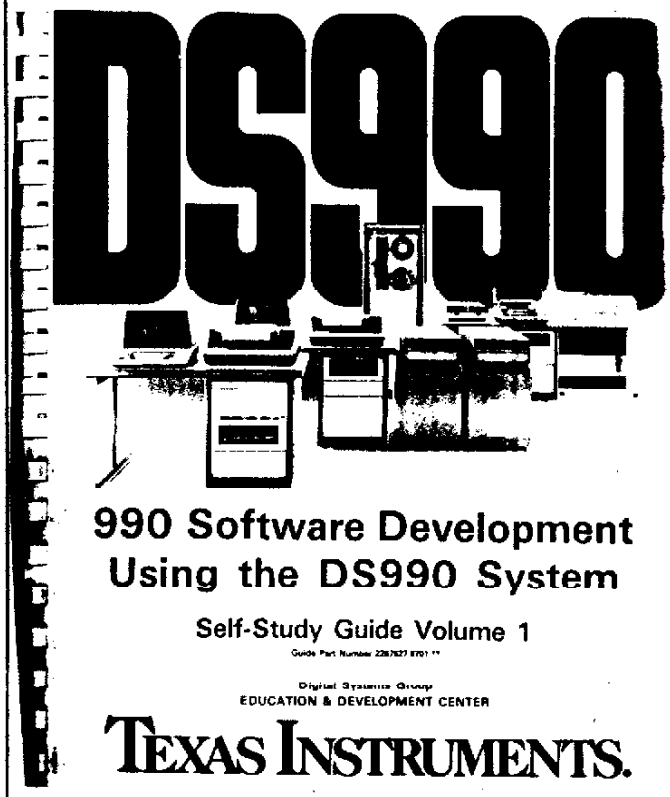

Here is the cover of one of the four books that make up TI's official assembly language tutorial. The DS990"minicomputer" used for some 99/4A software development is shown. The tape drive is the refrigerator sized device covering the bottom of the first "9". A washing machine sized hard drive is shown in the center 3rd from the left.

DONE

THINGS THAT HAVE COME AND GONE AND SOME THAT NEVER WERE

Trivia collected by
Bill Gaskill
July 1994

14 STEPS TO MAXIMIZE TI HOME COMPUTER PROFITS:

The following information comes from a 3.5" x 8" laminated marketing aid (which I will call a card) that TI produced for their retail dealers. The "card" has no part number on it and no copyright date, but it does bear the TI logo and is clearly a Texas Instruments product. Note item number 4 in the list below. It is certainly consistent with the William J. Turner strategy of 1981-1983 of "dumping" the consoles at fire sale prices in order to hook customers so they will buy the expensive peripherals and the high profit margin software.

As an aside, a TI-99/4A retailer typically paid Texas Instruments $26 for a cartridge that sold for $39.95 retail. Whenever a dealer gave a discount on software, the discount always came from the dealer's margin not TI's. There were of course exceptions to this statement, namely those times when TI had a sale, or when they did a promotional to bolster the sales of another product like the Speech Synthesizer.

1. Carry complete line of TI Home Computers to make major statement to consumer and to fully leverage advertising dollars spent.
2. Carry minimum of 150 software SKU's by June 1983.
3. Carry minimum of 20 peripheral SKU's by June 1983.
4. Compete aggressively in price of console. Maximize profit on aftermarket by providing full availability and convenient display.
5. Emphasize software in advertising (15 to 20 packages per ad) -- target ads at home purchaser.
6. Use TI point of purchase display with self-demonstrating cartridges on a chain.
7. Use TI demonstrators for store personnel training and in-store demonstration in conjunction with ads. Note demonstrator will be in your store.
8. Devote 25 running shelf feet to TI Home Computer line to make a major statement in home computers.
9. Display computer consoles and software so consumer can self-demonstrate.
10. Display software in a "series" format, separating each application segment.
11. Display software and peripherals adjacent to computer demonstration location.
12. Place consumer demonstration guide in a convenient location so consumers can browse through the book on their own.

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13. Display consumer aftermarket roadmap in visible location.

14. Maintain image of full-time aftermarket (software plus peripherals) through a continuous advertising campaign.

ALTMAN FAIRWARE LIST:

Fooled you! This one's still very much alive and kicking, compliments of BJ Mathis and Richard Baron of the Southwest 99ers in Tucson, Arizona. I picked up a copy at Fest-West '94 and you can too, by sending $2.00 to the Southwest 99ers Box 17831 Tucson, AZ 85731. You'll find that it is a great investment. The "List" is 33 pages long and has entries organized by software title (over 500 of them), includes a list of authors and their addresses, as well an index to what software programs they wrote, and finally the "List" is organized by category so you can quickly determine what is available in the Educational category, Bank and Finance category et cetera.

Not all of the software found in the "List" is available through the SW 99ers library, but a lot of it is. The Altman Fairware List tells you which titles may be obtained through the Southwest 99ers and which cannot. A very reasonable $2.00/disk copy fee is charged for programs from the "List". While the Altman Fairware List may not be the perfect resource to what is available in the public domain and shareware arena for software, it is impossible to find fault with such dedication and commitment to keeping things like this alive in the TI Community. My hat is off to BJ Mathis, Richard Baron, the late Ida McCarger who used to manage the "List" until her death on August 8, 1992, and to the Southwest 99ers in Tucson for keeping this important icon in TI-99/4A history alive and well.

AMERICAN SOFTWARE DESIGN and DISTRIBUTION:

Although cartridge producers and cartridge vendors stole the software spotlight in the days before Black Friday, there were also many disk and cassette software producers who supported the TI-99/4A. Tom Johnson, dba American Software Design and Distribution was one such producer, giving us entertainment and education titles such as; 3-D Maze, Bardyard Fun, Bomb Squad, Land on Mars, Laser Shield, Meteor Shower, Mr. Frog, Ski, Space Battle 2056, and Wizard's Dominion. Johnson also created Entrapment, a game that TI had licensed to sell for use with the Mini-Memory module prior to October 1983. I'm sorry to report that I have no further information on Mr. Johnson and would welcome any that 99ers reading this article can provide. As an amateur historian of "things TI", I am always looking for details. My name and address are found at the end of this article if you have any information on Tom Johnson or American Software Design and Distribution.

GONE BUT NOT FORGOTTEN:

This was the title of a Deborah Ashrand article written for the December 1988, Volume 1, Number 5 issue of PC Computing magazine. It covered "orphaned" computers including the TI-99/4A, IBM PCjr., and computers from Columbia, Eagle, Osborne and others. The following text is excerpted from a portion of the article entitled "Keeping the Faith".

> "The 99/4A and PCjr were early experiments in the home computer market. They weren't nearly as fast or powerful as other computers of their time, yet in many homes they continue to fulfill the role that visionaries once predicted for them: they've evolved from somber, cold pieces of machinery to tools that are useful and fun. In Tucson, the Mathis family owns three TI-99/4a's. BJ Mathis, a church clerk, uses one of the machines to generate financial reports and meeting minutes, while her husband, an Air Force Sergeant, often programs in assembly language. Their two sons write reports for school and play games on the TI set up in the den. "It gives them some background so that when they go to school and come across an Apple (computer), they'll at least know how to get started," says Mrs. Mathis.
>
> TI computer owners are "a real community," says BJ Mathis. "I don't know what makes us hang on, except that we get to caring about each other, and it's difficult to walk away from friends." She adds, "When someone upgrades to an IBM, it's known throughout the community."

PRK BASIC:

Remember all the excitement when we discovered the hidden secrets of programming in TI BASIC with a Personal Record Keeping or Statistics cartridge plugged in? I do. It was great fun to be able to have DISPLAY AT and ACCEPT AT capabilities in a console BASIC program in my early days as a 99er. It was even more fun to show others how to do it though, because it made me look like I actually knew something about computers and programming. Guess I fooled them?

Credit for "discovering" this hidden TI technique appears to belong to Paul Karis, a Dutch 99er who wrote about it in the Fall of 1981 in TI Home Tidings, an English User Group newsletter. 99er Magazine followed Karis' article with a limited one of their own on the DISPLAY AT and ACCEPT AT routines on page 72 of the Volume 1, Number 4 issue. The same article made it into the Best of 99er on page 76.

Others wrote about PRK BASIC too. I seem to recall seeing articles by Art Byers, Jim Swedlow, Newt Armstrong and Stephen Tuorto along the way, just to name a few. There doesn't seem to be much interest in PRK BASIC anymore,

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though. Perhaps we have just become more sophisticated in our needs and in our programming to use it?

JIM LOHMEYER:

Once upon a time, like around February 1988, at the time of TIXPO '88 in Las Vegas, I ran into a young programmer from Illinois named Jim Lohmeyer. He showed up on the TI scene with loads of talent, tons of enthusiasm and a vision of what he was going to do with his life after having left home for the West Coast. Lohmeyer moved to southern California and I think actually roomed or rented with Tom Freeman and family while Tom and Jim formed T and J Software. Jim moved out some months later and seems to have disappeared from the TI-99 Community since that time. Anyone have the latest scoop on what Jim is doing these days? All that talent seems to have gone to waste as far as the TI Community is concerned, 'cause I can't point to much that Mr. Lohmeyer left behind after his apparent departure. What a shame!

J. PETER HODDIE:

Who in the TI Community can forget this talented young assembly language programming guru. He gave us so much in the form of tutorials for MICROpendium, commerical and shareware software such as My-word for the Geneve, Sort Experiement, Pre-Scan It, the Font Writer programs and others, articles for the Boston Computer Society while he was

Bill Gaskill has one of the largest collections of TI modules anywhere. Here he is with his software. This display looks very much like a 1983 99/4A retail store.

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a member there and so much more. After a move to California's Silicon Valley and an attempt at creating his own business, named Blue Streak Software (with Paul Charlton I am told), word is he now works for Microsoft in the Redmond, Washington area. He still owes me a copy of FirstBase 1.1 that I paid him for in Anaheim at Fest-West '91. Maybe Mr. Hoddie will see this article and remember to send me the software?

SILVER WOLF SOFTWARE:

This P.O. Box 4242 Santa Rosa, California 95402 software firm was owned by Galen A. Read and Charles R. Burley. The two men started out in the TI Community by providing assembly language Fairware programs, but somewhere along the way Burley seems to have dropped out of sight. Galen Read of course became a programmer for CorComp and DataBiotics, and gave us Writerase, Console Calc, Desktop Publisher, Pre-Typer and a couple other commercial pieces of software before leaving the TI Community.

NEXT COLUMN

In July 1987 Mr. Read opened Innovative Programming, a Rohnert Park, California firm which was advertised in MICROpendium and which touted support for its customers through a new 4A/Talk Bulletin Board. By December 1987 though, Read was apparently having financial problems with the new business and announced to the TI world that his company was changing focus and would be moving out of the 99/4A market. In early 1988 word began to circulate around the TI Community that Read was not delivering on orders. In June 1988 the Lima, Ohio User Group newsletter reported that he had apparently taken in $10,000 in Grand Ram orders, but left town without delivering the products. I have not seen anything written about Galen Read since that time, nor have I heard anything about him. Did he get away with it?

Bill Gaskill
2310 Cypress Court
Grand Junction, CO 81506

****DONE****

Assembler Executing . . .
By Bob Carmany

Ever onward! The only problem is that I'm not exactly sure where we're headed. I think that it might be down the fabled "primrose path". So far, this hasn't been as bad as I had imagined. I have actually been able to understand a good portion of what has been going on. It may change soon, but for the present. . .

Ah yes, arithmetic instructions! All of that "good" stuff --adding, subtracting, multiplying, etc. I think that I could do without this lot. After all, I never was all that good in mathematics in school. Luckily, most of this lot deals with small numbers --the kind that you can use your fingers and toes to count. Let's go ahead and get started!

Name	Op Code	Comments
Add Immediate	AI	Uses a register and immediate addressing
Add Words	A	Any of the general addressing modes
Add Bytes	AB	" " " " "
Subtract Words	S	" " " " "
Subtract Bytes	SB	" " " " "
Increment	INC	" " " " "
Increment by Two	INCT	" " " " "
Decrement	DEC	" " " " "
Decrement by Two	DECT	" " " " "
Negate	NEG	" " " " "
Absolute Value	ABS	" " " " "
Multiply	MPY	Any general mode and a register
Divide	DIV	" " " " "

Most of these arithmetic operations are so simple that they scarcely need any sort of explanation. That's good because if they were very involved I wouldn't be able to understand any of this next bit.

```
AI    R7,6      This loads the value 6 into register 7.  The Overflow and
                Carry bits are affected by additions (remember the JUMP
                operators last time?)

A     R1,R7     Adds two 16-bit numbers contained in registers 1 and 7.
                The sum is compared to zero and the Logical Greater Than,
                Arithmetic Greater Than, and Equal status bits are
                affected.
```

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AB @GIZMO,R7 This is the same as add words except that two bytes are added and the Odd Parity bit is affected.

Subtract words (S) and subtract bytes (SB) are the converse of their "add" complements. The same status bits can be read and JUMP instructions can be used with them.

The decrement and increment instructions use a constant to either increment or decrement a value by either one or two. They affect the Carry and Overflow status bits and when the result is compared to zero, the Logical Greater Than, Arithmetic Greater Than, and Equal status bits are affected and can be read. I found they they are commonly used in loops. Remember that?

Negate (NEG) is easy to understand. The easiest way I found to figure it out was that it changed the sign of the value to the opposite. For example, if R5 contained the value of -5 :

NEG R5 would leave a value of 5 there instead.

Absolute Value creates the absolute value of a number. The same bits as the previous examples are affected.

Multiply (MPY) and Divide (DIV) multiply and divide two 16-bit numbers to create a 32-bit product. The second operand must be register direct addressing. The 32 bit product spills over into two adjacent registers.

MPY @GIZMO,R7 would put the most significant 16 bits into register 7 and the least significant 16 bits into register 8. No status bits are affected.

Divide does the same thing except that the Overflow status bit is affected.

There are still a bunch of instructions that I haven't encountered to a large degree but from time-to-time they appear in programs --usually the ones that Ron K and Tony write. Luckily, I keep my trusty set of A/L books with me so I can read them whenever I find one of those "goodies". As I encounter them, I'll try to explain each in turn.

Now, for something easy --COPY. This is easier than drinking a Tooheys! COPY is used to copy bits of source code that have been saved as seperate files on disk. The stuff is moved in and assembled when the assembler executes (I might use that for a title). . .

```
COPY  "DSK1.PART1"
COPY  "DSK1.PART2"
      etc.
```

This column sure causes a great thirst. Its time for a glass (or four) of Black Opal Cabernet. I found a supplier here in the States at long last!

With all of the preliminaries out of the way, next time I'm going to take a whack at writing a sort program. That ought to be interesting!

DONE

CC40 AND TI74 PRODUCTS YOU CAN PURCHASE DIRECTLY FROM TI

Here are the accessory lists for the TI-CC40 and TI-74 as of July, 27 1994 "R" denotes only reconditioned units are available. Prices do not include shipping & handling charges or applicable taxes. Prices and availability may change. To order, you may call 800-TI-CARES.

Model CC40

Unit Price	Model	Part Number		Available
2.650	MAN CC40	1052906 0001	5000	Y
9.950	BASIC LRN CC40	1055934 0001	5000	Y
18.950	AC9201	1055601 8900	5000	Y
1.000	RUBBER FT CC-40	1500348 0003	5000	Y
1.450	KYBD O/L ALCC	1054704 0101	5000	Y

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1.000	REF CARD ALCC	1052904 0001	5000	Y
40.000	SS1000 16K RAM	1052914 8900	5000	Y
20.000	SS1001 PASCAL	1056638 8900	5000	Y
20.000	SS3004 MEMO PROC	1055013 8900	5000	Y
20.000	SS3006 FINANCE	1054705 8900	5000	Y
20.000	SS3007 ELE ENG	1052924 8900	5000	Y
20.000	SS3008 STAT	1054706 8900	5000	Y
20.000	SS3009 MATH	1054707 8900	5000	Y
20.000	SS3024 GAMES	1054724 8900	5000	Y

Model TI74

Unit Price	Model	Part Number		Available
1.250	DUMMY MOD. TI74	1063002 0039	5000	Y
2.550	QR CARD 74	1059857 0001	5000	Y
4.600	CARRY CASE 74	1059859 0001	5000	Y
18.950	AC9201	1055601 8900	5000	Y
7.950	PA201	1059137 0001	5000	Y
4.000	BATT AAA 4PK	1500165 0006	5000	Y
4.000	BATT AAA 4PK	1500165 0006	5000	Y
35.000	CASS CABLE-74/95	1060328 0001	5000	Y
50.000	8K RAM-74/95	1060297 0001	5000	Y
60.000	PCIF 74/95	1065751 0001	5000	Y
5.000	CHEM-74	1062908 0001	5000	R
5.000	FIN-74	1062106 0001	5000	R
5.000	MATH-74	1060308 0001	5000	Y
5.000	PASCAL-74	1060292 0001	5000	R
5.000	STAT-74	1060285 0001	5000	R
65.000	74-SYSTEM CASE	1064930 0100	5000	Y
5.950	TECH/MANUAL 74	1059853 9000	5200	Y
2.500	SCHEMATIC 74	1059853 9900	5200	Y
1.000	TERM, BATT +	1063002 0001	5000	Y
1.000	TERM, BATT -	1063002 0002	5000	Y
1.000	TERM, BATT COMM	1063002 0003	5000	Y
1.000	TERM, BATT COMM	1063002 0003	5000	Y
1.000	SPRING,BATTERY	1063002 0004	5000	Y
1.850	BOTTOM CASE 74	1063002 0005	5000	Y
1.000	B/DOOR 74/95	1063002 0006	5000	Y
1.850	KEY TOP FUNCTIO	1063002 0007	5000	Y
1.000	KEY TOP NUMERIC	1063002 0008	5000	Y
1.000	KEY TOP SPACE	1063002 0009	5000	Y
2.350	ELASTOMER K/B	1063002 0010	5000	Y
1.000	WINDOW TI74	1063002 0011	5000	Y
1.000	SHOCK ABSORBER	1063002 0012	5000	Y
1.000	RUBBER FOOT	1063002 0013	5000	Y
1.000	FOIL TOP ESD	1063002 0014	5000	Y
1.000	FOIL BOTTOM ESD	1063002 0015	5000	Y
1.000	FOOT,CONDUCTIVE	1063002 0016	5000	Y
1.000	INSULATOR I/O S	1063002 0017	5000	Y
1.000	OVERLAY METAL74	1063002 0018	5000	Y
1.000	TOPCASE 74	1063002 0019	5000	Y
1.000	DIODE IN60	1063002 0020	5000	Y
1.000	DIODE IN270	1063002 0021	5000	Y
1.000	CABLE, PCB RIBB	1063002 0022	5000	Y
1.000	RES ARRAY 10K	1063002 0023	5000	Y
1.400	CRYSTAL 4MHZ	1063002 0024	5000	Y

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2.800	FET VP0808L	1063002 0025	5000	Y
5.600	LSI RC4193NB	1063002 0026	5000	Y
6.000	LSI SI7660	1063002 0027	5000	Y
22.000	LSI TMSC70009	1063002 0028	5000	Y
12.150	LSI HN61256PC93	1063002 0029	5000	Y
12.600	LSI HN6264LP	1063002 0030	5000	Y
1.000	CONN I/O,10 PIN	1063002 0031	5000	Y
1.000	FRAME, LCD DSPL	1063002 0032	5000	Y
1.650	POTENTIOMETER	1063002 0033	5000	Y
15.950	LCD DISPLAY	1063002 0034	5000	Y
6.600	LSI-HD44100	1063002 0035	5000	Y
1.000	ZEBRA STRIP B	1063002 0037	5000	Y
1.000	ZEBRA STRIP A	1063002 0038	5000	Y
1.000	I/D LABEL TI74	1063002 0040	5000	Y
56.900	KYBD ASSY	1063002 0041	5000	Y

If you need anything else, please contact me again.

Regards,
Paul King

TI Consumer Relations
Texas Instruments — Internet: ti-cares@lobby.ti.com
P O Box 10508 M/S 5828 — Phone: 806-741-2663
Lubbock, TX 79408-0053 — Fax: 806-741-2690

Original text
From CGood @ SMTP (Charles Good) {CGOOD@osulima1.lima.ohio-state.edu}, on 7/25/94 2:57 PM:
To: ti-cares @ SMTP (ti-cares) {ti-cares@lobby.ti.com}

Please mail me a list of software and hardware products for the CC40 and TI74 which can be purchased from TI using a credit card via 800-842-2737.

Thank you
Charles W. Good

DONE

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