TM-832/000/02

TECHNICAL MEMORANDUM

(TM Series)

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SCHOPS/Switch Control Interface Document

By

B. J. Cline
M. A. Franks

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Approved

R. A. Totschek

SYSTEM DEVELOPMENT CORPORATION
2500 COLORADO AVE.
SANTA MONICA
CALIFORNIA

1 SUBSYSTEM DESCRIPTION

1.1 General

This document supercedes the SCHOPS/Switch Control Interface Document, TM(L)-832/000/01, dated 1 March 1963. Part of the information for updating is derived from SCHOPS/Switch Control Interface meetings held on 4 January 1963 and 14 February 1963. Other information is from the document Milestone 4 for Control 160A Computer at STA (LMSC-656952), dated 15 January 1963, by E. M. Malone, E. Peabody, and E. D. Rodrigues.

SDC is responsible for designing the SCHOPS portion of the interface; LMSC is responsible for designing the switch control, including the design of the switching hardware and the CDC 160A Switch Control program.

SCHOPS is a scheduling program designed and written for the CDC 1604, which allocates the use of specified pieces of equipment or equipment complexes at the Satellite Test Annex (STA) and remote tracking stations for specific tasks on a temporal basis. In performing this function, SCHOPS assists the System Controller (SC) in the resolution of conflicts in demands for specific equipment and provides other necessary information for implementing the control of this equipment.

A primary product of SCHOPS, then, is a schedule of resource allocations for a prescribed scheduling period. The LMSC developed Switch Control program, in turn, effects the actual switching of communication lines between the automatic data handling equipment, displays, and control equipment at the STA.

1.2 SCHOPS Side of Interface

SCHOPS produces a table of resolved rise and set times and vehicle-station identifiers. It also maintains a set of equipment status tables, generates tables for scheduling 1604 flight support operations, and determines the intervals during which the CDC 1604 Bird Buffer complexes communicate with tracking stations on the one hand and with 1604 complexes on the other. (Bird Buffer/Tracking Station communications include both pass-associated operations and free-time transmissions.) From these tables, SCHOPS produces an output tape which includes the necessary information to be passed on to the switch control 160A, such as the time-ordered assignments of equipment to the switch coordinates and the necessary equipment identifiers. It also produces printed schedules for use by such operations personnel as the SC, the Test Controllers, and the person responsible for operating the switches, called the Master Data Controller (MDC).

SCHOPS accepts input information, such as equipment status data, assignment data, and operational priorities, which is used to allocate vehicle-station contacts and, in turn, to determine the switch-setting information. SCHOPS also has the capability to accept updated equipment information, such as equipment assignment or configuration changes, and "Security Lockout" data.

1.3 Switch Control Side of the Interface

The Switch Control program is designed to control the switching operations necessary to connect the Bird Buffer computers to the tracking stations through the Communications Data Select and Cross Connect unit (CDSCCU) and to the 1604 computers and 166 printers through the Computer Select and Cross Connect Unit (CSCCU). To perform this function, the Switch Control program receives a switch-schedule tape generated by the SCHOPS system. This tape contains information which describes the correspondence between the physical equipment, the CDSCCU and CSCCU, and the vehicle designations. In addition, the switch-schedule tape contains information which describes the various switching operations to be performed during the SCHOPS schedule interval.

The Switch Control program monitors actions from the Master Data Control Console (MDCC) and prints the status of these actions on the MDCC associated 166 printer. The switch-control computer receives interrupts from the MDCC, when actions are taken there, so that the switch status tables can be updated. Figure 1 illustrates the configuration of the switch-control complex*. Crosspoint connections, shown as black dots, illustrate a possible equipment configuration. Bird Buffer 05, for example, is connected to a tracking station assigned to coordinate 62 on the CDSCCU side. On the CSCCU side, this bird buffer is connected to 1604-3 and to 166 printers 01 and 52. Periodically, the status of all crosspoints of the CDSCCU and CSCCU is printed on the MDCC 166 printer. Switch commands input to the 160A are referenced to a unique system time. To execute the command, the Switch Control program compares the current system time with the time associated with the command being processed. Current system time is input to the 160A control computer through the Computer Timing Buffer Equipment (CTBE).

The Switch Control program may receive additional inputs from cards which contain schedule overrides, equipment changes, equipment assignment changes, and security lockout information.

*Transmission equipment, such as the 1607 tape drives (connected between the CSCCU and the 1604 computers) and the Communication Coupling Converters (connected between the Bird Buffers and the CDSCCU), is not shown in the illustration.

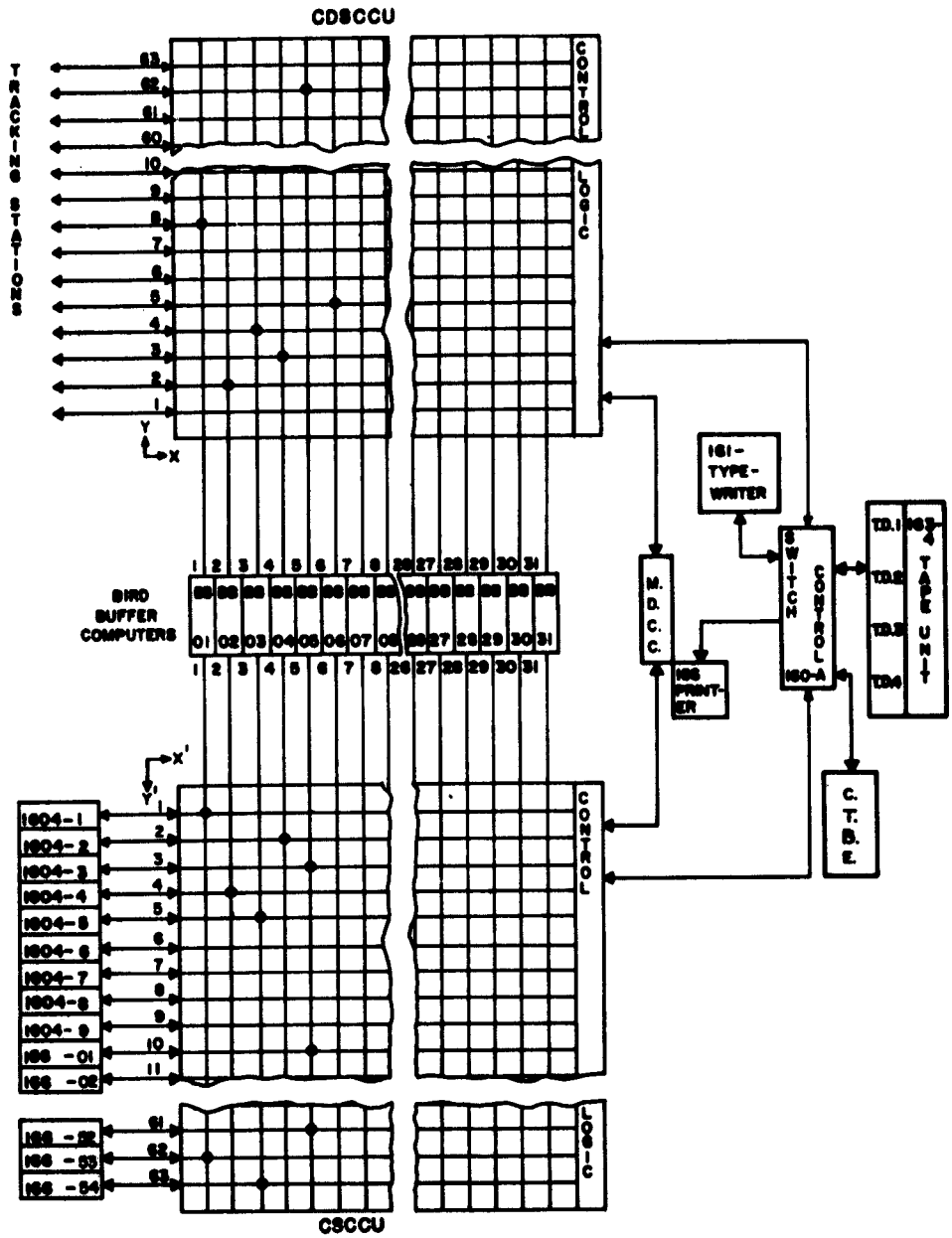

FIGURE 1 STA SWITCH CONTROL COMPLEX

The Switch Control program generates a listable history tape of all switch actions performed. This tape contains the status of the crosspoints of the CDSCCU and CSCCU at the beginning of the tape and again at the end of the tape. The history tape will be processed by an off-line program other than SCHOPS.

1.4 Interface Procedure

Although it is not exhaustive, the procedure is intended to be sufficiently detailed to define the interface between the two programs.

1.4.1 In the operational environment the following steps, occuring cyclically, define the general procedure:

a. The SCHOPS program will be used to produce a Schedule Tape which defines initial equipment assignments.

b. At an appropriate time, the Schedule Tape will be read into the Control Computer.

c. The equipment assignments in effect at this time will be compared with the assignments contained on the Schedule Tape. Discrepancies will be pointed out so that the Master Data Console operator can take corrective action.

d. The first time that step "c" is executed, discrepancies may be expected to occur because of assignment changes which have been made during the period that SCHOPS is being run. These changes will be introduced and step "c" repeated until an agreement is achieved.

e. During the period of operation of the Control Computer with a particular Schedule Tape, the Master Data Control Console operator may introduce, by means of appropriate cards, additional changes in assignments.

f. At an appropriate time, the cards defining changes in assignments which were generated in steps "d" and "e" will be delivered to the MULTIOPS personnel for inclusion in the next SCHOPS run.

g. These cards will be read by the SCHOPS program, and will be used to modify the input data package and to produce the next Schedule Tape for the Control Computer.

1.4.2 The Schedule Tape will be used to communicate four types of information to the Control Computer:

a. The relationship between matrix points of the CDSCCU, the CSCCU, and arbitrary equipment numbers.
b. The relationship between arbitrary equipment numbers and physical equipments.
c. The relationship between physical equipments and their functions.
d. Switch actions in terms of arbitrary equipment numbers.

Physical equipments will be defined by BCD equipment identifications and functions will be defined by vehicle numbers (for Bird Buffers), and vehicle numbers plus AN or PR (for data analysis and data presentation printers). For 1604 computers the function is either "ON" or "OFF" while tracking stations will have no functional identification.

The relationship between matrix points and arbitrary equipment numbers will be defined by a table, ordered on matrix point, of the arbitrary equipment numbers. The relationship between arbitrary numbers, physical equipments, and functions will be defined by entries in a table; one entry will be made for each arbitrary equipment number and each entry will consist of an arbitrary equipment number, BCD identification, and function.

In many instances, the entries relating arbitrary equipment numbers, physical equipments, and functions will be incomplete because not all matrix points will be connected to a piece of equipment and not all pieces of equipment (1604's for instance) will have a unique function.

1.4.3 Two classes of cards will be used to change assignments: those defining a change in the assignment of physical equipments to matrix points, and those defining a change in the function of the physical equipments.

a. The cards defining a change in the assignment of physical equipment will contain a BCD identification and a line number indicating that the physical equipment is to be shifted from its present matrix point to the matrix point indicated on the card. The effect of such a card will be to interchange the arbitrary equipment numbers for the matrix points (in the table relating matrix points and arbitrary equipment numbers).

b. The cards defining a change in function will contain a BCD identification and a function, and will be used to shift the function to a new piece of equipment. The effect of such a

card will be to interchange the BCD identifications in the table relating arbitrary equipment numbers, BCD identifications, and functions.

1.5 Equipment

1.5.1 SCHOPS uses the following equipment:

a. One CDC 1604 Computer.
b. Three CDC 1607 Units.
c. One Card Reader.
d. One Card Punch.
e. One 1612 Printer.

1.5.2 The Switch Control System uses the following equipment:

a. One CDC 160A Computer.
b. One CDC 163-4 Tape Unit.
c. One 166 Printer (at the MDCC).
d. One 161 Typewriter.
e. One Master Data Control Console (MDCC).
f. One Communications Data Select and Cross Connect Unit (CDSCCU).
g. One Computer Select and Cross Connect Unit (CSCCU).
h. One Card Reader.

2 TAPE FORMATS

2.1 Switch Schedule Tape

The switch schedule tape is composed of three types of records: header records, equipment identification records, and switch records. Each record is fifty 1604 words in length. The record formats are described below.

Type 1 Record: Header Record

Words 1, 2, 3, 4

47–0
all ones

47–0
"SCHEDULE" in BCD

47–36	35–29	28–24	23–18	17	16–0
zeros	year	month	day		system time

47	46	45–41	40–24	23	22	21–17	16–0
		day	start time of schedule period			day	stop time of schedule period

Words 5 through 50 contain full zeros.

Type II Record: Equipment ID Record

This record type consists of two tables which establish a correspondence between the physical and functional equipment designations. The first record contains TABLEIN and the next four records contain TABLEOUT. These formats are described below.

TABLEIN (4 blocks) Ordered by arbitrary equipment number. TABLEIN is contained in one 50 word record. The first 48 words contain data and the last two words are full zero. Blank words contain zeros.

Block I (16 words) contains Y coordinates for the data lines on the CDSCCU.

word 1

47_{100} 45 (binary)	44	43	42 36 Y coord Eq. 1	35 31	30 24 Y coord Eq. 2	23 19	18 12 Y coord Eq. 3	11 7	6 0 Y coord Eq. 4

words 2-16 Same format for equipment numbers 5-64.

Block II (8 words)

same format, but contain X coordinates for the Bird Buffers on the CDSCCU.

Block III (8 words)

same format, but contain X' coordinates for the Bird Buffers on the CSCCU.

Block IV (16 words)

same format as above, but contain Y' coordinates for computer and display equipment on the CSCCU.

TABLEOUT (4 blocks) Ordered by coordinate number within each block. TABLEOUT is contained in eight 50 word records. The first 376 words contain data and the last 24 words are blank. All blank words contain six-bit BCD blanks.

Block I (126 words)

words 1 and 2

47 A 12	11 B 0

47 C 24	23 D 12	11 E 9	8 E 6	5 E 3	2 E 0

A = six BCD characters of equipment ID on Y coordinates of the CDSCCU.
B = first two decimal digits of vehicle number in six-bit BCD.
C = last four decimal digits of vehicle number in six-bit BCD.
D = analysis (AN), presentation (PR), or six-bit BCD blanks.
E = octal digit, arbitrary equipment number, right justified.

Block II (62 words)

same format as above, but for Bird Buffers on the X coordinates of the CDSCCU.

Blck III (62 words)

same format as above, but for Bird Buffers on the X' coordinates of the CSCCU.

Block IV (126 words)

same format as above, but for computer equipment on the Y' coordinates of the CSCCU.

Type III Record: Switch Record

These records are fifty 1604 words in length.

all words

47	46	45 41	40 24	20 12	11	10 9	8 0
		day	system time	eq. no. on X coord.		C/D*	eq. no on Y coord.

(eq. no. is an arbitrary equipment number on either the X or X', or Y or Y' coordinate)

The last switch action on tape is followed by full zero words for the remainder of the 50-word record. Following the last Type III record is an EOF record.

*Bit 9 = 1, connect
10 = 1, disconnect

2.2 History Tape

The history tape will be written by the 160A computer in six-bit BCD format. There are three files on the tape.

2.2.1 Status File

A. Header Record

1604 Word	Character	Content
1	1-3	Word count
	4-8	Unique ID
2	1-8	Year-Month
3	1-8	Day-Seconds

B. Data Records

1. Equipment Assignment

1604 Word	Character	Content
1	1-3	Word count
	4-5	Line number
	6	blank

1604 Word	Character	Content
1	7-8	Station, Equipment
2	1-3	or Bird Buffer label
	4	blank
	5-8	Vehicle number
3	1-2	if applicable
	3	blank
	4-6	Use tag for printer, on/off for 1604, others blank
	7	
	8	
4	1-2	Arbitrary number
	3-8	blank

2. Switch Setting

1604 Word	Character	Content
1	1-3	Word count
	4-8	Veh # for printer
2	1	or 1604-label
	2-4	Printer use tag
	5	blank
	6-8	Bird Buffer label
3	1-2	
	3	blank
	4-8	Station label
4	1	blank
	2-7	Bird Buffer vehicle number
	8	blank

3. Lockout

1604 Word	Character	Content
1	1-3	Word count
	4-5	Line number
	6	blank
	7-8	Station or
2	1-3	Equipment label
	4	blank
	5-7	YLO if line lockout exists, blank if not
	8	blank
3-14 (as needed)		Bird Buffer - numbers of all BB whose connection to this line is under security lockout

2.2.2 Schedule Tape Switch Actions

A. Header Record

1604 Word	Character	Content
1	1-3	Word count
	4	blank
	5-8	Schedule tape
2	1-4	Time
	5-8	blank

B. Action Record

1. Switch Action

1604 Word	Character	Content
1	1	blank
	2-4	Word count
	5-6	blank
	7-8	** if alarm, blank if not
2	1-2	blank
	3-8	Time; day
3	1-2	and seconds
	3-4	blank
	5	C or D
	6-8	blank
4	1-6	Printer veh # or 1604 label
	7-8	Printer use tag or 1604 ON/OFF
5	1-2	blank
	3-7	Bird Buffer label
	8	blank
6	1-2	blank
	3-7	Station label
	8	blank
7	1-2	blank
	3-8	Bird Buffer Vehicle Number
8	1-2	blank
	3-8	Reason for action (MDCC,
9	1-2	YLO, CLO, SECURITY, etc.)
	3-8	blank
10	1-5	Previous BB connection on this line
	6-8	blank
11	1-5	Scheduled BB connection on this line
	6-8	blank

2. Card Actions

This is an exact BCD image of the actual card content as read in.

3. Other actions

This is a class of one line BCD phrase briefly explaining the nature of the action. Examples:

```
TO MTCE CDSCCU
TO MODE 1  CSCCU
OUTPUT  INHIBIT  TIMING  BUFFER
```

2.2.3 Upon termination of a history tape, another file of status will be written in the same format as defined in 2.2.1 of this document.

3 CARD FORMATS

The following cards pertain to either the Switch Control Program only or both the Switch Control Program and the SCHOPS program, according to the following legend:

(S) Switch Control Program only.
(B_1) = Both; SCHOPS to Switch Control.
(B_2) = Both; Switch Control to SCHOPS.

1. Action card (S). This card is used by the Switch Control program for schedule overrides. The card can perform the function of adding, deleting, or replacing switch actions. For a deletion, only the month, day, and system time appear on the card.

2. Schedule Tape Identifier Card (B_1). This card is punched by the SCHOPS program for use by the Switch Control program to insure that the correct tape is being processed.

3. "Cards Only" control card (S). This card is used by the Switch Control program to allow switch actions directly from cards with no tape input.

4. CHG card (B_2). This card is used to modify the equipment assignment tables within the switch control program. This modification will affect either the assignment of physical equipment to matrix points or the function of the physical equipment. For the next SCHOPS run, all available "CHG" cards are input to SCHOPS so that the equipment assignment tables output on the schedule tape will reflect, as closely as possible, the present configuration.

5. SET and CLR cards (B_2). These cards are used to modify the equipment assignment tables within the Switch Control program so that switch failures can be distinguished from "Security Lockouts." These cards are input to the SCHOPS program to update equipment tables for the next schedule generation.

6. Emergency Control card (S). This card is used by the Switch Control program whenever it is necessary to read in a "CHG", "SET" or "CLR" card.

Action Card

Col.	Contents
1-3	blank
4-5	month in decimal
6-7	day in decimal, execution time for action
8-12	system time in decimal, seconds
13	blank
14-79	free field containing three peices of information anywhere in the field, separated by blanks and in the following order:

(1) "C" or "D"; connect or disconnect

(2) designator of equipment

(a) tracking station designators (given $1 \leq N \leq 9$) are

VTS-N	HTS-N	IOS-N
NHS-N	TTS-N	ATS-N
FGS-N	FNS-N	KTS-N

(b) 1604 designators (given $1 \leq N \leq 9$) are 1604-N

(c) printer designators (given AN is "analysis", PR is "presentation", $1 \leq VVVVVV \leq 999999$ is vehicle number) are VVVVVV AN or VVVVVV PR

(3) vehicle number of Bird Buffer (given $1 \leq VVVVVV \leq 999999$) is VVVVVV.

80	blank

Schedule Tape Identifier Card

Col.	Contents
1-3	blank
4-69	free field containing five pieces of information anywhere in the field, separated by blanks, and in the following order:
	(1) ID — card label
	(2) YYMMDDSSSSS — unique identification specifying start of SCHOPS run — Y=Year, M=Month, D=Day, S=System Time
	(3) SSSSS — beginning time of overlap
	(4) SSSSS — end time of overlap
	(5) E — tape unit identifier
70-71	month of execution time
72	blank
73-74	day
75	blank
76-80	system time

"Cards only" Control Card

Col.	Contents
1-3	blank
4-5	month in decimal
6-7	day in decimal
8-12	seconds in decimal
13	blank
14-79	free field containing "CARDS ONLY" card label anywhere in the field.
80	blank

Switch Schedule Modification Card
(Change Card - CHG)

Col.	Contents
1	"B"
2	"3"
3	blank
4-79	free field containing four or five pieces of information anywhere in the field, separated by blanks, and in the following order:

(1) "CHG" change card indicator

(2) designator of equipment to be changed

(a) Bird Buffer designators (given $01 \leq NN \leq 99$) are BB-NN

(b) tracking station designators ($1 \leq N \leq 9$) are:

VTS-N	HTS-N	IOS-N
NHS-N	TTS-N	ATS-N
FGS-N	FNS-N	KTS-N

(c) printer designators (given $01 \leq NN \leq 99$) are PR-NN

(d) 1604 designators (given $1 \leq N \leq 9$) are 1604-N

(e) vehicle numbers ($1 \leq VVVVVV \leq 999999$) are VVVVVV

(3) the word "TO"

(4) designator of status after change

a. coordinate designators (given $01 \leq NN \leq 99$) are LINE NN
b. the word "ON" or the word "OFF"
c. vehicle number VVVVVV or 000000 if the vehicle is unassigned.

(5) The word "EQUIP" or the word "STATION"

80	blank

Switch Schedule Modification Card

(Security Set, SET and Security Clear, CLR)

Col.	Contents
1	"B"
2	"3"
3	blank
4-79	free field containing three pieces of information anywhere in the field, separated by blanks, and in the following order: (1) "SET" or "CLR" modification card indicator (2) first piece of equipment involved in the set or clear (a) 1604 designators (given $1 \leq N \leq 9$) are 1604-N (b) tracking station designators are as noted under Change Card (c) printer designators, ($01 \leq NN \leq 99$) are PR-NN (3) Second piece of equipment involved is Bird Buffer designated by BB-N ($1 \leq N \leq 31$)
80	blank

Emergency Control Card

Col.	Contents
1-3	blank
4-69	free field containing five pieces of information anywhere in the field, separated by blanks, and in the following order:
	(1) ID — card label
	(2) YYMMDDSSSSS — unique identification specifying start of SCHOPS run
	(3) SSSSS — beginning time of overlap
	(4) SSSSS — end time of overlap
	(5) E — tape unit identifier
70-80	blank

4 OPERATIONAL DEFINITIONS

4.1 Equipment: (Definition by enumeration)

Each Bird Buffer complex is an equipment.
Each CDC 1604 computer complex is an equipment.
Each Data Presentation 166 printer is an equipment.
Each Data Analysis 166 printer is an equipment.
The Multi-Ops 166 printer is an equipment.
Each pair of duplex 1200-bps lines linking the STA to an augmented half-station is an equipment.

4.2 Switch Coordinate:

Each switch (CDSCCU and CSCCU) has a number of "spigots" to which an equipment may be connected. Each "spigot" is identified by a number, called its coordinate. The coordinates of the spigots on the CDSCCU to which the 1200-bps lines may be connected are called "Y - coordinates;" those on CDSCCU to which Bird Buffers may be connected are called "X - coordinates;" those on the CSCCU to which the Bird Buffers may be connected are called "X' - coordinates;" and, finally, those on the CSCCU to which the 1604 computers and 166 printers may be connected are called "Y' - coordinates."

4.3 Physical Equipment Identifier:

Each physical equipment has an associated identifier called its "physical equipment number " Each Bird Buffer complex has a unique physical equipment number of the form BB-r, where the r is a two-digit decimal number between 01 and 31, inclusive.

Each 1604 complex has a unique physical equipment number of the form 1604-s, where s is a single-digit decimal number between 1 and 9, inclusive.

Each of the printers in the combined data analysis, data presentation, and multi-ops areas has a unique physical equipment number of the form PR-t, where t is a two-digit decimal number between 01 and 54, inclusive.

Each pair of duplex, 1200-bps lines has a physical equipment number of the form XXX-u, where the XXX is a three letter mnemonic for the tracking station and the u is a single-digit decimal number between 1 and 3, inclusive. The XXX's are chosen from the set VTS, NHS, TTS, KTS, IOS, ATS,

FGS, HTS, which correspond to Vandenberg, New Boston, Thule, Kodiak, Indian Ocean, Annette, Fort Greely, and Hawaii stations, respectively.

4.4 Functional Equipment Identifiers:

The role of each equipment in the system changes from time to time, depending on whether it is active or inactive (from a scheduling point of view) and depending on the vehicle with which it is associated. Temporally variable identifiers, called "functional equipment numbers," are therefore assigned to each equipment. For each active Bird Buffer, the number of the vehicle with which it is identified will serve as its functional equipment number; inactive Bird Buffers will all have functional equipment numbers of zero. Each active data-analysis printer will have a functional designator of the form v AN, where v is the vehicle number of the bird with which it is associated. Similarly, active data-presentation printers have functional designations of the form v PR. Inactive data-analysis or data-presentation printers are functionally designated with a functional equipment number of zero. 1604 computers are functionally designated as "ON" or "OFF," and are not given vehicle identities. Tracking stations have no functional designation.

4.5 Arbitrary Equipment Number:

Each equipment is assigned a unique, arbitrary four-digit-octal, equipment number for ease in cross referencing. At any given time, there is a one-to-one relation between arbitrary and physical equipment numbers, (e.g., 177 corresponds to 1604-4), and that relationship may be maintained for as long as the set of available equipment remains invariant. Removal of an equipment releases the corresponding arbitrary equipment number for assignment to any equipment which may subsequently be added.

SWITCH	Coordinates	Equipment Type	IDENTIFIERS		
			Physical Equipment Number (Examples)	Functional Equipment Number (Examples)	Range of Arbitrary Equipment Nos. (Octal)
Communications Data Select and Cross Connect Unit (CDSCCU)	Y-Coordinate $1 \leq Y \leq 63$	Pairs of fully duplexed 1200-bps lines	NHS - 2 VTS - 1 IOS - 3	On Off	0001 - 0077
	X-coordinate $1 \leq X \leq 31$	BIRD	BB - 18 BB - 31 BB - 07	1234 6703 1145	0100 - 0136
Computer Select and Cross Connect Unit (CSCCU)	X'-Coordinate $1 \leq X' \leq 31$	BUFFERS			0137 - 0175
	Y'-Coordinate $1 \leq Y' \leq 63$	1604's	1604 - 3 1604 - 8	On Off	0176 - 0206
		Printers	Pr - 22 PR - 03 PR - 19	1234 PR 1234 AN 6703 AN	0207 - 0274

TABLE NAME	INDEX	ENTRIES
TABLEIN	Arbitrary Equipment Number	Coordinate
TABLEOUT	Coordinate Number + Block Index	Physical Equipment Number Functional Equipment Number Arbitrary Equipment Number

FIGURE 2 REFERENCE CHART

(last page)

EXTERNAL DISTRIBUTION LIST

Space Systems Division (Contracting Agency)
Major C. R. Bond (SSOCD)

6594th Aerospace Test Wing (Contracting Agency)
Col. A. W. Dill (TWRD)
Lt. Col. M. S. McDowell (TWRU)

PIR-E5 (Aerospace)
F. M. Adair
R. V. Bigelow
R. O. Bransberg
L. H. Garcia
G. J. Hansen
C. S. Hoff
L. J. Kreisberg
T. R. Parkin
E. E. Retzlaff
H. M. Reynolds
D. Saadeh
R. G. Stephenson
P. C. Tiffany
V. White

PIR-E1 (Lockheed)
E. M. Malone
W. E. Moorman
E. Peabody
E. D. Rodrigues

WINSOR, M. E.	22156	WONG, J. P.	SUNNYVALE
WINTER, J. E.	24117	ZUBRIS, C. J.	24075
WISE, R. C.	22085		

ALDANA, J.	22131B	KEYES, R. A.	24073
ALEXANDER, L. B.	22134	KNEEMEYER, J. A.	22088A
ALLFREE, D.	24083	KNIGHT, R. D.	22119
ALPERIN, N. I.	22153	KOLBO, L. A.	22155
ARMSTRONG, E.	24123	LAUGHLIN, J. L.	24073
BECERRA, C.	24082	LAVINE, J.	24093
BIGGAR, D.	24118A	LEWIS, H. L.	23010
BILEK, R. W.	23007	LITTLE, J. L.	24088B
BRENTON, L. R.	24103B	LONG, F.	22156
BURKE, B. E.	24086	MADRID, G. A.	22081
BURKE, R. F.	22158	MAHON, G. A.	24089
BUSCH, R. E.	22088B	MARIONI, J. D.	24076B
BUSTYA, C.	22134	MARSHALL, R. D.	22160
CHAMPAIGN, M. E.	22152	MARTIN, W. P.	24127B
CHIODINI, C. M.	24091	MCKEOWN, J.	23013
CIACCIA, B. G.	24082A	MILANESE, J. J.	22155
CLEMENTS, R. F.	22109	MUNSON, J. B.	22087A
CLINE, B. J.	24127	MYERS, G. L.	14056A
COGLEY, J. L.	22156	NELSON, P. A.	24075
CONGER, L.	24088A	NGOU, L.	24127
COOLEY, P. R.	24081	OLSON, M. M.	22161
CRUM, D. W.	24105	PADGETT, L. A.	24110A
DECUIR, L. E.	24053A	PATIN, O. E.	SUNNYVALE
DERANGO, W. C.	24082B	PERSICO, D. J.	24083
DEXTER, G. W.	25016	POLK, T. W.	24113
DISSE, R. J.	23014	REILLY, D. F.	24121
DOBBS, G. H.	22116B	ROCKWELL, M.	24086A
DOBRUSKY, W. B.	24065A	SCHROEDER, J. B.	24124
DUGAS, R. L.	22125	SCOTT, R. J.	24110
ELLIS, R. C.	22131A	SEACAT, C. M.	SUNNYVALE
ERICKSEN, S. R.	22113	SEIDEN, H. R.	22126B
FELDSTEIN, H. F.	24128	SHAPIRO, R. S.	24110B
FRANCIS, C. W.	25013	SHOEL, S. J.	23007
FRANKS, M. A.	24122	SKELTON, R. H.	22148
FRIEDMAN, L.	22122	SPEER, N. J.	24086A
GARDNER, S. A.	25026	STONE, E. S.	24058B
GERGEN, V. J.	25014	SWEENEY, M. J.	25026
GREENWALD, I. D.	22094A	TABER, W. E.	22101
HAAKE, J. W.	22153	TENNANT, T. C.	27029
HENLEY, D. E.	22094B	THOMPSON, J. W.	24088
HILL, C. L.	22101	TOCHE, C.	24121
HILLHOUSE, J.	22078	TOTSCHEK, R. A.	24120
HOLZMAN, H. J.	24065B	TUCKER, A. E.	22109A
HUDSON, G. R.	24126	VORHAUS, A. H.	24076A
JOHNSON, R. E.	22125	WEEMS, S.	22109A
KASTAMA, P. T.	22076	WEINSTOCK, M.	22131
KATZ, M.	25014	WEST, G. D.	SUNNYVALE
KAYSER, F. M.	24109	WEST, G. P.	22116A
KEDDY, J. R.	24105	WILLIAMS, H. D.	22110
KEY, C. D.	23013	WILSON, G. D.	24124

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System Development Corporation,
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DOCUMENT.
Scientific rept., TM-832/000/02,
by M. Franks, B. Cline. 16 April 1963.
23p., 2 figs.
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DESCRIPTORS: Satellite Networks.
Programming (Computers).

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dated 1 March 1963. Describes SCHOPS UNCLASSIFIED
as a scheduling program designed and
written for the CDC 1604, which allocates
the use of specified pieces of equipment
or equipment complexes at the Satellite
Test Annex (STA) and remote tracking
stations for specific tasks on a temporal
basis. Reports that performing this function,
SCHOPS assists the System Controller (SC) in
the resolution of conflicts in demands for
specific equipment and provides other
necessary information for implementing the
control of this equipment. Also states that
primary product of SCHOPS (Scheduling
Operations Package) is a schedule of resource
allocations for a prescribed scheduling
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