

PHILCO 2000
OPERATING TECHNIQUES
TRAINING NOTES

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PHILCO 2000

OPERATING TECHNIQUES TRAINING NOTES

STANDARD OPERATING PROCEDURES

EXECUTE AN INSTRUCTION

1. Press STEP
2. Clear PR
3. Enter Instruction into PR
4. Press I_L or I_R depending on which instruction is to be performed
5. Press ADVANCE

EXECUTE AN I-O ORDER

1. Press STEP
2. Clear D
3. Clear PR
4. Enter I-O order in D
5. Enter TIO and starting address in left half of PR
6. Press I_L Press ADVANCE (If I-O Order is accepted the I indicator lights)

CLEAR MEMORY

1. Press PRE-CLEAR
2. Press STEP
3. Clear D
4. Clear PR
5. Enter, into the left half of PR, the instruction

TIXS 0,0\$

6. Press I_L
7. Press ADVANCE.
8. Clear PR
9. Enter, into PR, the instructions

```
TDM 0$  
JMPL 0$
```

10. Press I_L
11. Enter, into D, the instructions

```
CM 1,0$  
JMPL 0$
```

12. Press RUN
13. Press ADVANCE (The computer will stop when the memory is cleared and the register displays will be as follows:

```
D 0 ----- 0  
PR 0 ----- 0  
JA 0 -----01  
PA 0 -----01  
MA 0 ----- 0
```

CHANGE CONTENTS OF A MEMORY LOCATION

1. Press STEP*
2. Clear D
3. Clear PR
4. Enter, into the command fields of PR, the commands

TMD
TDM
5. Press I_L
6. Enter, into both address fields of PR, the address of the location to be changed
7. Press ADVANCE (The contents of the location to be changed appears in D, and the I_R indicator lights)
8. Change the contents of D as desired.
9. Press ADVANCE (The contents of the memory location is changed and the I indicator lights)
10. To check the change:
 - a. Press I_L
 - b. Press ADVANCE (The new contents of the location appears in the D register)
11. To change the contents of another address
 - a. Press I_L
 - b. Clear both address fields of PR
 - c. Go back to step 6

CHANGE CONTENTS OF LOCATION WITHOUT INTERFERENCE WITH RUN

If it is desired to change the contents of the memory location without interfering with a program run, insert the following actions between steps 1 and 2.

- a. Press ADVANCE until the I indicator lights
- b. Copy down the contents of D

Add the following actions after step 11.

- a. Enter the original contents back into D
- b. Press I
- c. Press RUN
- d. Press ADVANCE

JUMP TO A LOCATION WITHOUT CHANGING THE CONTENTS OF JA

1. Press STEP
2. Place the address of the jump location in either the right or left address field of PR
3. Press either I_L or I_R depending upon the location of the jump address
4. Press the Jump button (The jump address appears in PA)

NOTE:

The Jump location can be index register modified.

PHILCO OPERATING SYSTEM - SYS

SYS has the following RECOMMENDED TAPE ASSIGNMENTS

<u>Magnetic Tape Unit</u>	<u>Use during TAC or ALTAC Compilation</u>	<u>Use during Program Run Time</u>
0	Unassigned	Unassigned
1	System Tape	System Tape
2	Scratch (Current Binary Program)	Scratch (Intermediate error dump tape)
3	Scratch	Scratch
4	Binary Program Tape	Binary Program Tape
5	Scratch (Code Edits and Program Cards)	Scratch (Final error dump tape)
6	Scratch	Scratch
7	Library Tape	Unassigned
8	SYS Input Tape	SYS Input Tape
9 - 15	Unassigned	Unassigned

Unassigned Tape Units may be used by a programmer for additional input or output data tapes, library tapes, pure TAC language program tapes or RPL Tapes.

System Tape contains the system executive program, the TAC and ALTAC compilers and the many utility routines incorporated into the system. It also contains the TAC and ALTAC libraries in binary format for use with Relocatable Binary Programs.

Scratch Tape 2 (during compilation will have, upon completion of a compilation, the RPL, the Absolute Binary or the Relocatable Binary programs just compiled.

Scratch Tape 2 (during run time) used an intermediate storage tape for raw memory locations and dump parameters.

Scratch Tapes 3 and 6 (during compilation) used as working tapes during a TAC or ALTAC compilation and contain no useful data.

Scratch Tapes 3 and 6 (during run time) used by some of the utility routines. The programmer or operator may use these tapes (caution) if he is sure the utility routines do not also use the tapes.

Binary Program Tape (during compilation). Tape Unit 4 may contain a prepared scratch tape or a Binary Program Tape. It will have,

upon completion of a compilation, the binary program just compiled provided there were no major compilation errors or special IBIT instructions given. As jobs are compiled the binary programs will be stacked on tape unit 4. (If a new scratch tape is being used, rather than the previous day's binary program tape, the scratch must have a block of Z's at the beginning of tape and must be re-wound before compilation.

Binary Program Tape (during run time). May be any binary program tape that contains the programs to be run.

Scratch Tape 5 (during compilation) will have, upon completion of a compilation, the code edit of the job just compiled with Data Select 0 and the binary program cards of the same job with Data Select 1. Code edits and program cards will be stacked on tape unit 5 as they are compiled.

Scratch Tape 5 (during run time) will contain the edited output for a TRACE, SNAP, or ERROR DUMP called for by an operator or running program. The edited information will be stacked along with any code edits that may be on the tape.

Library Tape contains the various subroutines (TAC language), macros and generators that are available to the programmer.

SYS Input Tape contains the various jobs to be compiled and/or run. The tape usually contains the control instructions, TAC language program and data necessary for the job. The jobs may be in code or image mode.

DESCRIPTION OF SYSTEM FUNCTIONS

The following jump instructions are normally given via the program register of the central computer, but may be given when in the FLEXO MODE of operation via the console typewriter.

1. INITIALIZATION FUNCTION (JMPL 1)

This function should be executed by an operator whenever the system is initially read into memory, or if control is to be transferred from magnetic tape or paper tape mode back to flexo mode. The function performs the following actions:

- a. Types out on the flexo SYSTEM N INITIALIZED.
- b. Initializes the system to the flexo mode of input.
- c. Clears all of memory from 1000 (octal) up to the end of memory.
- d. Clears the dump and IBIT parameter areas.
- e. Rewinds tape 4.
- f. (Caution) If CONIN CODE or IMAGE is given after initialization, the system will position tape 8 to the beginning of the next block and search for a new JOB card.

2. ERROR DUMP FUNCTION (JMPL 2)

The operator executes a jump to this function in the event of program malfunction. The function executes the dumps specified by the DUMP control statements and then proceeds to the END OF JOB FUNCTION. The function performs the following actions:

- a. Writes on tape unit 2 in core image format, the contents of all memory locations specified by the dump parameters. When finished a sentinel is added and tape unit 2 is rewound.
- b. Loads the program DUMPCON into memory to edit and transfer the information to tape unit 5.
- c. Upon completion of the dump on tape unit 5 the system will jump to 4 to begin the END OF JOB FUNCTION.
- d. Note: If tape unit 2 is disturbed, DUMPCON may miss or run beyond the sentinel block and begin typing FORM....FORM....FORM.... In this event, the operator the operator should jump to 4 since DUMPCON is having difficulty interpreting the format of the dump.

3. SPECIAL ERROR DUMP FUNCTION (JMPL 3)

This jump should not be issued by an operator unless a program specifically calls for it.

When the system is initialized the contents of memory locations 2 and 3 are the same and a jump to either location will result in an error dump. But after running a program the locations may be different since the programmer has the option of changing location 3.

4. END OF JOB FUNCTION (JMPL 4)

This function should be executed by an operator if a job is to be interrupted and/or terminated without a memory dump. The function performs the following actions:

- a. Types out on the flexo END OF JOB.
- b. If in FLEXO MODE returns to flexo for next control instruction.
- c. If in MAGTAPE or PAPER TAPE MODE initiates a search for the next JOB instruction.

5. NEXT CONTROL LINE FUNCTION (JMPL 5)

If in the FLEXO MODE of operation, the operator may jump to this function in order to return control to the console typewriter. The function performs the following actions:

- a. If originally in the FLEXO MODE of operation the function returns to the console typewriter waiting for the next control instruction.
- b. If in the PAPER TAPE or MAGTAPE MODE of operation, the function will obtain and execute the next control instruction on the operating medium and remain in the original mode of operation

DESCRIPTION OF SYSTEM CONTROL INSTRUCTIONS

1. REWIND: Rewinds the Magnetic Tape Unit(s) specified in the address field.

Example: (t) (t) REWIND (t) 3,8,9, (c)

Explanation: Rewinds Magnetic Tape Units 3,8, and 9.
2. REWINDLO Rewinds, with lockout, all Magnetic Tape Units specified in the address field.

Example: (t) (t) REWINDLO (t) 4,5 (c)

Explanation: Rewinds Tape Units 4 and 5 with lockout.
3. READF: Spaces and/or reads forward up to 19,000 blocks from a specified tape into memory.

Example: (t) (t) READF (t) 6,2,5,1500 (c)

Explanation: The tape mounted on Tape Unit 6 is to be spaced forward 2 blocks, and 5 blocks are read into starting memory location 1500 (octal).
4. READB: Spaces and/or reads backwards up to 19,000 blocks from a specified tape into memory.

Example: (t) (t) READB (t) 8,0,1,1000 (c)

Explanation: Read backwards 1 block from Tape Unit 8 into location 1000 (octal).
5. WRITE: Spaces and/or writes a specified number of blocks up to 19,000 on an output tape.

Example: (t) (t) WRITE (t) 5,3,6,1700 (t)

Explanation: The tape mounted on Tape Unit 5 is spaced forward 3 blocks, and 6 blocks are written starting from location 1700 (octal)
6. WRTSENT: Writes a sentinel block onto a specified tape.

Example: (t) (t) WRTSENT (t) 5, ZZZZZZZZ (c)

Explanation: A sentinel block containing 129 words of Z's is written onto tape unit 5.

7. LOCSENT: Searches forward on a tape for a specified sentinel block. After the sentinel block is located, the tape will be positioned at the end of the sentinel block.
- Example: (t) (t) LOCSENT (t) 5, YYYYYYYY (c)
- Explanation: The tape mounted on Tape Unit 5 is searched forward for a sentinel block which contains all Y's.
8. CONIN: Changes the mode of operation or source of the control instructions to the specified medium.
- Example: (t) (t) CONIN (t) CODE (c)
- Explanation: Initiates Magnetic Tape mode of operation and initiates a search for the next JOB card (code mode format) on magnetic tape unit 8.
- Example: (t) (t) CONIN (t) IMAGE (c)
- Explanation: Similar to CONIN CODE except information must be in image mode format on tape.
- Example: (t) (t) CONIN (t) PAPER (c)
- Explanation: Initiates paper tape mode of operation and initiates a search for the next JOB instruction on paper tape.
- Example: CONIN FLEXO
- Explanation: If CONIN FLEXO is executed from paper tape or magnetic tape, the system will switch to flexo mode of operation returning control to the operator.
9. JOB: The JOB instruction precedes every new series of operations (jobs) which enters the system. It is normally given by the programmer within his program. The instruction performs the following actions:
- a. Types out all the information on the job card. Usually the programmer's name or other identifying information.

- b. Clears all of memory from 1000 (octal) up to the highest location.
- c. Clears the dump and IBIT parameter areas.
- d. Rewinds scratch tapes 3 and 6.
- e. Edits all the information on the job card for the High Speed Printer and edits the information to appear on a new page of the printer.
- f. Rewinds tape unit 2 and writes JOB card on tape unit 2.

Example: (t) (t) JOB (t) JIGSAW, SMITH (c)

Explanation: Performs the actions listed above.

10. TAC

The TAC instruction is normally given by the programmer within his program, it signals the start of a TAC compilation. The source of the TAC language program may be on magnetic tape, paper tape or is to be entered from the console typewriter.

Example: (t) (t) TAC (t) MAGTAPE, 8, LIB, 7 (c)

- Explanation:
- a. Copies the TAC language program from tape unit 8 onto tape unit 6.
 - b. Calls in TAC Compiler to perform the TAC compilation.
 - c. Informs TAC the library is on tape unit 7.
 - d. Forms the Binary Relocatable output on tape unit 2.
 - e. Copies Binary Relocatable output from tape unit 2 onto tape unit 4 provided there were no compilation errors or special IBIT instructions given.
 - f. Puts the Code Edit output and Binary cards on tape unit 5.
 - g. Upon completion of the compilation it will type out END TAC and the identity of the program just compiled.

Example: (t) ABS(t) TAC (t) PAPER, LIB 7 (c)

- Explanation:
- a. Copies the TAC language program from paper tape onto tape unit 6.
 - b. Through g. Same as above, except that compiled program is in Binary Absolute format.

Example: (t) RPL (t) TAC (t) FLEXO, LIB, 7 (c)

Explanation: a. Accepts TAC language program from the console typewriter and copies it onto tape unit 6.
b. through g. Same as above, except that compiled program is in RPL format.

11. ALTAC: The ALTAC instruction is normally given by the programmer within his program. It signals the start of an ALTAC compilation. The source of the ALTAC language program may be on magnetic tape, paper tape or is to be entered from the console typewriter.

Example: (t) (t) ALTAC (t) MAGTAPE, 8, LIB, 7 (c)

Explanation: a. Copies the ALTAC language program from tape unit 8 onto tape unit 2.
Calls in the ALTAC compiler to generate TAC language output on tape unit 6.
Informs ALTAC the library is on tape unit 7.
b. through g. Same steps as outlined in the TAC Control instruction.

12. IBIT: May be used to control the transfer of a compiled program from tape unit 2 to tape units 4 or 5 during a compilation. May also specify the input mode of a TAC language tape and retain a TAC language program on tape unit 6.

Example: (t) (t) IBIT (t) 46 (c)

Explanation: If control instruction IBIT 46 is executed prior to a TAC control instruction, the compiled program will not be saved on tape unit 4.

Example: (t) (t) IBIT (t) 47 (c)

Explanation: If the control instruction IBIT 47 is executed prior to a TAC control instruction, the compiled program will be saved on tape unit 4, regardless of compilation errors.

Example: (t) (t) IBIT (t) 41 (c)

Explanation: If the control instruction IBIT 41 is executed prior to a TAC control instruction, the TAC language input to a compilation is assumed to be in binary image mode on another tape unit other than tape 8.

Example: (t) (t) IBIT (t) 42 (c)

Explanation: If the control instruction IBIT 42 is executed prior to a TAC control instruction, the TAC language input to a compilation is assumed to be in Hollerith image mode on another tape unit other than tape 8.

Example: (t) (t) IBIT (t) 43 (c)

Explanation: If the control instruction IBIT 43 is executed prior to a TAC control instruction, the TAC language input will be left on tape 6 after the compilation in the same mode as it was on the original input tape.

Example: (t) (t) IBIT (t) 44 (c)

Explanation: If the control instruction IBIT 44 is executed prior to a TAC control instruction, the binary program just compiled will not be saved on tape unit 4.

Example: (t) (t) IBIT (t) 45 (c)

Explanation: If the control instruction IBIT 45 is executed prior to a TAC control instruction, the binary program cards from the job just compiled will not be saved on tape unit 5.

13a. RPL: Initiates the search, load operation and running of a specified RPL Program.

Example: (t) (t) RPL (t) 4 JIGSAW, GO (c)

Explanation: Rewinds tape unit 4 and searches for the identity JIGSAW, when found the program will be loaded into the starting address specified within the program and an automatic jump will be executed to the starting address to run the program.

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Example: (t) (t) RPL (t) 1, SYSTRACE, GO, 16 000 (c)

Explanation: The relocatable program SYSTRACE will be located and loaded from tape unit 1 into memory location 16,000, and a jump effected to the starting address to run the program.

Example: (t) (t) RPL (t) 4, JIGSAW (c)

Example: (t) (t) RPL (t) 1, SYSTRACE, , 16 000 (c)

Explanation: Omitting the GO parameter will cause the system to load a program without running it. If several programs are loaded the system is set to remember the starting address of the last program loaded.

13b. ABS: Initiates the search, load operation and running of a specified Binary Absolute Program.

Example: (t) (t) ABS (t) 4, JIGSAW, GO (c)

Explanation: Loading procedure is just the same as in 13a (RPL).

13c. REL: Initiates the search, load operation and running of a specified Binary Relocatable Program. Also loads any subroutines used with specified program and lists all defined symbols used by specified program.

Example: (t) (t) REL (t) 4, JIGSAW, GO, LIST, SUBS, 8

Explanation: Tape unit 4 will be rewound and the Binary Relocatable Program, JIGSAW, will be located and loaded from tape unit 4. All subroutines used with JIGSAW will be located and loaded first from tape unit 8 and then from tape unit 1, if necessary. All symbols used in JIGSAW which are defined after loading the program and its subroutines will be listed on tape unit 5 and a jump will be made to JIGSAW's starting address.

14. DUMP: Defines the format and memory locations to be dumped in case of program malfunction.

Example: (t) (t) DUMP (t) O,1000,1700 (c)
Example: (t) (t) DUMP (t) C,1000,1700 (c)
Example: (t) (t) DUMP (t) A,1000,1700 (c)
Example: (t) (t) DUMP (t) F,1000,1700 (c)
Example: (t) (t) DUMP (t) S,1000,1700 (c)

Explanation: The dump routine is preset to execute a dump of locations 1000 (octal) through 1700 (octal) in respectively octal command, alphanumeric, floating point and fixed point format.

15. OCT: Is used to change the contents of a specified memory location.

Example: (t) 1023 (t) OCT (t) 3260606060606060 (c)

Explanation: Changes the content of memory location 1023 (octal) to the specific octal characters.

16. JMP: Transfers control to the object program by causing a jump to the specified address.

Example: (t) (t) JMPR (t) 1700 (c)

Explanation: Causes a jump to the right half of memory location 1700 (octal).

Example: (t) (t) JMP (t) * (c)

Explanation: When given, following the loading of a series of programs, a jump will be executed to the starting address of the last RPL program loaded, provided there has been no intervening jump in the system.

17. HLT: The principal use of the HLT instruction is to relay messages to the operator and cause the computer to halt to allow operator action.

Example: HLT PUT REEL 167 ON T9

Explanation: The computer will halt with the specified type-out on the console typewriter. Pressing the ADVANCE bar will cause the system to read and execute the next control instruction.

18. REM: Similar to the HLT control instruction, but does not cause the computer to halt.

Example: REM DUMP AFTER 3 MINUTES

Explanation: Types on the console typewriter the specified remark but continues operating.

19. JOBSRCH: Searches the SYS Input Tape (tape unit 8) for a specified JOB, and enables immediate execution of that JOB.

Example: (t) (t) JOBSRCH (t) JIGSAW, SMITH (c)

Explanation: Searches tape unit 8 for the specified JOB (actually searches for first parameter only, e.i., JIGSAW). If located it will type out FOUND JOB and begin to execute the job.

FRED (Parameters entered via D Register)

LOAD : 8 blocks into loading address (relocatable).
RUN : JMPL to loading address.
JBT : JUMP
OF : OFF
TR : Toggels 25-28 specify output tape.

HALTS :

HLTL 02222

- a. Press step,
- b. Skip two instructions immediately following
HLTL 02222,
- c. Press run,
- d. Press advance.

HLTL 01111

- a. Enter parameters in D Register,
- b. Press advance.

HLTL 01111

- a. Repeat as desired,
- b. To wrap up, clear D register and press advance.

PARAMETERS:

Dump parameters

- a. Bits 1-15 = From location
- b. Bits 25-39 = To location
- c. Bits 40-47 = Format (quaternary code)
Command (0103)
Octal (0212)
Floating(0112)
Fixed (0302)
Alpha (0101)

PROGRAM DESCRIPTION:

COMPACT

LOAD : 4 blocks into loading address (relocatable).
RUN : JMPL to loading address.
JBT : JUMP
OF : OFF
TR : OFF

HALTS :

- HLTL 11111 - Enter first parameter in D register, then
press advance
- HLTL 07070 - Enter subsequent parameter in D register,
press advance
- HLTL 07070 - Repeat as desired

PARAMETERS:

First parameter

- a. Bits 1-15 = From location
- b. Bits 20-23= Output tape

Subsequent parameters

- a. Bits 1-15 = From location
- b. Bits 25-39= To location
- c. Bits 45-47= Format (binary code)
 - Command (000)
 - Octal (001)
 - Floating(010)
 - Fixed (100)
- d. Bit 16 = If registers (A,Q,D) are desired
- e. Bit 40 = If an absolute stop is desired on
output tape

NOTE: COMPACT can be restarted (at HLT 07070) by jumping to loading
address plus M/330.

PROGRAM DESCRIPTION:

SYS RPLC

LOAD: (t) (t) RPLC (c)

RUN: SYS automatically JUMPS to 6000

JBT: JUMP

OF: OFF

TR: OFF

TYPE IN: SYS CONTROL INSTRUCTIONS - The following instructions illustrate the format of the permissible operations.

(t)	(t)	NEWTAPE	(t)	6	(c)			
(t)	(t)	REWIND	(t)	1,2,4,6	(c)			
(t)	(t)	ADD	(t)	1, FRED	(c)			
(t)	(t)	COPYTIL	(t)	4, JIGSAW	(c)			
(t)	(t)	SKIPTIL	(t)	4, PATCH	(c)			
(t)	(t)	DELETE	(t)	2, TOM	(c)			
(t)	(t)	COPY	(t)	2	(c)			
(t)	(t)	ENDALL	(t)	LIST	(c)			
(t)	(t)	CORRECT	(t)	3, HSPTEST	(c)	} Rarely used by an Operator.		
R	(t)	6152	(t)	TMQ	(t)		1622	(c)
L	(t)	6177	(t)	W/SPEC	1422		(c)	
(t)	(t)	END	(t)		(c)			

	(t)	(t)	IDCHANGE	(t)	5, JOHN	(c)	
I	(t)	(t)	JOHN 2			(c)	
L	(t)	5144	(t)	TMD	(t)	6331	(c) Rarely used by an Operator.
L	(t)	6400	(t)	ø/6060606060606060		(c)	
	(t)	(t)	END			(c)	

NOTES: a) NEWTAPE must be the first control instruction for a series of operations.

 b) ENDALL must be the last control instruction for a series of operations.

FUNCTION OF CONTROL INSTRUCTIONS:

- a) NEWTAPE: Designates the output tape
- b) REWIND: Rewinds all tapes specified
- c) ADD: Locates specified program and copies it on output tape
- d) COPYTIL: Copies all programs until it locates the specified one. It then leaves the input tape positioned at the beginning of the specified program.
- e) DELETE: Copies all programs until it locates the specified one. It then leaves the input tape positioned at the end of the specified program.
- f) SKIPTIL: Bypasses all programs on the input tape leaving it positioned at the beginning of the specified program.
- g) COPY: Copies all programs from the specified input tape to the new tape until it senses the sentinel block of Z's.

FUNCTION OF CONTROL INSTRUCTIONS: (Cont'd)

- h) CORRECT: Copies all programs until it locates the specified one. It then copies and corrects the specified program and leaves the input tape positioned at the end of the specified program.

The changes must follow the CORRECT instruction and must terminate with an END card.

- i) IDCHANGE: Has the same function as the CORRECT instruction with the additional feature of being able to change the identity of the program.
- j) ENDALL: Writes a sentinel block of Z's on output tape. Types out total blocks copied not including sentinel and lists the program identities.

SYS CONTROL CARDS

If care is taken during a card-to-tape operation, needless wastes of time can be avoided on the Philco 2000. One cause of compilation failures is incorrect placement of SYS Control Cards. A preliminary scan of SYS Control Cards before the card-to-tape operation can assure that a job, which would otherwise fail on the 2000, will not fail because of carelessness. The cards, listed below, must be in the sequence shown. Cards in brackets are optional and may be excluded. Cards are shown only for the four most commonly run jobs. Card format shown is the standard TAC format.

TAC Compilations

	JOB	ANY NAME
	(IBIT	44 (or 43,45, 41, 46, 42, 47))
REL (or ABS,RPL)	TAC	MAGTAPE,LIB
(I		ANY IDENTIFICATION)

TAC LANGUAGE PROGRAM

END PROGRAM STARTING ADDRESS

ALTAC Compilations

	JOB	ANYNAME
	(IBIT	44 (or 43,45,41,46,42,47))
REL(or ABS,RPL)	ALTAC	MAGTAPE,LIB
(I		ANYID)

ALTAC STATEMENTS

END \$
or
COMPLETE \$

Test Runs

```
JOB ANYNAME
(DUMP C,1000,5000)
(HLT ANY INSTRUCTIONS)
*REL 4,ANYID,GO,LIST,SUBS
*ABS 4,ANYID,GO
*RPL 4,NYID,GO
(HLT ANY INSTRUCTIONS)
(JMP *)
```

Test Runs With Data Generation

```
JOB ANYNAME
(DUMP C,1000,2000)
(HLT ANY INSTRUCTIONS)
(REWIND DATA TAPE NO. )
RPL 1,DATA,GO
TAPE DATA TAPE NO.
```

DATA CARDS

```
END DATA
(HLT ANY INSTRUCTIONS)
*REL 4,ANYID,GO,LIST,SUBS
*ABS 4,ANYID,GO
*RPL 4,ANYID,GO
(HLT ANY INSTRUCTIONS)
(JMP *)
```

* Only one of these cards is used for each job

PROC Error Indications

PROC is an Input-Output Program that Philco 2000 programmers use to ease the programming of Magnetic Tape functions. Instructions written for PROC cause PROC to generate basic machine language instructions during compilation. However, when an error is made using PROC coding or when certain circumstances prevent the execution of an otherwise legitimate I/O Order, PROC gives a Non-Recoverable Tape Error indication at run time. There are two types of error indications:

1. PR = JMPL aaaaa
HLTR bbbbb (I cycle)

at this Halt, PA = bbbbb+1. In other words, it is a Halt to itself. When this Halt occurs, there is nothing to do but rerun the program.

BEFORE RERUNNING, BE SURE THAT PA = 1 MORE THAN THE ADDRESS FIELD OF THE HLTR.

2. at this Halt, the FLEXO types out:
NON-RECOVERABLE TAPE ERROR ...
with the contents of A and Q.

The contents of A and Q will display the reason for the HLT (see attached table). When this timeout occurs, there is no recovery possible. Use the timeout to take corrective action, e.g., change M.T. or Transport, and rerun program.

INPUT-OUTPUT PROCESSOR

ERROR RECOVERY PROCEDURES

READ (FORWARD) RECOVERY PROCEDURES

Parity and Sprocket Errors

1. Record the status of the D Register, PR register and the Instruction cycle.
2. Clear D and PR registers.
3. Add (1) to the NBP displayed in the IOP unit and record this number.
4. Subtract 200 from the Memory Address displayed in the IOP unit and record this address.
5. Give a STOP order.
6. Give a SPACE (BKW) order for 1 block.
7. Give a STOP order.
8. Give a READ (FWD) order for the NBP and address calculated in steps 3 and 4.
 - a. If error occurs again, repeat steps 5, 6, 7, and 8.
 - b. If error persists, try reading tape on another transport (rerun the job).
 - c. If you get over the error, proceed with steps 9 and 10.
9. Restore D and PR registers and set Instruction cycle.
10. Press run and advance.

BLKMARK Error

1. Record the status of the D register, PR register and the Instruction cycle.
2. Clear D and PR registers.
3. Record the NBP displayed in the IOP unit.
4. If the NBP is zero:
 - a. Give a STOP order.
 - b. Proceed to steps 6 and 7.
5. If the NBP is greater than zero:
 - a. Give a STOP order.
 - b. Give a RESUME order.
 - c. Proceed to steps 6 and 7.
6. Restore D and PR registers and set Instruction cycle.
7. Press run and advance

S1 Error

1. Record the status of the D register, PR register and the Instruction cycle.
2. Clear D and PR registers.
3. Record the NBP displayed in the IOP unit.
4. Record the memory address displayed in the IOP unit.
5. Give a STOP order.
6. Give a SPACE(BKW) order for 2 blocks.
7. If the S1 error occurs again:
 - a. Give a STOP order.
 - b. Give a SPACE(FWD) order for 1 block.
 - c. Give a READ (FWD) order for the NBP and memory address recorded in steps 3 and 4.
 - d. If S1 error occurs again, repeat steps 5, 6, and 7.
 - e. If error persists, try reading tape on another transport (rerun the job).
 - f. If you get over the error, proceed with steps 9 and 10.
8. If after step 6 the S1 error does not occur, proceed to step 7c.
9. Restore D and PR registers and set Instruction cycle.
10. Press run and advance.

S2 Error

1. Record the status of the D register, PR register and the Instruction cycle.
2. Clear D and PR registers.
3. Record the NBP displayed in the IOP unit.
4. Record the Memory Address displayed in the IOP unit.
5. If the NBP is zero:
 - a. Give a STOP order.
 - b. Give a SPACE (BKW) order for 1 block.
 - c. Proceed with steps 7 and 8.
6. If the NBP is greater than zero:
 - a. Give a STOP order.
 - b. Give a SPACE (BKW) order for 1 block.
 - c. Give a READ (FWD) order for the NBP and Memory Address recorded in steps 3 and 4.
 - d. Proceed with steps 7 and 8.
7. Restore D and PR registers and set Instruction cycle.
8. Press run and advance.

WRITE RECOVERY PROCEDURES

Parity and Sprocket Errors

1. Record the status of the D register, PR register and the Instruction cycle.
2. Clear D and PR registers.
3. Give an ERASE order.
4. Give a RESUME order.
5. Restore D and PR registers and set Instruction cycle.
6. Press run and advance.

BLKMARK Error

1. Same procedure as for PARITY or SPROCKET.

S1 Error

1. Record the status of the D register, PR register and the Instruction cycle.
2. Clear D and PR registers.
3. Give (2) ERASE orders.
4. Give a RESUME order.
5. Restore D and PR registers and set Instruction cycle.
6. Press run and advance.

S2 Error

1. The best procedure for this error is to rerun the job.
2. The following steps may be used to clean up the tape:
 - a. Give a STOP order.
 - b. Give a SPACE (BKW) order for 2 blocks.
 - c. Give a STOP order.
 - d. Give a WRITE order for 2 blocks.
 - e. If the S2 error does not occur this time or appears marginal (BLKMARK) ERASE two blocks and tape may be used again.
 - f. If the S2 error does occur, label the tape as "BAD TAPE-S2 ERROR" and give it to an engineer to clean up.

SYSAIDE Typeouts

<u>Type-Out</u>	<u>Meaning</u>	<u>Action</u>
ILLEGAL BLK CNT	A decimal number larger than 19,000 was entered as the block count parameter	SYSAIDE ignores all remaining SYSAIDE control instructions and returns control to SYS via locations
ILLEGAL TAPE NUMBER	Either an alphabetic character or a decimal number larger than 15 was entered as a magnetic tape unit parameter	SYSAIDE ignores all remaining SYSAIDE control instructions and returns control to SYS VIA locations
TAPE ERR ON n dob Incomplete	A transmission error other than a parity or sprocket error, was detected	SYSAIDE ignores all remaining SYSAIDE control instructions and returns control SYS via location 2 (ERROR Dump)
TAPE n ROCKED	Parity or sprocket error was detected, and five error correction attempts failed	Computer halts the operator presses the Advance bar to initiate five more error correction cycles. This timeout occurs as long as the error exists or until the operator returns control to SYS by executing a JMPL to location 2
NO ROCK	A possible error in the SYSAIDE program was detected	SYSAIDE returns control to SYS via location 2. This timeout should normally not happen and is not of concern to the SYSAIDE user
CONTROL LINE	An illegal control instruction was encountered by SYSAIDE and control was returned to SYS via location 20	After producing the typeout SYS executes a JMPL to location 2

DATA Typeouts

DATA is a service routine used with SYS for the purpose of transcribing input data required by a user's program onto any specified magnetic tape.

<u>Type Out</u>	<u>Meaning</u>	<u>Action</u>
TAPE NOT RECOGNIZED	The first instruction furnished the data routine does not contain the word TAPE in the COMMAND field or CARD may be out of order	Go card to tape again
TAPE SELECTED FOR DATA ILLEGAL	The TAPE instruction contains an illegal parameter (anything other than 0,3, 6,7, or 9 through 15)	GO Card to tape again
JOB CARD INTERCEPTED	A job control instruction is detected after a TAPE instruction and prior to END DATA. The purpose of this type out is to avoid bypassing other jobs on the input tape due to the absence of an END DATA instruction	After this type out occurs an error dump is produced

JOBSRCH Typeouts

JOBSRCH is a service routine which searches the SYS input tape (magnetic tape unit 8) for a specified JOB, and enables immediate execution of that JOB.

<u>Type out</u>	<u>Meaning</u>	<u>Action</u>
FOUNDJOB	indicates that the desired JOB card is located	The name of the JOB will then be typed out, and the job will be executed
CAN NOT FIND JOB xxxxx	indicates that an END INPUT JOB CARD* is found before the desired JOB	SYS will then be initialized, and JOBSRCH may be attempted again

MODIFICATIONS TO SYS FOR USE WITH TAC II AND ALTAC II

<u>Type Out</u>	<u>Meaning</u>	<u>Action</u>
PROGRAM NOT XFERRED	A transfer is not made to RPL tape	Programmer will examine Codedit for errors, operator goes on to next job, or IBIT 47 can cause it to be forced on RPL
LOADING ERRORS -	Any of the following errors is detected - the Console Typewriter types out the following (control is returned to system via END OF JOB)	
ILLEGAL 1st CARD	First card not PMAX or TUG absolute	
ILLEGAL CARD	Card type incorrect	
CHECKSUM ERROR	Check Sum Error	
EXECEEDS MEMORY	Available memory exceeded	
ILLEGAL CSA	Attempt to load below M/1000 or beyond specified PMAX	

* The SYS input tape must be terminated by a job CARD with ENDINPUT in the Address and Remarks field.

TAC II AND ALTAC II (Continued)

<u>Type Out</u>	<u>Meaning</u>	<u>Action</u>
ILLEGAL MODIFIER	Illegal address modifier	
SYMBOL REDEFINED	Name-symbol already defined	
TOO MANY SYMBOLS	No more room for name-symbol list	

RPLC TYPE INS

RPL CORRECTOR is a service routine which revises an RPL tape

When ORDER is typed out by CONSOLE TYPEWRITER the operator types in one of seven control statements. The specific statement TYPED in depends upon the operation to be performed.

CONTROL STATEMENT Typed In

ACTION

COPY

The entire input tape is copied onto the specified Output Tape. The last RPL program on the input tape is indicated by a sentinel block of all Z's when this sentinel block is sensed, ORDER is typed out.

COPYTIL

All RPL programs are copied until the specified program is located; the input tape is positioned at the beginning of the specified program, and the ORDER is typed out.

SKIPTIL

All RPL programs are bypassed until the specified program is located; the input tape is positioned at the beginning of the specified routine, and ORDER is typed out.

DELETE

All RPL programs up to specified program are copied onto the output tape, and the specified program is bypassed. The input tape is positioned at the beginning of the first block after the deleted routine, and ORDER is typed out.

ADD

All RPL programs are bypassed until the specified program is located. This program is then copied onto the output tape and ORDER is typed out.

CONTROL STATEMENT Typed In

ACTION

CORRECT

Additional information is requested to identify the medium which contains the corrections. All preceding RPL programs are copied onto the output tape until the specified program is located; corrections inserted from either magnetic tape or paper tape, and the corrected program is copied onto the output tape.

ENDALL

A sentinel block of all Z's is written on the output tape, and all tapes used by the routine are rewound. The computer halts at 6066₈ at which time the left address portion of the Program Register contains all ones.

RPLC TYPE-OUTS

<u>TYPE-OUT</u>	<u>MEANING</u>	<u>ACTION</u>
RPLC	Routine is identified	NONE
NEWTAPE	The number of the magnetic tape unit that contains the final output tape is requested.	Number of that unit
ORDER	The action to be performed is requested.	One of the Control Statements
FROM	The number of the magnetic tape unit that contains the RPL Programs to be acted upon is requested. It happens after type-in of all Control Statements with the exception of ENDALL.	Number of that unit
ID IS	The identification of RPL program to be acted upon is requested. It happens for all Control Statements except COPY and ENDALL.	Program Identity
MT or PT	The identification of input medium upon which corrections are found is requested. It happens for the Control Statement CORRECT	MT. if corrections are on magnetic tape PT. if corrections are on paper tape
CORRECTION	The number of the magnetic tape unit that contains the correction tape is requested. It happens after type-in of MT	Number of that unit

RPLC ERROR TYPE-OUTS

<u>TYPE-OUT</u>	<u>MEANING</u>	<u>ACTION</u>
UNIT NOT AVAILABLE	Designated Magnetic Tape Unit is not available, or there is no Write Ring on the output tape	Requests new Type-in
BAD TAPE	Nonrecoverable error on magnetic tape	Rewinds all tapes used by the routine; halts at 6066 _g ; left address of PR contains all "ones"
PT TRANSMISSION ERROR	Paper tape transmission error	Same as above
NO END LINE CHARACTER	Carriage return character missing on a line of coding when paper tape input is being used	Same as above
NOT HERE	Designated RPL program not found on tape	Same as above
BAD SECTION WORD	Input tape not in acceptable RPL format	Same as above
BAD CARD # XXXXX	Correction instruction is illegal. XXXXX corresponds to the sequence number of the instruction, as counted by the RPL Corrector routine	Ignores instruction and continues; all following instructions are ignored and sequence numbers are typed out until a new octal location is sensed in the LOCATION field of an instruction

CARD-TO-TAPE PROCEDURE

OPTIONAL CONTROLS

Set when specified; otherwise, observe that options are not being introduced.

Card Controller

SKEW OVERRIDE
PARITY OVERRIDE

UBC

DATA SELECT
COND STOP
STOP OVRD
PARITY OVRD
WRITE ALL

SETUP INSTRUCTIONS

Perform the following operations.

Card Reader

1. Lock tray in up or non-released position.
2. Press and release START button (motor in reader starts).
3. Fan, then load data cards into hopper (9 edge face forward).
4. Set card counter to zero.
5. Set LOCAL-REMOVE switch to REMOTE position (switch is located on right side of reader behind maintenance panel).

Card Controller

1. Set TEST MODE switch to OFF position.
2. Establish words/card and cards/block format of READ plugboard (use blank rows in the CARDS and WORDS fields of the plugboard to designate format).
3. Unless otherwise indicated, set following toggle switches to listed positions
 - a. CARD SIZE80
 - b. BLANK COLUMN.....SPACE
 - c. CNTRL CHARS.....IGNORE
 - d. CARD MODE.....CODE or IMAGE

4. If CNTRL CHARS switch is set to sense, depress ACCEPT EX CARD pushbutton. Otherwise, observe ACCEPT EX CARD pushbuttons in released position.
5. Press and release START button (clears controller).
6. Depress Halt Reader. (Safety Precaution)

Tape Transport

1. Mount scratch tape with write enable ring (refer to tape loading procedure).
2. Turn MANUAL CONTROL switch to STOP
3. Turn MODE switch to AUTO
4. Observe REMOVE READY indicator lit. If STANDBY indicator is lit, press and release LOCAL button.

UBC

1. Depress BUFFER CONTROLLER OFF LINE pushbutton.
2. Select desired tape unit (Depress MAG TAPE 1A or 1B pushbutton).
3. Turn FROM device switch to PCC.
4. Turn TO device switch to MTT.
5. Depress CONTIN CYCLE pushbutton.
6. Press and release READY pushbutton
7. Press and release EXECUTE pushbutton to initiate the operation.
8. Doesn't Start, Repeat Steps
check:
 - Loose jack plugs
 - Tape Transport local button rewind lockout

PROCESSING ACTION

Following the initiation of the conversion procedure, the number of cards/block specified by the reader plugboard will be read by the card reader into the storage area of the UBC and the loading cycle will be completed. After the specified number of cards have been read, the UBC will unload the storage area to the magnetic tape unit. Since the CONTINUE CYCLE pushbutton on the UBC is depressed, loading and unloading will continue until all of the data cards are read. During the conversion, a COUNTER register in the card controller counts each card as it is read. When the supply of data cards has been exhausted, this register will display the number of cards remaining, if any, that are necessary to satisfy the cards/block requirement and permit the UBC to advance into the unloading cycle. If this requirement has not been satisfied, the operator must run blank cards through the card reader.

(The number of cards necessary is displayed by the COUNTER register). If the requirement has been satisfied, the UBC will stop in the LOAD CYCLE and the contents of both the PROGRAM and COUNTER registers will display the cards/block setting. Make sure you have JOB END CARD.

ERROR RECOVERY PROCEDURES

ERROR INDICATIONS DISPLAYED ON CARD CONTROLLER	STATUS OF DEVICE FOLLOWING ERROR DETECTION	SUGGESTED ERROR RECOVERY METHOD Tray must be back in place
SKEW or PX CARD	Reader stops after passing skewed card. That card was neither read nor counted. Card could be upside down Reader stops after passing extra card. That card was neither read nor counted.	a. Release tray b. Remove last card passed through reader and replace in hopper as next card to be read. c. Lock tray in non-released position d. Press and release CONT pushbutton on card reader <u>TRANSMISSION light</u>
<hr/> PARITY or	<hr/> Reader stops after reading but not counting card containing error. COUNTER register displays number of cards remaining to be read.	a. Release tray b. Subtract number displayed by COUNTER register from number displayed by PROGRAM register; add <u>one</u> to the difference; remove that number of cards from tray.
EDIT	Reader stops after reading but not counting card containing error. COUNTER register displays number of cards remaining to be read. NOTE EDIT error indicates missing end-of-card or end-of-block character	CAUTION Maintain card sequence c. Replace these cards in hopper as next cards to be read. d. Lock tray in non-released position e. Press and release START pushbutton on card controller (clears card controller). f. Press and release READY pushbutton on UBC. on CARD Reader.

or

INVAL CODE

Reader stops after reading but not counting card containing error. COUNTER register displays number of cards remaining to be read.

- g. Press and release EXECUTE pushbutton on UBC. on Card Reader
- h. If error reoccurs, correct card containing error. (Call C.E.)

INVAL CODE and
PX CARD

Reader stops after reading card containing error plus one additional card. Neither card was counted. COUNTER register displays number of cards remaining to be read.

- a. Release tray.
- b. Subtract number displayed by COUNTER register from number displayed by PROGRAM register; add two to the difference; remove that number of cards from tray.

or

INVAL CODE, PX
CARD and PARITY

Same as above. INVAL CODE and PARITY errors appear on same card.

- CAUTION
- Maintain card sequence
- c. Replace these cards in hopper as next cards to be read.
 - d. Lock tray in non-released position.
 - e. Press and release START pushbutton on card controller (clears card controller).
 - f. Press and release READY pushbutton on UBC (clears UBC).
 - g. Press and release EXECUTE pushbutton on UBC.
 - h. If error reoccurs, correct card containing error.

Call C.E

EX CARD IN
BUFF

Reader stops after reading
one card in addition to the
number specified by the
cards/block field.

- a. Depress ACCEPT EX CARD
pushbutton on card con-
troller.
- b. Press and release START
pushbutton on card con-
troller.
- c. Press and release EX-
ECUTE pushbutton on UBC.

MECHANICAL
FAULT, READER

Conversion not begun

Repeat set up instructions.

Unusual error
combination and/or
and/or card jam

Card reader stops mech
fault. UBC loading
cycle interrupted.

- a. Release tray on Card
Reader
- b. Remove damaged cards and
prepare new cards, if
necessary.
- c. On Card Controller, set-
up words/card and cards/
block fields of PUNCH
plugboard. These fields
should correspond with
format of READ plugboard.

Both TRANSMISSION FAULT and
LOAD CYCLE indicators on
UBC are lit.

- d. Press and release START pushbutton
on card controller.
- e. On card punch, set POWER switch to
ON position (switch is located on
right side of punch cabinet).
- f. Load blank cards in punch hopper
with pointed side down and with row
12 of cards towards punch (number of
cards should exceed number of
cards/block specified by plugboard).
- g. On UBC, press and release READY
pushbutton.
- h. Release CONT CYCLE pushbutton on
UBC.
- i. Depress SPACE REV pushbutton on UBC.
- j. Press and release EXECUTE pushbutton
on UBC.
- k. Release SPACE REV pushbutton.
- l. Turn FROM switch to MTT.

- m. Turn TO switch to PCC.
- n. Press and release READY pushbutton.
- o. Press and release EXECUTE pushbutton(The cards which are punched represent the last known block of data on tape).
- p. Turn FROM switch to PCC.
- q. Turn TO switch to MTT.
- r. Depress CONT CYCLE pushbutton on UBC.
- s. From the card reader tray, remove all cards up to but not including the card corresponding to the last card of the good block punched from tape.
- t. Replace any cards removed from the tray(and also any cards which were reproduced) in the card hopper as the next cards to be read.
- u. Lock card tray in non-released position
- v. Press and release START pushbutton on card controller.
- w. Press and release READY pushbutton on UBC.
- x. Press and release EXECUTE pushbutton on UBC.

ERROR INDICATIONS DISPLAYED ON UBC	STATUS OF DEVICE FOLLOWING ERROR DETECTION	SUGGESTED ERROR RECOVERY METHOD
BUFFER EDIT	UBC stops at end of unloading cycle. Both TRANSMISSION FAULT and UNLOAD CYCLE indicators are lit.	<ul style="list-style-type: none"> a. Press and release READY pushbutton on UBC b. Release CONTIN CYCLE pushbutton on UBC. c. Depress SPACE REV pushbutton on UBC.
or		
BUFFER PAR during unloading cycle	UBC stops at end of unloading cycle. Both TRANSMISSION FAULT and UNLOAD CYCLE indicators are lit.	<ul style="list-style-type: none"> d. Turn FROM switch to MTT. e. Press and release EXECUTE pushbutton on UBC. f. Release SPACE REV pushbutton. g. Turn FROM switch to PCC. h. Depress CONT CYCLE pushbutton. i. Release tray on Card Reader.

BUFFER PAR
during loading
cycle

UBC stops at end of load-
ing cycle. Both TRANS-
MISSION FAULT and LOAD
CYCLE indicators are lit.

-
- j. From the tray, remove that number of cards which correspond to the number specified by the cards/block field of the READ plugboard.
 - k. Replace these cards in hopper as next cards to be read.
 - l. Press and release START button on Card Controller.
 - m. Press and release READY pushbutton on UBC.
 - n. Press and release EXECUTE pushbutton on UBC.

-
- a. Press and release READY pushbutton on UBC.
 - b. Release tray on Card Reader.
 - c. From the tray, remove that number of cards which correspond to the specified by the Cards/block field of the read plugboard.

CAUTION

Maintain card sequence

- d. Replace these cards in hopper as next cards to be read.
 - e. Press and release START pushbutton on Card Controller. (clears controller)
 - f. Press and release READY pushbutton on UBC (clears UBC)
 - g. Press and release EXECUTE pushbutton.
-

I-O DEVICE
MECH

UBC interrupted during
unloading cycle.
Both TRANSMISSION FAULT
and UNLOAD CYCLE indica-
tors are lit.

- a. Observe indicators at top of tape unit and note those which are lit.
- b. If LOCAL indicator is lit, press and release LOCAL button on tape unit and perform steps e through r .
- c. If WRITE ENABLE is not lit, tighten upper reel (supply reel on transport). Press and release LOCAL pushbutton and perform steps e through r .
- d. If END TAPE indicator is lit, mount new scratch tape. Press and release LOCAL pushbutton and perform steps e through r .
- e. Press and release READY pushbutton on UBC.
- f. Release CONTIN CYCLE pushbutton on UBC.
- g. Depress SPACE REV pushbutton on UBC.
- h. Turn FROM switch to MTT.
- i. Press and release EXECUTE pushbutton.
- j. Release SPACE REV pushbutton.
- k. Turn FROM switch to PCC.
- l. Depress CONT CYCLE pushbutton.
- m. Release tray on CARD Reader.
- n. From the tray, remove that number of cards which correspond to the number specified by the cards/block field of the READ plugboard.
- o. Replace these cards in hopper as next cards to be read.
- p. Press and release START button on Card Controller (clears controller).

- q. Press and release READY pushbutton on UBC (clears UBC).
- r. Press and release EXECUTE pushbutton on UBC.

I-O DEVICE
PAR

UBC stops at end of unloading cycle. Both TRANSMISSION FAULT and UNLOAD CYCLE indicators are lit.

-
- a. Press and release READY pushbutton.
 - b. Release CONT CYCLE pushbutton.
 - c. Depress MAG TAPE ERASE pushbutton.
 - d. Press and release EXECUTE pushbutton.
 - e. Release MAG TAPE ERASE pushbutton.
 - f. Depress CONT CYCLE pushbutton.
 - g. Press and release UNLOAD CYCLE pushbutton.
 - h. If error persists, notify customer engineer.

or

I-O DEVICE
EDIT

Same as above.

UNACC INSTR

Processing not initiated

Repeat setup instructions

MAG TAPE
BL MK

UBC stops at end of unloading cycle. Both TRANSMISSION FAULT and UNLOAD CYCLE indicators are lit.

-
- a. Press and release READY pushbutton
 - b. Release CONT CYCLE pushbutton.
 - c. Depress MAG TAPE ERASE pushbutton
 - d. Press and release EXECUTE pushbutton twice. (Two blocks must be erased because the tape stops one block following the block in error.)
 - e. Release MAG TAPE ERASE pushbutton.
 - f. Turn FROM DEVICE switch to MTT.
 - g. Turn TO DEVICE switch to PCC.
 - h. Depress SPACE REV pushbutton.

- i. Press and release EXECUTE pushbutton.
- j. Release SPACE REV pushbutton.
- k. On Card Controller, setup words/card and cards/block fields of PUNCH plugboard. These fields should correspond with format of READ plugboard.
- l. Press and release START pushbutton on card controller.
- m. On card punch, set POWER switch to ON position. (switch is located on right side of Punch cabinet.)
- n. Load blank cards printed side down in punch hopper with row 12 of cards punch. (number of blank cards should exceed number specified by cards/block field of plugboard).
- o. Press and release EXECUTE pushbutton.
- p. On Card Reader, release tray and remove all cards up to but not including the card corresponding to the last card of the good block punched from tape. This may mean removing up to two data blocks; however, in most cases only the cards for one block will be required.
- q. Replace the cards removed (maintain card sequence) from the tray in the hopper as the next cards to be read.
- r. Turn TO DEVICE switch to MTT.
- t. Lock tray in non-released position
- u. Press and release START pushbutton.
- v. Depress CONT CYCLE pushbutton.
- w. Press and release READY pushbutton.
- x. Press and release EXECUTE pushbutton.

TAPE-TO-CARD DATA CONVERSION

OPTIONAL CONTROLS

Set when specified; otherwise, observe that options are not being introduced.

Card Controller

SKEW OVERRIDE
PARITY OVERRIDE

UBC

DATA SELECT
COND STOP
STOP OVRD
PARITY OVRD
WRITE ALL

SETUP INSTRUCTIONS

Perform the following operations.

Card Punch

1. Set POWER switch to ON position. (switch is located on right side of punch)
2. Fan, then load blank cards in hopper with row 12 of the last card toward the punch.
3. Set card counter to zero.

Card Controller

1. Set TEST MODE switch to OFF position (switch is located behind maintenance panel).
2. Establish words/card and cards/block format of PUNCH plugboard (use blank rows in the CARDS and WORDS fields of the plugboard to designate format).
3. Unless otherwise indicated, set following toggle switches to listed positions:
 - a. CARD SIZE 80
 - b. BLANK COLUMN..... SPACE
 - c. CNTRL CHARS..... IGNORE
 - d. CARD MODE..... CODE

4. If CNTRL CHARS switch is set to sense, depress ACCEPT EX CARD pushbutton.
Otherwise, observe ACCEPT EX CARD pushbutton is in released position.
5. Press and release START button (clears controller).

Tape Transport

1. Mount tape containing data to be punched (refer to tape loading procedure).
2. Set MANUAL CONTROL switch to STEP.
3. Set MODE switch to AUTO.
4. Observe REMOTE READY indicator is lit. If STANDBY indicator is lit, press and release LOCAL pushbutton.

UBC

1. Depress BUFFER CONTROLLER OFF LINE pushbutton
2. Select desired tape unit (Depress MAG TAPE 1A or 1B pushbutton).
3. Turn FROM DEVICE switch to MTT.
4. Turn TO DEVICE switch to PCC.
5. Depress CONTIN CYCLE pushbutton.
6. Press and release READY pushbutton.
7. Observe DEVICE STATUS WRITE AVAILABLE indicator is lit. If not lit, repeat setup instructions from beginning.
8. Press and release EXECUTE pushbutton to initiate the operation.

PROCESSING ACTION

The data being processed is transferred block-at-a-time from the tape unit into the storage area of the UBC. From the storage area, data is delivered to the punch in a character oriented format where it is recorded onto cards. Processing continues in this manner until either a Stop character is sensed or until the end of information is reached and the operator manually stops the process. End of information can be determined by the operator in various ways; however, it is the responsibility of the person requesting the conversion to provide the specific information to be recognized as the signal. Examples of end of information signals would be as follows:

- a. given the number of blocks to be converted.
- b. a block of sentinels will be the final block on tape
- c. an end or complete card will be present if TAC or ALTAC language tape is being used as the source.
- d. if the deck of cards is sequenced, and the number of the last card is given.

ERROR RECOVERY PROCEDURES

In the following procedures, SKEW, INVALID CODE, and PX CARD errors are not considered because they will not occur except as a result of a card jam. In which case, the procedure is presented and identified as unusual error combinations.

ERROR INDICATIONS DISPLAYED ON CARD	STATUS OF DEVICE FOLLOWING ERROR DETECTION	SUGGESTED ERROR RECOVERY METHOD
PARITY	<p>Punch stops after punching and continuing the card containing the parity error.</p> <p>Also, one additional card is punched, but it is not counted. Both cards remain in the punch.</p>	<ol style="list-style-type: none"> a. Remove blank cards from punch hopper. b. Press and hold RUN OUT pushbutton on punch until two cards pass through the punch into the stacker. c. Subtract number displayed by counter register from number displayed by program register; add <u>one</u> to the difference; remove that number of cards from stacker. d. Replace blank cards in hopper. e. Release CONTIN CYCLE pushbutton on IBC. f. Depress SPACE REV pushbutton. g. Depress READY pushbutton. h. Press and release EXECUTE pushbutton. i. Release SPACE REV pushbutton. j. Press and release START button on Card Controller k. Press and release EXECUTE pushbutton. One block from tape will be punched. Before continuing, verify correct location on tape by comparing the first card of the block just punched with the first card of the cards removed for congruity.

1. Depress CONTIN CYCLE pushbutton.
- m. Press and release EXECUTE pushbutton.

EDIT

Punch stops at end of UBC unloading cycle.

- a. Repeat setup instructions.

UNACC INSTR

Procedure not initiated

- Repeat Setup instructions.

Unusual error combination and/or card jam

Punch stops with MECHANICAL FAULT, PUNCH indicator on the card controller lit. Both the TRANSMISSION FAULT and UNLOAD CYCLE indicators on UBC are lit.

- a. Remove blank cards from punch hopper.
- b. Remove damaged cards from punch
- c. Subtract number displayed by counter register from number displayed by program register; add one to the difference; remove that number of cards from stacker.
- d. Replace blank in punch hopper.
- e. Release CONTIN CYCLE pushbutton on UBC.
- f. Depress SPACE REV pushbutton on UBC.
- g. Depress READY pushbutton.
- h. Press and release EXECUTE pushbutton.
- i. Release SPACE REV pushbutton.
- j. Press and release START button Card Controller.
- k. Press and release EXECUTE pushbutton. One block from tape will be punched. Before continuing, verify correct location on tape by comparing the first card of the block just punched with the first card of the cards removed for congruity.

- l. Depress CONTIN CYCLE pushbutton.
- m. Press and release EXECUTE pushbutton.

ERROR INDICATIONS DISPLAYED ON UBC	STATUS OF DEVICE FOLLOWING ERROR DETECTION	SUGGESTED ERROR RECOVERY PROCEDURE
BUFFER EDIT	UBC stops at end of loading cycle. Both TRANSMISSION FAULT and LOAD CYCLE indicators are lit.	<ol style="list-style-type: none"> a. Press and release READY pushbutton. b. Release CONTIN CYCLE pushbutton. c. Depress SPACE REV pushbutton. d. Press and release EXECUTE pushbutton.
or		
BUFFER PARITY	UBC stops at end of loading cycle. Both TRANSMISSION FAULT and LOAD CYCLE indicators are lit.	<ol style="list-style-type: none"> e. Release SPACE REV pushbutton. f. Depress CONTIN CYCLE pushbutton. g. Press and release EXECUTE pushbutton. h. If error persists, notify customer engineer.
or		
I-O DEVICE PAR	UBC stops at end of loading cycle. Both TRANSMISSION FAULT and LOAD CYCLE indicators are lit.	
or		
I-O DEVICE EDIT	UBC stops at end of loading cycle. Both TRANSMISSION FAULT and LOAD CYCLE indicators are lit.	
<hr/>		
I-O MECH FAULT	UBC is interrupted during loading cycle. Both TRANSMISSION FAULT and LOAD CYCLE indicators are lit.	<ol style="list-style-type: none"> a. Observe indicators at top of tape unit and note those which are lit. b. If LOCAL indicator is lit, press and release LOCAL button on tape unit and perform steps through .

- c. If END TAPE indicator is lit, mount new data tape. Press and release LOCAL pushbutton on tape unit and perform steps through .
- d. Press and release READY pushbutton on UBC.
- e. Release CONTIN CYCLE pushbutton.
- f. Depress SPACE REV pushbutton.
- g. Press and release EXECUTE pushbutton.
- h. Release SPACE REV pushbutton.
- i. Depress CONTIN CYCLE pushbutton.
- j. Press and release READY pushbutton.
- k. Press and release EXECUTE pushbutton.

MAG TAPE BL MK

UBC stops at end of loading cycle.
Both TRANSMISSION FAULT and LOAD CYCLE indicators are lit.

-
- a. Press and release READY pushbutton.
 - b. Release CONTIN CYCLE pushbutton.
 - c. Depress SPACE REV pushbutton.
 - d. Press and release EXECUTE pushbutton twice. (Two blocks must be spaced in the backward direction.)
 - e. Release SPACE REV pushbutton.
 - f. Depress CONTIN CYCLE pushbutton.
 - g. Press and release READY pushbutton.
 - h. Press and release EXECUTE pushbutton.
 - i. If error persists, notify customer engineer.

MAG TAPE OVRN

UBC stops at end of loading cycle.
Both TRANSMISSION FAULT and LOAD CYCLE indicators are lit.

Notify customer engineer.

TAPE TO PRINTER DATA CONVERSION

OPTIONAL CONTROLS

Set when specified; otherwise, observe that options are not being introduced. When tapes which are not edited for the printer are being used as the source, depress the WRITE ALL pushbutton on the UBC.

Printer Controller

EDIT ERROR OVERRIDE
PARITY ERROR OVERRIDE
TROUBLE OVERRIDE

UBC

DATA SELECT
COND STOP
STOP OVRD
PARITY OVRD
WRITE ALL

SET UP INSTRUCTIONS

Perform the following operations:

High-Speed Printer

1. Install vertical format paper tape loop on paper tape reader located on left side of printer and behind cabinet door.
to install tape:
 - a. Swing spring-loaded pressure plate away from sprocket wheel which drives tape.
 - b. Position format tape over sprocket wheel teeth so that a frame of the tape containing holes in all channels is exposed to light source; engage sprocket holes with teeth of sprocket wheel.
 - c. While holding sprocket holes engaged with sprocket teeth, allow pressure plate to return.
2. Insert appropriate plugboard, either code edit or write all, into holder located on right side of printer and behind cabinet door. The write all plugboard is wired one-to-one; the code edit is not.
3. Observe correct position of paper; i.e., there are six sprocket holes below the perforation between pages and before the sprocket holes engage the teeth of the drive tractors.

To reposition paper:

- a. Open four tractor pressure plates (the lower two are located behind the front cabinet door).
- b. Count six sprocket holes below perforation between pages and place the left seventh sprocket hole over the upper left tractor; and close the pressure plate. Do the same with the right side.
- c. Pull paper taut and engage the paper sprocket holes with the lower left and right tractors; close pressure plates.

Printer Controller

1. Press and release RESET PRINT pushbutton (clears controller).
2. Turn PAPER ADVANCE control to CH. 7.
3. Press and release PAPER ADVANCE pushbutton (one page of paper is advanced).
4. Set TEST MODE toggle switch to down position.
5. Set STOP END OF LINE toggle switch to down position.
6. If WRITE ALL pushbutton on UBC is being used, set PRINTER FORMAT CONTROL switch to either 64 or 80. Control is located beneath the control panel and behind the cabinet door.
7. Turn PAPER ADVANCE to PROGRAM.

Tape Transport

1. Mount tape containing data to be printed (refer to tape loading procedure).
2. Turn MANUAL CONTROL switch to STOP.
3. Turn MODE switch to AUTO.
4. Observe REMOTE READY indicator is lit. If STANDBY indicator is lit, press and release LOCAL pushbutton.

UBC

1. Depress BUFFER CONTROLLER OFF LINE pushbutton.
2. Select desired tape unit (depress MAG TAPE 1A or 1B pushbutton.)
3. Turn FROM DEVICE switch to MTT.
4. Turn TO DEVICE switch to HSP.
5. Depress CONTIN CYCLE pushbutton (if more than one block is to be printed).
6. Press and release READY pushbutton.
7. Press and release EXECUTE pushbutton to initiate conversion.

PROCESSING ACTION

The being processed is transferred block-at-a-time from the tape unit into the storage area of the UBC. From the storage area, data is delivered to the printer in a character oriented format, where hard copy is produced. Processing continues in this manner until either a Stop character is sensed or until the end of information is reached and the operator stops the process manually. End of information can be determined by the operator in various ways; however, it is the responsibility of the person requesting the conversion to provide the specific information to be recognized. Examples of end of information signals would be as follows:.

- a. the number of blocks to be converted
- b. a block of sentinels as the final block on tape
- c. successive edit error indicating end of edited information

ERROR RECOVERY PROCEDURES

ERROR INDICATIONS DISPLAYED ON PRIN- TER CONTROLLER	STATUS OF DEVICE FOLLOWING ERROR DETECTION	SUGGESTED ERROR RECOVERY METHOD
EDIT --	Printer stops at end of line, and before printing that line. UBC stops before completing unloading cycle. Both TRANSMISSION FAULT and UNLOAD CYCLE indicators are lit.	<ol style="list-style-type: none">a. Press and release RESET PRINT pushbutton on Printer Controller.b. Release CONTIN CYCLE pushbutton on UBC.c. Depress SPACE REV pushbutton.d. Press and release EXECUTE pushbutton.e. Depress CONTIN CYCLE pushbutton.f. Press and release EXECUTE pushbutton.g. If error reoccurs and if it is desirable to print the block containing error, repeat steps <u>a</u> through <u>d</u>; depress WRITE ALL pushbutton on UBC; press and release EXECUTE pushbutton; release WRITE ALL pushbutton, and continue with step <u>e</u>; otherwise notify customer engineer.

PARITY

Printer stops after detecting error, and the line is not printed.

UBC stops before completing unloading cycle. Both TRANSMISSION FAULT and UNLOAD CYCLE indicators are lit.

- a. Press and release RESET PRINT pushbutton on Printer Controller.
- b. Release CONTIN CYCLE pushbutton on UBC.
- c. Depress SPACE REV pushbutton.
- d. Press and release EXECUTE pushbutton.
- e. Depress CONTIN CYCLE pushbutton.
- f. Press and release EXECUTE pushbutton.
- g. If error reoccurs and if it is desirable to print the block containing error, repeat steps a through d; set PARITY CHECK OVERRIDE toggle switch in UP position; press and release EXECUTE pushbutton; set PARITY CHECK OVERRIDE toggle switch in down position, and continue with step e. Otherwise, notify customer engineer.

COUNTER ERROR

Printer stops after printing current line seven times.

UBC stops before completing unloading cycle. Both TRANSMISSION FAULT and UNLOAD CYCLE indicators on UBC are lit.

- a. Press and release RESET PRINT pushbutton on Printer Controller.
- b. Release CONTIN CYCLE pushbutton on UBC.
- c. Depress SPACE REV pushbutton.
- d. Press and release EXECUTE pushbutton.
- e. Depress CONTIN CYCLE pushbutton.
- f. Press and release EXECUTE pushbutton.
- g. If error reoccurs, notify customer engineer.

RIBBON ALIGNMENT

Printer stops after attempting to print the line. UBC stops before completing unloading cycle.

Both TRANSMISSION FAULT and UNLOAD CYCLE indicators are lit.

OUT OF PAPER

Printing operation stops. UBC stops before completing unloading cycle. Both TRANSMISSION FAULT and UNLOAD CYCLE indicators are lit.

-
- a. Open front cabinet door of
 - b. Place new supply of paper on bottom shelf with creased edge of paper outward.
 - c. Open four tractor pressure plates.
 - d. Insert paper upward and under printer ribbon; pull it up to the upper tractors.
 - e. Count six sprocket holes from top and place the left seventh sprocket hole over the left tractor; close pressure plate. Do the same with the right side.
 - f. Pull paper taut and engage the paper sprocket holes with the lower left and right tractors; close pressure plates.
 - g. Close cabinet door.
 - h. Press and release PAPER ADVANCE pushbutton.

**HAMMER DRIVER \$
FAULT**

Printing operation stops. UBC stops before completing unloading cycle. Both TRANSMISSION FAULT and UNLOAD CYCLE indicators are lit.

-
- a. On tape transport, turn MODE CONTROL switch to STANDBY.
 - b. On PRINTER CONTROLLER POWER PANEL, hold THYRATON POWER DISCONNECT toggle switch in up position until HAMMER DRIVER FAULT indicator goes out.
 - c. Press and release RESET PRINT pushbutton on printer controller.
 - d. Turn MODE CONTROL switch to REMOTE.

- e. Press and release LOCAL pushbutton.
 - f. Release CONTIN CYCLE pushbutton on UBC.
 - g. Depress SPACE REV pushbutton.
 - h. Press and release EXECUTE pushbutton.
 - i. Depress CONTIN CYCLE pushbutton.
 - j. If error reoccurs, notify customer engineer.
-
-
-

PHILCO 2000

SKIP INSTRUCTIONS

MNEMONIC COMMAND AND REGISTER TESTED	ADDRESS FIELD															
	UNIT (N)				DEVICE		COMPARISON QUANTITY (CQ)									
	S	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
SKCA N; B; W ASSEMBLER COUNTER	1	I-O CHANNEL				BLOCKS (B)				WORDS (W)						
SKCUA N; CQ UNIT AVAILABILITY	0	I-O CHANNEL				0	0	0	0	0	MECH. UNAVAIL.	RUN	REWIND	READ ONLY	NOT USED	NOT USED
SKCAA N; CQ ASSEMBLER AVAILABILITY	0	0	0	0	0	0	1	0	CONNECTED				RUNNING			
									A1	A2	A3	A4	A1	A2	A3	A4
SKCPT CQ PAPER TAPE TRANSMISSION	0	0	0	0	0	1	1	0	0	0	0	0	0	0	INTER- LOCK	WORD COUN- TER
SKFA N; CQ ASSEMBLER FAULT	1	I-O CHANNEL				0	Dis- abled	MISSING B.M.		SPROCK- ET	POOR BLOCK MARK	PARITY	NOT USED	BEGIN TAPE	END TAPE	SPACE
								S1	S2							
SKFB N; CQ UBC FAULT	0	I-O CHANNEL				0	0	0	0	0	MECHANICAL		EDIT		PARITY	
											UBC	I-O	UBC	I-O	UBC	I-O
SKFD N; CQ DRUM FAULT	0	DRUM				0	1	0	0	0	0	0	0	0	0	DRUM FAULT
SKFPT CQ PAPER TAPE FAULT	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	PARITY
QUATERNARY COMMANDS: SKCx 0012 SKFx 2012																

PHILCO, 2000

INPUT-OUTPUT ORDERS

DATA REGISTER

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

					WHICH UNIT
			BLOCKS SPACED		MAGNETIC TAPE
BAND NUMBER	DRUM STARTING ADDRESS				DRUM NUMBER
					I-O PROC. CHANNEL

24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47

		AMOUNT	COMMAND	
			FROM	TO
		BLOCKS R/W	MAGNETIC TAPE	
	NUMBER OF WORDS		DRUM OR PAPER TAPE	
BUFFER CHANNEL	CARDS PER BLOCK	WORDS PER CARD	U B C	

QUATERNARY COMMANDS FROM AND TO CODES

- 00 (0) REAL-TIME UNIT
- 01 (1) CENTRAL COMPUTER MEMORY
- 02 (2) DRUM
- 03 (3) UNIVERSAL BUFFER-CONTROLLER
- 10 (4) PAPER TAPE (WAT CHANNEL)
- 13 (7) I-O DEVICE CONNECTED TO UBC
- 21 (9) MAGNETIC TAPE, MODE 1, FORWARD
- 22 (A) MAGNETIC TAPE, MODE 2, FORWARD
- 23 (B) MAGNETIC TAPE, MODE 3, FORWARD
- 31 (D) MAGNETIC TAPE, MODE 1, REVERSE
- 32 (E) MAGNETIC TAPE, MODE 2, REVERSE
- 33 (F) MAGNETIC TAPE, MODE 3, REVERSE

OTHER INPUT-OUTPUT COMMANDS

- 2021 (89) RESUME
 - 2022 (8A) REWIND
 - 2023 (8B) REWIND WITH LOCKOUT
 - 3030 (CC) RELEASE
 - 3031 (CD) MINUS ONE READ
 - 3032 (CE) ERASE
 - 3033 (CF) EDIT
 - 3320 (F8) STOP
- HEXADECIMAL CODES IN PARENTHESES