

RECOMP II USERS' PROGRAM NO. 1115

PROGRAM TITLE: URAL (Utility Routine Alphanumeric,  
Luebbert)

PROGRAM CLASSIFICATION: Utility Routine

AUTHOR: Major Luebbert  
United States Military Academy  
Department of Electricity  
West Point, New York

PURPOSE: URAL is a general usage alphanumeric utility routine furnished in relocatable form. It may be used by itself to provide a convenient means for manual entry and readout of alphanumeric information packed 8 characters per word in a form compatible with and interchangeable with those required by mechanized machine commands such as RDY 776XO, RDZ 776XO and TYA (or TYC) 776XO. It may also be used as a supplement to PPP-2, the alphanumeric input and output of which pack data 6 characters per word in a form which cannot be typed out by the TYA (+72 776XO) command.

DATE: 1 September 1961

Published by

RECOMP Users' Library

at

AUTONETICS INDUSTRIAL PRODUCTS

A DIVISION OF NORTH AMERICAN AVIATION, INC.

3400 East 70th Street, Long Beach 5, California

DEPARTMENT OF ELECTRICITY  
UNITED STATES MILITARY ACADEMY  
WEST POINT, NEW YORK

PROGRAM TITLE: URAL (Utility Routine Alphanumeric, Luebbert)

1. INTRODUCTION.

URAL is a general usage alphanumeric utility routine furnished in relocatable form. It may be used by itself to provide a convenient means for manual entry and readout of alphanumeric information packed 8 characters per word in a form compatible with and interchangeable with those required by mechanized machine commands such as RDY 776X0, RDZ 776X0 and TYA (or TYC) 776X0. It may also be used as a supplement to PPP-2, the alphanumeric input and output of which pack data 6 characters per word in a form which cannot be typed out by the TYA (+72 776X0) command.

2. RESTRICTIONS.

The restrictions are the same as those of the SAIL and LAOS sub-routines. Most important is that the peak input typing speed for two adjacent characters should not exceed 140 words per minute.

3. METHOD.

See flow chart, Paragraph 5.

4. USAGE.

The master relocatable tape should be used only to produce relocated tapes. Only relocated tapes should be used as described below.

4.1 UTILITY DATA ENTRY.

- a. With SWITCH B OFF, set the location counter to the start of URAL (specific setting determined by relocation).
- b. Key into the console keyboard "L XXXX START" where "L" is the L key just to the left of the ten position keyfield, "XXXX" is the four digit address where one wishes to begin storing alphanumeric words, and "START" is the start button just to the left of the ten position keyfield.
- c. The computer will automatically set the typewriter to the letters case, cause it to carriage return, and then halt awaiting type-in of alphanumeric information from the typewriter keyboard.

#### 4.1 UTILITY DATA ENTRY (Cont'd)

- d. Type in the desired alphanumeric information. It will be stored 8 characters/word starting at location XXXX. When all desired data has been entered type blanks slowly. After a minimum of 8 blanks and a maximum of 15 blanks have been typed the computer will display "+00XXXX0000YYYY" on the console nixie tubes. This is a control word specifying the extent of the alphanumeric data in the format used by the LAOS alphanumeric output subroutine. The XXXX is the four digit address of the first word of packed alphanumeric data and the YYYY is the four digit address of the last word. The computer also carriage returns and types out the word in command format printout "+00XXXX0-00YYYY0".
- e. The computer automatically returns to condition 4.1 ready for key-in from the console. If SWITCH B is turned ON at this time, it goes to condition 4.2.

#### 4.2 UTILITY DATA PRINT-OUT.

- a. With SWITCH B ON, set the location counter to the start of URAL (specific setting determined by relocation).
- b. Key into the console "L XXXX C" where "L" is the L key just to the left of the ten position keyfield, "XXXX" is the four digit address of the start of the alphanumeric data, and "C" is the C key just to the left of the ten position keyfield.
- c. Depress the "CLEAR" key on the console just to the right of the ten position keyfield. Note: this step is optional. It affects only the nixie tube display and does not affect the data entered.
- d. Key into the console "L YYYY START" where "L" is the L key just to the left of the ten position keyfield, YYYY is the four digit address of the last word of alphanumeric data to be printed out, and "START" is the start key just to the left of the ten position keyfield.
- e. The computer will type out in alphanumeric form all data between the limits specified. It will then carriage return, type out the control word used for the print-out, and return to condition 4.2 ready for key-in from the console. If SWITCH B is turned OFF at this time it goes to condition 4.1.

### 4.3 SUBROUTINES.

URAL may also be used as part of an operating program to provide 8 character/word input and output subroutines (SAIL and LAOS). Their calling sequences are as follows:

#### SAIL ALPHANUMERIC INPUT

SLL	
$\alpha$	+57 (URAL + 20) + 00 XXXX 0
$\alpha + 1$	Normal Return

URAL is address of start of the relocated URAL program.

XXXX is the four digit address of the start of the alphanumeric data storage.

#### LAOS ALPHANUMERIC OUTPUT

SLR	
$\alpha$	+57 (URAL + 40) + 00 XXXX 0
$\alpha + 1$	+ 00 YYYY 0
$\alpha + 2$	Normal Return

YYYY is the four digit address of the end of the alphanumeric printout desired.

### 4.4 EXTENT OF STORAGE.

67<sub>8</sub> words including SAIL and LAOS subroutines.

### 4.5 RELOCATION INFORMATION.

URAL is provided in standard relocatable form using the modified AN-004 (RUG 1075) relocater. The URAL program occupies locations 0000 thru 0067, the relocation matrix occupies locations 4000 thru 4067, the relocater program occupies locations 7730 thru 7754, and a control word with the extent of the subroutine (67<sub>8</sub>) in its right address is in location 3777. This relocatable tape should not be used except to produce relocated tapes. To produce a relocated tape load the URAL standard relocatable tape. At L7730 enter the desired location of URAL after relocation in the address portion of the second half word. One permissible way of doing this is to depress "C +00 00000 + 00 UUUU0 ENTER" where "C" is the "C" key just to the left of the ten position keyfield, the +'s and 0's are entered from the keyfield, and UUUU is the 4 digit address of the desired starting location of the relocated program, also entered from the ten position keyfield, and "ENTER" is the enter key just to the right of the ten position keyfield. The last digit of UUUU should always be a 0 to assure proper operation of the high speed loop instructions in the SAIL and LAOS subroutines. After this control word is entered depress "START" (just to the left of the ten position keyfield) and a URAL tape relocated to the desired location will be punched by the tape punch.

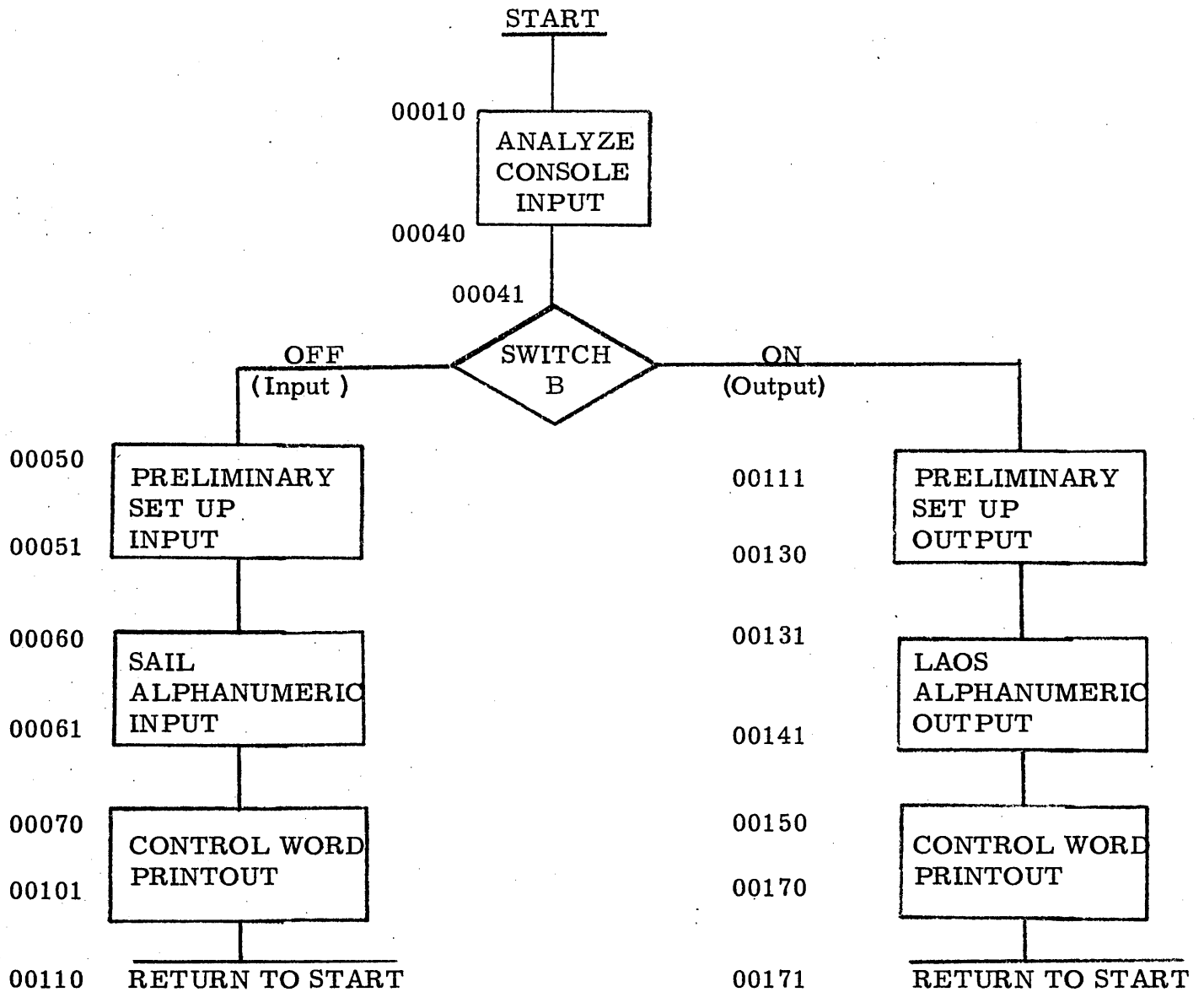
#### 4.5 RELOCATION INFORMATION (Cont'd)

If "START 1" "START 2" or "START 3" are available for use when the URAL routine is used, it may be convenient to enter at L0001, 2 or 3 the instruction "+77 (URAL) 0+0000000" so that the START 1, 2 or 3 button may be used to enter condition 4.1 or 4.2 (which depends upon setting of SENSE SWITCH B). This instruction may be punched on to the relocated tape either before or after the relocated URAL is punched on it.

#### 4.6 UTILIZATION OF L AND V LOOPS.

URAL destroys the previous contents of the L and V loops.

5. CODING INFORMATION.



00200 - 00360 SAIL SUBROUTINE  
 00400 00621 LAOS SUBROUTINE  
 0064 TEMP STO 1  
 0065 TEMP STO 2  
 0066 LEFT ADDRESS MASK  
 0067 RIGHT ADDRESS MASK

6. CHECKOUT: URAL MASTER RELOCTABLE TAPE WAS RELOCATED TO A VARIETY OF LOCATIONS AND INPUTS AND OUTPUTS CHECKED AGAINST EACH OTHER AND AGAINST DATA PRODUCED BY LAMP PROGRAMMING AID.

Subject: LIRAL (Utility Routine)  
Alphanumeric Luebbert

Prepared by: Major Luebbert

SAIL 0020 - 0036  
LAOS 0040 - 0062

LOCATION		ACTION		Final Cond.	INSTRUCTION				NOTES AND REMARKS
Address	I	Opn	Operand	Accumulator	S	Op	Address	I	
$\alpha + 0$	0	STO	T <sub>1</sub>		+	60	0064	0	+
	1	EXT	Left add		+	33	0066	0	+
1	0	ALS	118		+	41	0011	0	-
	1	STO	T <sub>2</sub>		+	60	0065	0	+
2	0	CLA	T <sub>1</sub>		+	00	0064	0	+
	1	EXT	Right add		+	33	0067	0	+
3	0	ALS	1		+	41	0001	0	-
	1	STA	T <sub>2</sub> . 1		+	42	0065	1	+
4	0	STA	$\alpha + 6$		+	42	0006	1	+
	1	TSB	$\alpha + 11.1$		+	54	0011	1	+
5	0	TYC	"Letters"		+	72	0037	0	-
	1	TYC	"CR"		+	72	0010	0	-
6	0	TRA	SAIL		+	57	0020	0	+
	1	PZE	L(S)		+	00	0000	0	-
7	0	TYC	"Letters"		+	72	0037	0	-
	1	TYC	C/R		+	72	0010	0	-
0	0	TYC	FIGS		+	72	0033	0	-
	1	TYW	7774		+	12	7774	0	-
1	0	TRA	Alpha		+	77	0000	0	+
	1	CLA	T <sub>2</sub>		+	00	0065	0	+
2	0	STO	$\alpha + 14$		+	60	0014	0	+
	1	TYC	"Letters"		+	72	0037	0	-
3	0	TYC	"CR"		+	72	0010	0	-
	1	TRA	"LAOS"		+	57	0040	0	+
4	0	PZE	L (S)		+	00	0000	0	-
	1	PZE	L (F)		+	00	0000	0	-
5	0	TYC	"Letters"		+	72	0037	0	-
	1	TYC	C/R		+	72	0010	0	-
6	0	TYC	FIGS		+	72	0033	0	-
	1	TYW	$\alpha + 14$		+	12	0014	0	+
7	0	TYC	"Letters"		+	72	0037	0	-
	1	TRA	Alpha		+	77	0000	0	+

