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WIRED BOOTSTRAP II UNIVAC 1230 GENERAL PURPOSE DIGITAL COMPUTER--ETC(U)
MAR 70 G BOTSEAS, D POTTER, C AFCKER

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NAVY UNDERWATER SOUND LABORATORY
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⑥ WIRED BOOTSTRAP II
UNIVAC 1230 GENERAL PURPOSE DIGITAL COMPUTER, SERIAL 62

⑭ NUSL-TM-2211-64-70

⑩ George/Botseas, David/Potter and Clair/Becker

NUSL Technical Memorandum No. 2211-64-70

⑪ 30 March 1970

INTRODUCTION

LEVEL

The Univac 1230 General Purpose Digital Computer, Serial 62, contains a special purpose auxiliary memory comprised of sixty-four 30-bit words. This memory area, commonly referred to as "Wired Bootstrap Memory," is divided into two groups of thirty-two words each. Each group of words has been wired to contain a special purpose LOAD program which may be used to enter other programs such as COMPBOOT, UPAC and SLUPAK into the computer. These LOAD programs, which operate in a non-destructive readout mode, and are selectable by operation of the BOOTSTRAP PROGRAM switch, are known as Wired Bootstraps I and II.

Wired Bootstrap I, better known as the Paper Tape Bootstrap, is described in NUSL Technical Memorandum No. 2211-95-69.

This memorandum is devoted to Wired Bootstrap II.

WIRED BOOTSTRAP II

⑫ 8p.

General

Wired Bootstrap II, commonly referred to as the Magnetic Tape Bootstrap, in the UNIVAC 1230 General Purpose Digital Computer, Serial 62, was designed specifically to input a program which has been written on magnetic tape in "Bootstrap II Format". Input is via the 1540 Magnetic Tape Unit tied to Computer I/O Channel 7.

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Bootstrap II Format

The core image of a record written on magnetic tape in Bootstrap II Format is illustrated in Figure I. This record must be written in Modulus 5, Octal Format, Odd parity at 556 BPI. Figure II illustrates one 30-bit word recorded on magnetic tape in Modulus 5, Octal Format.

Flowchart of Wired Bootstrap II

A simplified flowchart of Wired Bootstrap II is shown in Figure III.

Machine Coded Program of Wired Bootstrap II

An annotated copy of the machine coded program is presented in Figure IV. Note that Wired Bootstrap II, like Bootstrap I, occupies memory cells 00540 through 00577. Depending upon the position of the BOOTSTRAP PROGRAM switch, either Wired Bootstrap I or II will be transferred to these core locations.

Operating Instructions

To load a program using Wired Bootstrap II, perform the following steps:

1. Mount the program tape on MTU 1.
2. Set the BOOTSTRAP PROGRAM Switch to II.
3. Depress OP STEP.
4. Depress MASTER CLEAR.
5. Depress LOAD.
6. Depress START.

Upon completion of Step 6, the program will be read into core and executed. If an error is detected during the READ operation, the Bootstrap program will rewind the magnetic tape and another READ will be attempted.

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SUMMARY OF WIRED BOOTSTRAP II OPERATIONS

After the Bootstrap II Program has been initiated:

- a. The computer performs initialization and assumes control of the 1540 Magnetic Tape Unit.
- b. An input buffer is established resulting in the pseudo buffer control word 12110 00105 being automatically transferred to the Input Buffer Control Register 00107.
- c. An external function command, interpreted as REWIND/READ, MOD 5, OCTAL, ODD PARITY, 556 BPI, is issued to the Magnetic Tape Unit.
- d. Upon receipt of this command, the 1540 Magnetic Tape Unit rewinds and commences to read the tape mounted on logical unit 1.
- e. Since the lower half of the Input Buffer Control Register 00107 contains the address 00105, the first word (WORD 0 in Figure I) transferred from the Magnetic Tape Unit is stored in memory cell 00105. Prior to this and each subsequent transfer, the lower half of the Input Buffer Control Register is automatically incremented by 1.
- f. The next two words (WORDS 1 and 2) received by the computer are stored in memory cells 00106 and 00107 respectively.
- g. Since WORD 2 overstored the contents of the Input Buffer Control Register 00107, WORDS 3 through N of the inputted record will be stored within the memory area defined by the address limits found in WORD 2.
- h. Upon completion of the READ operation, an external interrupt and a status word are transmitted to the computer.
- i. If the status word indicates a good read, a "checksum check" is performed to ensure that the load is good. If either the magnetic tape status word or the "checksum check" reveals an error, the program will jump to address 00540 and another read is attempted.

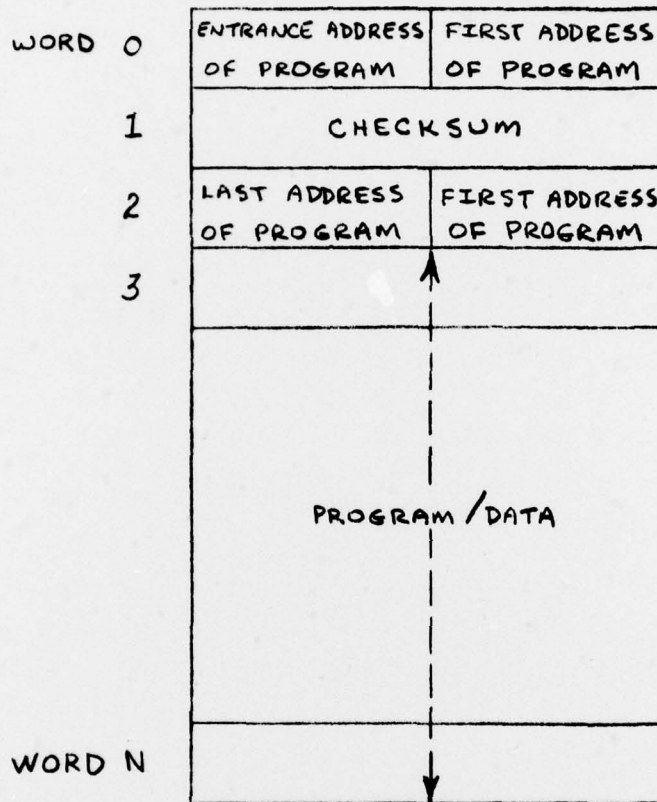
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j. If no errors are detected, it is assumed that the load was good and control is transferred to the entrance address of the inputted program.

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NOTES

1. ALL ADDRESSES ARE ABSOLUTE.
2. WORD 1 CONTAINS THE SUMMATION OF WORD 0 PLUS WORDS 3 THRU N.
3. WORD 3 IS FIRST WORD OF PROGRAM.
4. THIS RECORD MUST BE THE FIRST RECORD ON TAPE, AND
5. MUST BE WRITTEN IN MOD5, OCTAL FORMAT, ODD PARITY, AT 556 BPI.

FIGURE I - WIRED BOOTSTRAP II RECORD FORMAT

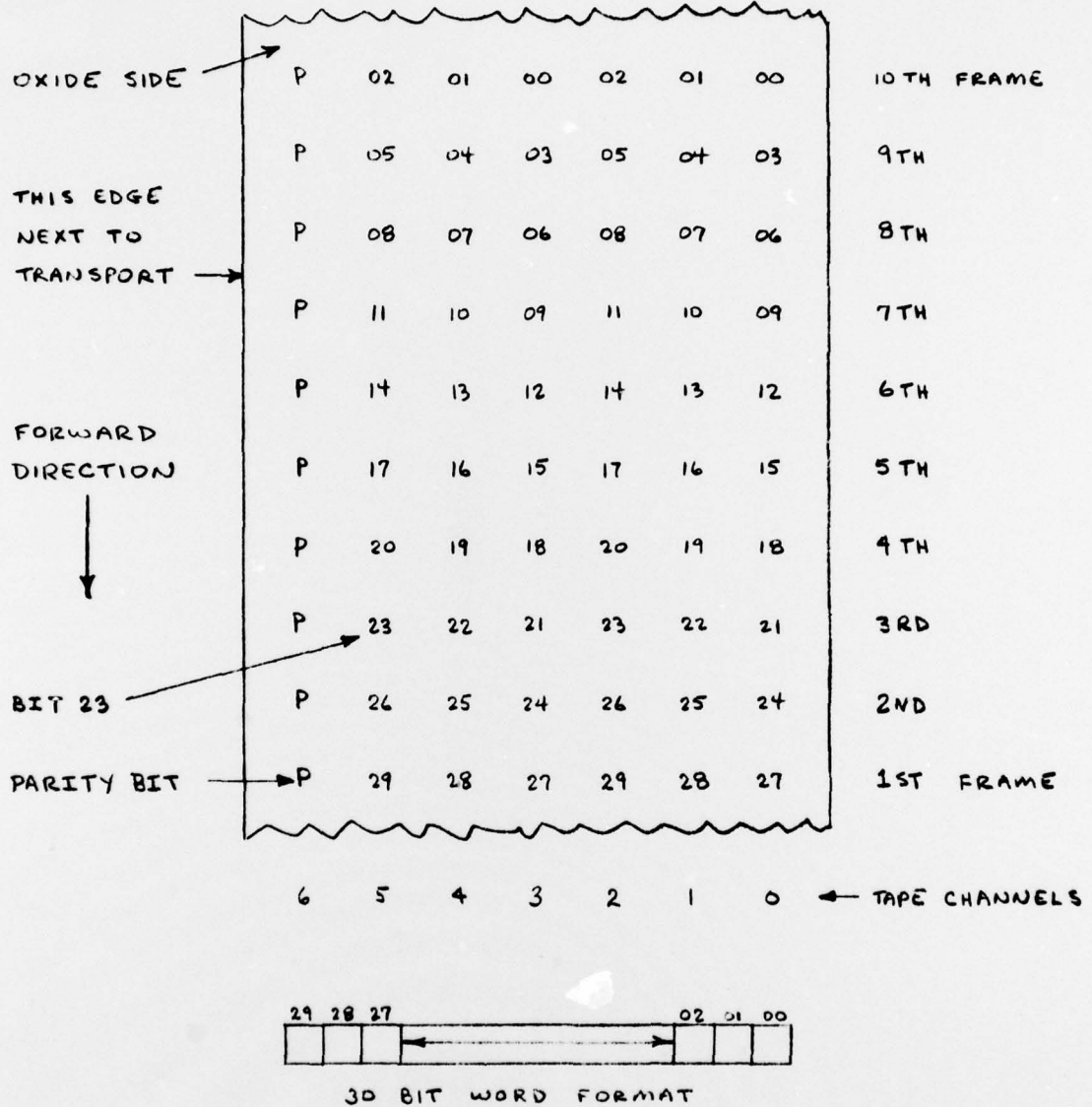


FIGURE II - MODULUS 5, OCTAL TAPE FORMAT

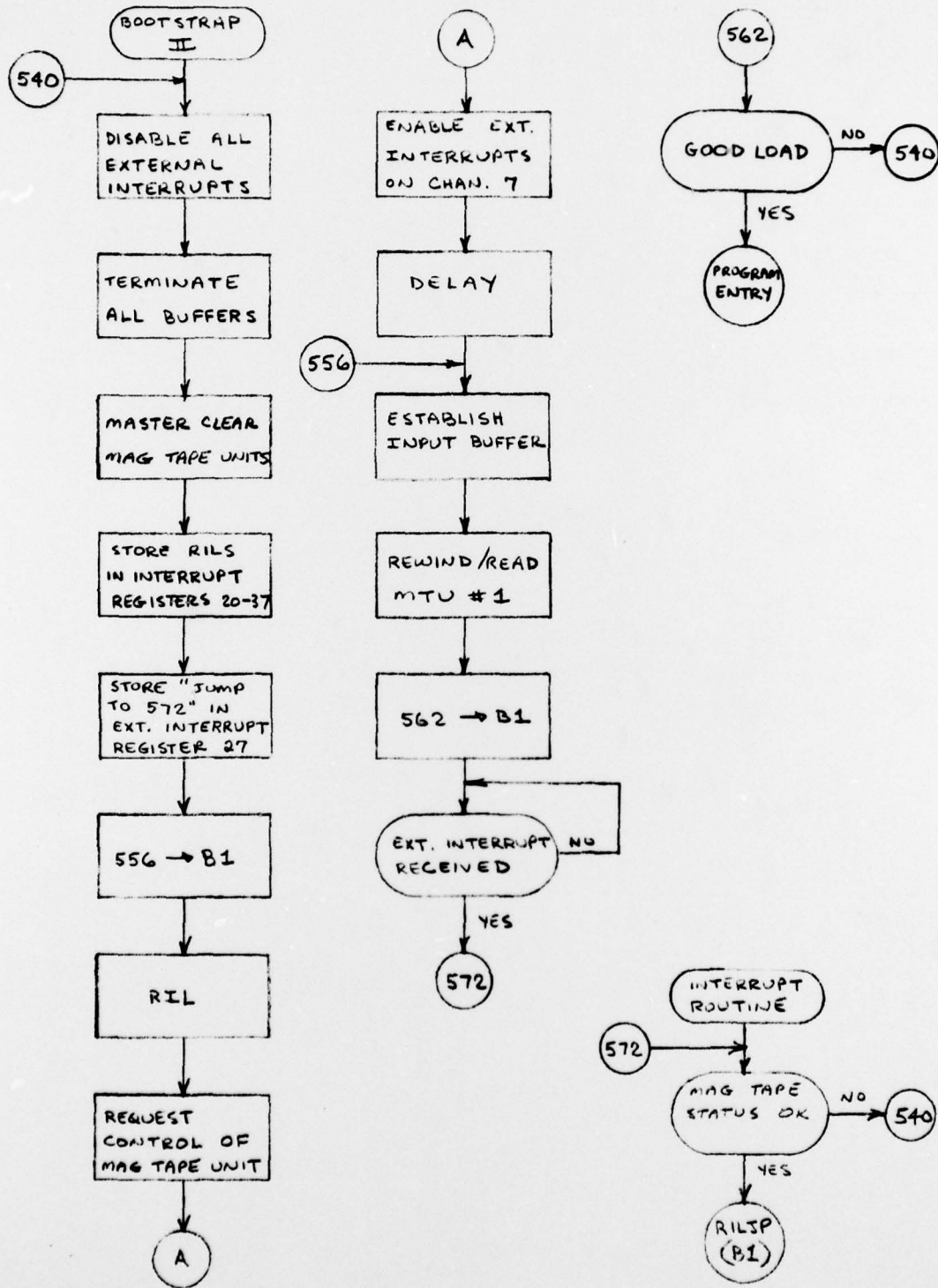


FIGURE III - SIMPLIFIED FLOW DIAGRAM OF WIRED BOOTSTRAP II

| ADDRESS | INSTRUCTION | | | NOTES |
|---------|-------------|-----|-------|---|
| 00540 | 66 | 026 | 00000 | Lock out all ext. interrupts/EX-COM for Demand Control |
| 00541 | 67 | 024 | 00011 | Terminate all buffers/EX-COM for Request Control |
| 00542 | 13 | 370 | 00540 | Master Clear Mag Tape Units |
| 00543 | 10 | 000 | 60000 | |
| 00544 | 70 | 100 | 00020 | } Store RILS in external interrupt registers 00020-00037 |
| 00545 | 14 | 020 | 00020 | |
| 00546 | 10 | 030 | 00576 | } Store jump instruction in external interrupt register 00027 |
| 00547 | 14 | 030 | 00027 | |
| 00550 | 12 | 100 | 00556 | Return address → B1 |
| 00551 | 60 | 000 | 00000 | Release interrupt lockout |
| 00552 | 13 | 370 | 00541 | Request Control of Mag Tape Unit |
| 00553 | 66 | 370 | 00000 | Unlock external interrupts on Channel 7 |
| 00554 | 12 | 700 | 00040 | } Delay. Jump to 00572 if external interrupt is rec'd. |
| 00555 | 72 | 700 | 00555 | |
| 00556 | 73 | 370 | 00562 | Establish input buffer |
| 00557 | 13 | 370 | 00577 | Rewind/Read first record |
| 00560 | 12 | 100 | 00562 | Return address → B1 |
| 00561 | 61 | 000 | 00561 | Wait for interrupt. Jump to 00572 when rec'd. |
| 00562 | 12 | 110 | 00105 | } Test checksum |
| 00563 | 11 | 030 | 00106 | |
| 00564 | 21 | 030 | 00105 | |
| 00565 | 21 | 031 | 00000 | |
| 00566 | 71 | 120 | 00107 | |
| 00567 | 61 | 000 | 00565 | |
| 00570 | 60 | 500 | 00574 | Good load? If not, jump to 00574. |
| 00571 | 61 | 020 | 00105 | Yes. Jump to program entry cell. |
| 00572 | 11 | 010 | 00527 | |
| 00573 | 52 | 400 | 16010 | Mag tape status code OK? |
| 00574 | 61 | 000 | 00540 | No. Try again. |
| 00575 | 60 | 101 | 00000 | Yes. Release interrupt lockout and jump to address in B1 |
| 00576 | 61 | 000 | 00572 | External interrupt jump instruction |
| 00577 | 00 | 001 | 62711 | EX-COM for Rewind/Read/MOD 5/OCTAL/ODD/556/MTU 1 |

FIGURE IV - Machine Code Listing of Wired Bootstrap II