

ENGINEERING  
SPECIFICATION

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COMPUTER DIVISION  
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PRELIMINARY SPECIFICATION  
FOR THE 6684 TRANSLATING DATA  
CHANNEL CONVERTER.

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## 1.0 SCOPE

This specification describes the 6684 TRANSLATING DATA CHANNEL CONVERTER.

This converter enables the 6X00 peripheral processor to communicate with 3000 series peripheral equipment. The converter simulates a 3606 data channel.

## 2.0 APPLICABLE DOCUMENTS

2.1 Specification, 6600 Computer System Input/Output. Publication Number 60045100.

2.2 Specification. 3000 Series Computer System Input/Output. Publication Number 60048800.

2.3 Specification. Computer Equipment Operating Conditions. Publication Number 11836200.

## 3.0 REQUIREMENTS

### 3.1 General Description.

The 6684 allows one 6000 series Data Channel to communicate with 3000 series external equipment. Data is transmitted through the converter in two function selectable modes. Mode A transmission passes the data through the converter unchanged. Mode B transmission translates both six bit characters as they pass through the converter. During a Mode B output (see note) operation, the data is translated from Display Code to internal BCD. A Mode B input translates data from internal BCD to DPC (display code). The 6684 does not check parity on the bytes received from the 3000 external equipment. A parity generator circuit sends a parity bit with each 12 bit byte sent to the 3000 equipment.

### 3.2 Data Transfer Rates.

The 6684 is capable of transferring one 12 bit word every microsecond in Mode A operations. Model data B transmission can obtain 500.000 words per second.

### 3.3 Input Power Requirements.

The 6684 must be supplied with (added) amps of 6 volt DC power and (added)amps of -6 volt DC power.

### 3.4 Cable Assignments

Table I defines the signals and pin assignments for the cables to the 3000 equipment. Not all of the signals seen in the 3000 Input/Output specification (see 2.2) are present, Table II defines the cables to the 6000 Data Channel. The pass-on and

NOTE: For a definition of output, see 6.1  
For a definition of input, see 6.2

the pass-back cables coming from (going to) other 6000 peripheral equipment on the channel have the color codes defined by Table II.

### 3.5 Operational Requirements.

#### 3.5.1 Selection and deselection.

The 6684 is selected by a Master Clear signal from the 6000 data channel or by a 2000 function code from the channel. When the 6684 is selected, it does not pass-on the function signal to other 6000 peripheral equipment. (see 3.5.10). The converter is deselected by a 2100 function code from the data channel.

#### 3.5.2 Functioning the 6684.

A 76XX or 77XX peripheral processor instruction sends a function code and "function" signal to the 6684. The function codes used by the 6684 are shown in Table III. These function codes are used to prepare the converter for the next channel operation as well as selection, deselection, and master clearing. An "inactive" signal is sent to the channel in response to a "function" signal.

#### 3.5.3 Status.

##### 3.5.3.1 Converter Status:

The computer can obtain the status of 6684 by transmitting a 1200 function code, activating the channel, and inputting one word from the 6684. Table IV defines the status bits.

##### 3.5.3.2 Equipment Status:

The 12 Status lines of the connected 3000 external equipment can be obtained by transmitting a 1300 function code to the 6684, activating the channel, and reading one word from the 6684.

#### 3.5.4. Connecting External Equipment.

##### 3.5.4.1 Mode I Connect:

Any function code sent to the 6684 which contains a "1" in the highest bit position will cause that function code to be sent to the 3000 external equipment with a "connect" signal. When either a "reject" or a "reply" is received from the external equipment, an "inactive" signal will be sent to data channel. Since the high order three bits of the connect code are always the equipment number, only equipment 4, 5, 6, and 7 can be connected in this manner.

##### 3.5.4.2 Mode II Connect:

This mode permits connect codes to be generated for all external equipments numbers but more computer operations are required. Transmission of a 1000 function code will condition the converter to send the next output data word to the 3000 equipment with a "connect" signal. When either a reply or a reject is received from the external equipment, an "empty" signal is returned to the computer.

### 3.5.5 Function external equipment.

#### 3.5.5.1 Mode I Function:

Any function code sent to the 6684 which contains a "zero" in the upper octal digit (OXXX) will be transmitted to the 3000 peripheral equipment with a "function" signal. When either a "reply" or a "reject" is received from the external equipment, an "inactive" will be returned to the data channel.

#### 3.5.5.2 Mode II Function:

This mode permits all function codes to be sent to the external equipment but more computer operations are required. Transmission of an 1100 function code will condition the converter to sent the next output data word to the 3000 external equipment with a "function" signal. When either a "reply" or a "reject" is received from the external equipment, an "empty" signal is returned to the computer.

### 3.5.6 Input/Output.

The computer must transmit a read, read end of record, or a write function code (Table III) prior to input or output of data. The 6000 channel is then activated and a read or write instruction is executed by the computer. A read or write operation is terminated by an "inactive" signal from the data channel. The read F.O.R. instruction can be terminated by a n "inactive" signal from the channel or by an "end of record" signal from the external equipment. On read F.O.R. operations, the "end of record" signal causes an "inactive" signal to be sent to the data channel.

#### 3.5.6.1 Mode A Data Transfers:

A "0" in bit position  $2^3$  of the input/output function code conditions the converter for Mode A data transfers. Mode A operations allows data to pass through the converter unchanged. A 6684 operating Mode A is completely program compatible to the 6681 Data Channel Converter.

#### 3.5.6.2 Mode B Data Transfers :

A "1" in bit position  $2^3$  of the input/output function code conditions the 6684 for Mode B data transfers. During a Mode B output, the upper and lower six bit characters of the data word(s) are translated from Display Code to internal BCD. Table V defines the character translation. During a Mode B input, the upper and lower six bit characters of the data word(s) are translated from internal BCD to Display Code. Table V also defines the input translation.

#### 3.5.6.3 Negate BCD Signal:

A "1" in bit position  $2^0$  of the input/output function code enables a "1" to be sent to the peripheral equipment on the Negate BCD Conversion line.

### 3.5.7 Interrupt.

The eight interrupt lines coming from the 3000 peripheral equipment are used as converter status bits. Sec 3.5.3.1.

### 3.5.8 Parity.

A "parity error" signal received from the external equipment will set bit 2<sup>2</sup> in the converter status word. A parity bit is generated in the 6684 for each connect code, function code, and data word sent to the peripheral equipment. The 6684 does not check for a parity error on words received from external equipment.

### 3.5.9 Internal Reject.

When the 6684 does not receive a "reply" or "reject" to a connect code or function mode within 100 microseconds, the converter generates it's own internal reject. This internal reject sets bit 2<sup>1</sup> in the converter status word as well as initiating control activities normally initiated by a "reply" or "reject".

### 3.5.10 Pass-on/Pass-back.

The 6684 is capable of relaying information to (from) 6000 equipments further from the data channel according to 6600 I/O specifications. See 2.1 when the 6684 is deselected. The 6684 must be selected before it will accept function codes. When selected, the 6684 does not pass-on function codes. See 3.5.1 .

### 3.5.11 Master Clear.

A 1700 function code causes a 50 microsecond "master clear" signal to be sent to the 3000 peripherals as does a "master clear" pulse from the 6000 peripheral processor.

### 3.5.12 Computer Running.

The "computer running" signal is transmitted to the 3000 peripheral equipment when the 6684 is selected.

### 3.5.13 Data Signal/Word Mark.

The "word mark" signal sent by the 6684 to the 3000 external equipment is always sent with the data signal. The "word mark" accompanies each 12 bits of data.

## 5.6 Environment.

The 6684 shall conform to the Specification for Computer Equipment Operating Conditions. See 2.3 .

## 6.0 QUALITY ASSURANCE PROVISIONS

The 6684 shall comply to test procedures outlined in QAI XXXXXX-CD. (still to be defined).

## 6.0 PREPARATION FOR DELIVERY

Packaging and crating must comply with QAI-700010-CD before the Authority to Ship form is signed by Quality Assurance.

## 6.0 NOTES

6.1 Output is defined as the flow of data from the 6000 computer data channel to the 3000 peripheral equipment.

6.2 Input is defined as the flow of data from the 3000 peripheral equipment to the 6000 data channel.

TABLE I.

6684 to 3000 Type External Equipment. I/O Cable A. Signal and Pin Assignments.

P i n (two used)	S i g n a l
A1-2	Data Bit 00
A3-4	Data Bit 01
A5-6	Data Bit 02
A7-8	Data Bit 03
A9-10	Data Bit 04
B1-2	Data Bit 05
B3-4	Data Bit 06
B5-6	Data Bit 07
B7-8	Data Bit 08
B9-10	Data Bit 09
C1-2	Data Bit 10
C3-4	Data Bit 11
C5-6	Parity Bit
C7-8	Channel Busy
C9-10	Not Used
D1-2	Read
D3-4	Write
D5-6	Connect
D7-8	Function
D9-10	Data Signal
E1-2	Reply
E3-4	Reject
E5-6	End of Record
E7-8	Parity Error
E9-10	(Unused)
F1-2	Word Mark
F3-4	Master Clear
F5-6	Not Used
F7-8	Not Used
(not in cable. F9-10 see note)	Termination Power.

TABLE I .

6684 to 3000 Ty ~~External~~ Equipment. I/O Cable B. Signal and Pin Assignments.

P i n (two used)	S i g n a l
A1-2	Status Bit 00
A3-4	Status Bit 01
A5-6	Status Bit 02
A7-8	Status Bit 03
A9-10	Status Bit 04
B1-2	Status Bit 05
B3-4	Status Bit 06
B5-6	Status Bit 07
B7-8	Status Bit 08
B9-10	Status Bit 09
C1-2	Status Bit 10
C3-4	Status Bit 11
C5-6	Computer Running
C7-8	Negate BCD Conversion-
C9-10	(Unused)
D1-2	Interrupt Line 0
D3-4	Interrupt Line 1
D5-6	Interrupt Line 2
D7-8	Interrupt Line 3
D9-10	Interrupt Line 4
E1-2	Interrupt Line 5
E3-4	Interrupt Line 6
E5-6	Interrupt Line 7
E7-8	(Unused)
E9-10	Override Interrupt
F1-2	(Unused)
F3-4	(Unused)
F5-6	(Unused)
F7-8	(Unused)
F9-10	Termination Power.

(not in cable,  
see note)

NOTE:The 29-Pair cables terminate in 61-Pin connectors.  
Pins F9-10 of each connector are used to provide power  
to the terminator assembly and do not connect to lines  
in the I/O cable.



TABLE II.

Coaxial Cable Lines , High Speed Interface.

<u>Input Cable</u>	<u>Color Code</u>	<u>Output Cable</u>
Data 2 <sup>0</sup>	90	Data 2 <sup>0</sup>
Data 2 <sup>1</sup>	91	Data 2 <sup>1</sup>
Data 2 <sup>2</sup>	92	Data 2 <sup>2</sup>
Data 2 <sup>3</sup>	93	Data 2 <sup>3</sup>
Data 2 <sup>4</sup>	94	Data 2 <sup>4</sup>
Data 2 <sup>5</sup>	95	Data 2 <sup>5</sup>
Data 2 <sup>6</sup>	96	Data 2 <sup>6</sup>
Data 2 <sup>7</sup>	97	Data 2 <sup>7</sup>
Data 2 <sup>8</sup>	98	Data 2 <sup>8</sup>
Data 2 <sup>9</sup>	99	Data 2 <sup>9</sup>
Data 2 <sup>10</sup>	900	Data 2 <sup>10</sup>
Data 2 <sup>11</sup>	901	Data 2 <sup>11</sup>
Active	902	Active
Inactive	903	Inactive
Full	904	Full
Empty	905	Empty
Clock (10 mc)	906	Function
Clock ( 1 mc)	907	Master Clear
Not Used.	908	Not Used.

TABLE III.

Function and Status Codes

Function Codes.

A. Select/Deselect

1. 2000 Select
2. 2100 Deselect

B. Mode I

1. Connect :

- 4XXXconnect external equipment 4
- 5XXXconnect external equipment 5
- 6XXXconnect external equipment 6
- 7XXXconnect external equipment 7

2. Function :

0XXX sends 9-bit Function code to the external equipment connected.

C. Mode II

1. Connect :

1000 must be transmitted to the 6684 prior to outputting the Connect code. This code conditions the 6684 to generate a pseudo "connect" signal when the computer outputs the Connect code.

2. Function :

1100 must be transmitted to the 6684 prior to outputting the Function code. This code conditions the 6684 to generate a pseudo "function" signal when the computer outputs the Function codes.

D. Status

1. 1200 Channel Status
2. 1300 External Equipment Status

E. Data I/O

1. 1400 Input to End of Record
2. 1500 Input until computer sends inactive signal
3. 1600 Output until computer sends inactive signal
4. A "1" in the lower octal bit of the Data Function codes enables the Negate BCD Line.
5. A "1" in bit  $2^3$  of the Data Function codes enable mode B I/O operations.

F. M.C.

1. 1700 Master Clear.

TABLE IV

Status Reply

XXX1      Reject (Internal or External)

XXX2      Internal Reject

XXX4      Transmission Parity Error

XX1X-2XXX Eight Interrupt Lines.

TABLE V.

MODE B TRANSLATIONS

<u>CHAR</u>	<u>DPC</u>	<u>INT. BCD</u>
None Assigned	00	16
A	01	21
B	02	22
C	03	23
D	04	24
E	05	25
F	06	26
G	07	27
H	10	30
I	11	31
J	12	41
K	13	42
L	14	43
M	15	44
N	16	45
O	17	46
P	20	47
Q	21	50
R	22	51
S	23	62
T	24	63
U	25	64
V	26	65
W	27	66
X	30	67
Y	31	70
Z	32	71
0	33	00
1	34	01
2	35	02
3	36	03
4	37	04
5	40	05
6	41	06
7	42	07
8	43	10
9	44	11
+	45	20
-	46	40
*	47	54
/	50	61
(	51	74
)	52	34

TABLE V.

MODE B TRANSLATIONS

<u>CHAR</u>	<u>DPC</u>	<u>INT. BCD</u>
\$	53	53
=	54	13
space	55	60
,	56	73
.	57	33
≡	60	76
[	61	17
]	62	72
:	63	12
#	64	14
→	65	75
v	66	52
↑	67	77
↗	70	55
↘	71	56
<	72	32
>	73	57
≡	74	15
≡	75	35
↖	76	36
;	77	37

NOTE: That although DPC 00 and int BCD character 16 have not been assigned, they are translated for future use. The translation above holds for both input and output Mode B operations.