


JK 4-700

1c713 U.S. PTC
09/732291
1/06/00

Class	Subclass	ISSUE CLASSIFICATION
710	305	

PATENT NUMBER
6549970

6549970

U.S. UTILITY Patent Application

O.I.P.E. <i>KW</i> SCANNED <i>Q.A.</i>	PATENT DATE APR 15 2003
--	-----------------------------------

APPLICATION NO.	CONT/PRIOR	CLASS	SUBCLASS	ART UNIT	EXAMINER
09/732291	D F	710		2181	

APPLICANTS
TITLE

Ikuya Arai
Kouji Kitou

DISPLAY APPARATUS ENABLED TO CONTROL BA-DIRECTIONAL
Information output system COMMUNICABILITY WITH AN EXTERNAL
COMPUTER USING IDENTIFICATION INFORMATION

PTO-2040
12/99

ISSUING CLASSIFICATION							
ORIGINAL		CROSS REFERENCE(S)					
CLASS	SUBCLASS	CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
710	305	710	62	64			
INTERNATIONAL CLASSIFICATION		345	59	132			
60	6 F	13/38					
2/24/03			62	1	12/8/00		
<input type="checkbox"/> Continued on Issue Slip Inside File Jacket							

<input type="checkbox"/> TERMINAL DISCLAIMER <input type="checkbox"/> The term of this patent subsequent to _____ (date) has been disclaimed. <input type="checkbox"/> The term of this patent shall not extend beyond the expiration date of U.S. Patent. No. _____ <input type="checkbox"/> The terminal _____ months of this patent have been disclaimed.	DRAWINGS			CLAIMS ALLOWED	
	Sheets Drwg.	Figs. Drwg.	Print Fig.	Total Claims	Print Claim for O.G.
	12	12	70	29	1
	RAYMOND N PHAN 9/25/02 (Assistant Examiner) (Date)			NOTICE OF ALLOWANCE MAILED	
RUPAL DHARIA PRIMARY EXAMINER <i>[Signature]</i> 9/30/02 (Primary Examiner) (Date)			10-2-02		
[Signature] 10/5/02 (Legal Instruments Examiner) (Date)			ISSUE FEE		
			Amount Due	Date Paid	
			\$0	10/31/02	
ISSUE BATCH NUMBER					

WARNING:

The information disclosed herein may be restricted. Unauthorized disclosure may be prohibited by the United States Code Title 35, Sections 122, 181 and 368. Possession outside the U.S. Patent & Trademark Office is restricted to authorized employees and contractors only.

Form PTO-436A
(Rev. 6/99)

FILED WITH: ☐ DISK (CRF) ☐ FICHE ☐ CD-ROM
(Attached in pocket on right inside flap)

Formal Drawings (1 of 1)

(FACE)

PATENT APPLICATION



09732291

1c7113 U.S. PTO

09/732291



12/08/00

INITIALS

JAN 16 2014

CONTENTS

	Date Received (Incl. C. of M.) or Date Mailed		Date Received (Incl. C. of M.) or Date Mailed
1. Application <u>12</u> papers.		42.	
2. <u>IDS</u>	<u>12-8-00</u>	43.	
3. <u>Chre: Page 38</u>	<u>1/31/01</u>	44.	
4. <u>Primary Amend. A</u>	<u>2/14/01</u>	45.	
5. <u>rej 3 mos.</u>	<u>7/15/01</u>	46.	
6. <u>Ext. of time 2</u>	<u>12-05-01</u>	47.	
7. <u>Journal dump</u>	<u>12-05-01</u>	48.	
8. <u>IDS</u>	<u>12-05-01</u>	49.	
9. <u>IDS</u>	<u>12-05-01</u>	50.	
10. <u>AmDT B</u>	<u>12-05-01</u>	51.	
11. <u>Supp Amndt C</u>	<u>2-4-02</u>	52.	
12. <u>IDS</u>	<u>2-4-02</u>	53.	
13. <u>Notice of allowability</u>	<u>4/22/02</u>	54.	
14. <u>Request for RCE</u>	<u>6-4-02</u>	55.	
15. <u>IDS</u>	<u>4-16-02</u>	56.	
16. <u>IDS</u>	<u>6-4-02</u>	57.	
17. <u>Notice of allowability</u>	<u>6-28-02</u>	58.	
18. <u>Request for RCE</u>	<u>8-5-02</u>	59.	
19. <u>IDS</u>	<u>8-5-02</u>	60.	
20. <u>Petition w/d from Issue</u>	<u>8/5/02</u>	61.	
21. <u>IDS</u>	<u>9-4-02</u>	62.	
22. <u>suppl. the adm't E</u>	<u>9-24-02</u>	63.	
23. <u>Ex Amndt E</u>	<u>10-2-02</u>	64.	
24. <u>Misc letter</u>	<u>10-31-02</u>	65.	
25. <u>Interview Summary</u>	<u>12-3-02</u>	66.	
26. <u>QUERY</u>	<u>12-13-03</u>	67.	
27.		68.	
28.		69.	
29.		70.	
30.		71.	
31.		72.	
32.		73.	
33.		74.	
34.		75.	
35.		76.	
36.		77.	
37.		78.	
38.		79.	
39.		80.	
40.		81.	
41.		82.	

(LEFT OUTSIDE)

ISSUE SLIP STAPLE AREA (for additional cross references)

POSITION	INITIALS	ID NO.	DATE
FEE DETERMINATION			
O.I.P.E. CLASSIFIER			
FORMALITY REVIEW	YL	905	1/29/01
RESPONSE FORMALITY REVIEW	MT	523	02/01/01

INDEX OF CLAIMS

✓ Rejected
 = Allowed
 - (Through numeral)... Canceled
 + Restricted
 N Non-elected
 I Interference
 A Appeal
 O Objected

Claim	Final	Original	Date
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			

Claim	Final	Original	Date
51			
52			
53			
54			
55			
56			
57			
58			
59			
60			
61			
62			
63			
64			
65			
66			
67			
68			
69			
70			
71			
72			
73			
74			
75			
76			
77			
78			
79			
80			
81			
82			
83			
84			
85			
86			
87			
88			
89			
90			
91			
92			
93			
94			
95			
96			
97			
98			
99			
100			

Claim	Final	Original	Date
101			
102			
103			
104			
105			
106			
107			
108			
109			
110			
111			
112			
113			
114			
115			
116			
117			
118			
119			
120			
121			
122			
123			
124			
125			
126			
127			
128			
129			
130			
131			
132			
133			
134			
135			
136			
137			
138			
139			
140			
141			
142			
143			
144			
145			
146			
147			
148			
149			
150			

If more than 150 claims or 10 actions
staple additional sheet here

(LEFT INSIDE)

SEARCHED

Class	Sub.	Date	Exmr.
710	101-103 128, 62 63-65 72, 8-11 14-15	6/24/01	RP
345	58, 98-100 132, 204 132	6/26/01	RP
709	236, 237 249-250	6/27/01	RP
Updated searches		4/14/02	RP
Updated searches		9/20/02	RP

INTERFERENCE SEARCHED

Class	Sub.	Date	Exmr.
710	305, 62 64	4/18/02	RP
345	132	4/18/02	RP
345	99	4/18/02	RP
Updated searches		9/25/02	RP

SEARCH NOTES (INCLUDING SEARCH STRATEGY)

	Date	Exmr.
Consult w/ Ray Bayer	4/10/02	RP

(RIGHT OUTSIDE)



UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSION
UNITED STATES PATENT AND
TRADEMARK OFFICE

BI-DIRECTIONAL SHEET

Bib Data:et

CONFIRMATION

SERI. NUMBER 0632,291	FILING DATE 12/08/2000 RULE	CLASS XXX	GROUP ART UNIT 2181	ATTORNEY DOCKET NO. 520.32695CX4
--------------------------	---------------------------------------	--------------	------------------------	--

APPLICANTS

Ikuya Aii, Yokohama-shi, JAPAN;

Kouji Kiku, Yokohama-shi, JAPAN;

CONTINUING DATA

THIS APPLICATION IS A CON OF 09/265,363 03/10/1999 PAT 6,247,090
 WHICH IS A CON OF 08/833,346 04/04/1997 PAT 5,887,147
 WHICH IS A CON OF 08/598,903 02/09/1996 PAT 5,652,845
 WHICH IS A CON OF 08/190,848 02/03/1994 PAT 5,221,212

FOREIGN APPLICATIONS

JAPAN 52212 02/10/1993

IF REQD, FOREIGN FILING LICENSE GRANTED

** 01/29/2

Foreign Prior art 35 USC 119 conditions met	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> Met after Allowance	STATE OR COUNTRY JAPAN	SHEET'S DRAWING 12	TOTAL CLAIMS 35	INDEPENDENT CLAIMS 14
Verified and Acknowledged	Examiner's Signature Initials				

ADDRESS

020447

ANTHONY HERRY STOUT AND KRAUS

SUITE 1E

1300 NOVENTEENTH STREET

ARLINGTON

22209

TITLE

DISPLAY WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WITH COMPUTER

<input type="checkbox"/> All Fees
<input type="checkbox"/> Filing Fees (Filing)

PATENT APPLICATION SERIAL NO. 09-732291

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

12/12/2000 FFANAEIA 00000024 09732291

01 FC:101	710.00 OP
02 FC:102	880.00 OP
03 FC:103	270.00 OP

PTO-1556
(5/87)

*U.S. GPO: 2000-468-987/39595

Sub B8

10

TITLE OF THE INVENTION

~~INFORMATION OUTPUT SYSTEM~~

~~CROSS REFERENCE TO RELATED APPLICATION~~

~~This is a continuation of U.S. application Serial No.~~

5 09/265,363, filed March 10, 1999, which is a continuation of
U.S. application Serial No. 08/833,346, filed April 4, 1997,
now U.S. Patent No. 5,887,147, issued March 23, 1999, which is
a continuation of U.S. application Serial No. 08/598,903,
filed February 9, 1996, now U.S. Patent No. 5,652,845, issued
10 July 29, 1997, which is a continuation of U.S. application
Serial No. 08/190,848, filed February 3, 1994, now abandoned,
the subject matter of which is incorporated by reference
herein.

BACKGROUND OF THE INVENTION

15 The present invention relates to an information output
system or display apparatus including a computer and an
information output device such as a display device or a
printer as a computer terminal and more particularly to an
information output system or display apparatus for performing
20 various types of control such as the information output method
and allowing or not allowing of information output from the
computer connected to the above information output device via
a communication interface.

In current display devices as computer terminals, a wide
25 variety of display positions and sizes on the screen and video

signal frequencies to be displayed are used depending on video signals to be inputted. Therefore, a display or a so-called multi-scan display has been used so that a display device can handle various video signals.

5 A microcomputer or a memory LSI is used to provide a most suitable display image for each video signal as this type of display device. Such a prior art is indicated in Japanese Patent Application Laid-Open No. 1-321475.

10 According to this prior art, the microcomputer controls the memory which stores information of the display position and size on the screen for each video signal beforehand and reads the information of the most suitable display position and size on the screen depending on the input video signal from the memory. The microcomputer outputs a control signal on
15 the basis of the read information. This control signal is applied to the deflection circuit as a control voltage or control current through a D-A converter so as to control the voltage or current at a predetermined part of the deflection circuit. By doing this, the display size and position of the
20 display device can be adjusted. When a video signal inputted to the display device is not a known signal, no corresponding information is kept in the above memory. Therefore, the switch mounted on the front of the display device is operated so as to input the adjustment information of the display position
25 and size on the screen. The control circuit of the above

microcomputer creates deflection control information on the basis of the above input information and adjusts the display position and size.

According to the aforementioned prior art, the display device obtains a most suitable screen display according to the input video signal. However, according to another prior art, the computer controls and changes the display status. Such a prior art is indicated in Japanese Patent Application Laid-Open No. 61-84688. According to this prior art, a discrimination pulse is superimposed at the blanking interval of a video signal outputted from the computer and the deflection frequency of the display device is changed on the basis of this discrimination pulse.

According to the former prior art among the aforementioned prior arts, the control of the display position and size on the screen is managed by the display device. Therefore, when adjustment is required or requested from the user of display device, it is necessary to perform manual adjustment using the adjustment switch of the display device each time and it is rather troublesome to operate the system.

According to the latter prior art among the aforementioned prior arts, the control can be operated by the computer. However, since the operation is such that the deflection frequency is simply changed on the basis of the discrimination pulse superimposed on the video signal, an

image cannot be adjusted to the display image (display position and size) which is required by a user of the computer. Namely, there is a problem imposed that the status which is simply desired by the user cannot be obtained.

5 Furthermore, no consideration is given to prevention of display (indication) of careless images (information) and restraining of unnecessary power consumption. Even if the discrimination pulse is superimposed at the blanking interval of the video signal, the video blanking level is generally
10 shallow in the case of the display device, so that the discrimination pulse is displayed. Furthermore, the control is applied only in one direction from the computer to the display device and no information is sent in the reverse direction, so
15 that there is another problem imposed that a malfunction cannot be avoided.

SUMMARY OF THE INVENTION

An object of the present invention is to provide an information output system wherein a computer can exercise various types of control of an information output device such
20 as a display device. Another object of the present invention is to provide an information output system for maintaining secrecy of information and for restraining power consumption. A further object of the present invention is to provide an information output system for informing the computer of the
25 operation status of the information output device so as to

allow easy maintenance.

To accomplish the above objects, according to the present invention, in an information output system consisting of at least a computer and an information output device, the
5 computer is equipped with a first communication means and the information output device is equipped with a second communication means. Furthermore, a control processing means and a memory means for storing the identification number of the computer beforehand are added to the information output
10 device, or a memory means for storing the identification number of the information output device beforehand is mounted in the computer in addition to the first communication means. The above second communication means has a plurality of communication interfaces. Furthermore, a detection means for
15 detecting the internal operation status and a control processing means for judging the detection result are added to the information output device and an audio output means for outputting the operation status in voice is added to the computer. A second display means for displaying the operation
20 status is mounted in the information output device. Or, a display means for displaying the operation status of the information output device is mounted in the computer.

The first communication means in the computer controls communication with the information output device and the
25 second communication means in the information output device

controls communication with the computer. The control
processing means operates and generates control signals for
exercising various types of control for the information output
device on the basis of control instructions from the second
5 communication means and compares the identification number of
the computer stored in the memory means with the
identification number sent from the computer via the first and
second communication means. When a comparison result match
occurs, the control processing means controls a predetermined
10 part in the information output device.

In the memory means mounted in the computer, the
identification number for identifying the information output
device is stored beforehand. When the identification number
which is sent from the information output device via the
15 second and first communication means matches with the
identification number which is stored in the memory means
beforehand, the computer communicates with the information
output device.

When no comparison result match occurs, the above control
20 processing means controls so that information which is sent
from the computer to the information output device is not
normally outputted from the information output device. By
doing this, information of a computer user will not be
indicated carelessly.

25 When the second communication means has a plurality of

communication interfaces, it can communicate with another plurality of information output devices and the computer and in the state that a plurality of similar information output devices are connected to the computer, it can exercise various types of control for the information output devices and can inform the computer of the status of each information output device.

The detection means detects the internal operation status of the information output device and the control processing means judges the detection result. The audio output means indicates the operation status of the information output device in voice on the basis of the judgment result which is sent from the information output device to the computer via the second and first communication means. Furthermore, the display means mounted in the information output device displays the above operation status. The display means mounted in the computer performs the same operation as that of the display means mounted in the information output device. In this case, information which is sent to the computer via the second and first communication means is used as display information.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing the first embodiment of the present invention.

Fig. 2 is a memory map showing the contents of the memory

8

in the display device shown in Fig. 1.

Fig. 3 is a flow chart showing the operation of the essential section shown in Fig. 1.

Fig. 4 is a block diagram showing the second embodiment
5 of the present invention.

Fig. 5 is a block diagram showing the third embodiment of the present invention.

Fig. 6 is a block diagram showing the internal structure of the display device 6B shown in Fig. 5.

10 00722204-1000000
Fig. 7 is a block diagram showing the fourth embodiment of the present invention.

Fig. 8 is a flow chart showing the operation outline shown in Fig. 7.

15 Fig. 9 is a block diagram showing the fifth embodiment of the present invention.

Fig. 10 is a block diagram showing the sixth embodiment of the present invention.

Fig. 11 is a block diagram showing the seventh embodiment of the present invention.

20 Fig. 12 is a block diagram showing the eighth embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The embodiments of the present invention will be explained with reference to the accompanying drawings
25 hereunder.

Fig. 1 is a block diagram showing the first embodiment of the present invention. In the drawing, a section 1 enclosed by a chained line indicates a computer. In the section 1, a reference numeral 2 indicates a CPU (central processing unit), 3 a display controller for generating various signals for video display, 4 a memory, and 5 a communication controller for communicating with peripheral devices. In addition, a magnetic recording unit is mounted as a data storage device which is not shown in the drawing.

10 A section 6 enclosed by another chained line indicates a so-called multi-scan display device which can be applied to various video signal specifications. In the section 6, a reference numeral 7 indicates a microcomputer for controlling display of the display device 6, 8 a second communication controller for communicating with the above communication
15 controller 5, 9 a second memory, 10 a general deflection circuit of the display device, 11 a video circuit of the display device, 12 a horizontal deflection yoke, 13 a vertical deflection yoke, and 14 a color cathode-ray tube (hereinafter
20 called a CDT (color display tube)) for displaying color images.

The operation shown in Fig. 1 is as shown below. The computer 1 has a structure which is the same as the general structure of a conventional personal computer or work station
25 and the communication controller 5 controls a communication

interface such as RS-232C which is installed in the standard type. When a control instruction of the display device 6 is inputted firstly by a user of the computer from a general keyboard which is not shown in the drawing of the computer 1, it is coded digitally by a keyboard controller which is neither shown in the drawing and CPU 2 identifies the instruction and controls the communication controller 5. The communication controller 5 sends the control instruction of the display device to the display device 6. When a control instruction of the display device 6 which is included in the software for allowing the computer 1 to operate is read from the external storage device such as a floppy disk drive or hard disk drive which is not shown in the drawing, CPU 2 identifies the instruction and controls the communication controller 5. The communication controller 5 also sends the control instruction of the display device to the display device 6.

Next, the display device 6 sends the control instruction from the computer 1 which is received by the communication controller 8 to the microcomputer 7. The microcomputer 7 identifies this control instruction and generates control signals to the relevant portions to be adjusted in the deflection circuit 10 or video circuit 11. The aforementioned deflection circuit 10 and video circuit 11 can be adjusted in the same way as with a conventional multiscan display and the

adjustment means has a structure which is the same as that of
a conventional multiscan display. By doing this, the display
size and position, brightness, contrast, and hue of images
displayed on the CDT 14 are made most suitable to a user of
5 the computer system.

Furthermore, WYSIWYG (what you see is what you get)
control which makes an image displayed on the display device 6
similar to print output of an output device other than the
display, for example, a printer can be realized only by
10 sending a control instruction for changing the display
position and size to the display device 6 instead of operating
and generating display data by the computer 1. The interface
part of the above display device 6 such as the communication
control terminal is mounted on the back or side of the display
15 device from a viewpoint of easy connection to the computer 1
and appearance.

Furthermore, the aforementioned communication function is
used for adjustment at a factory. In this case, necessary
information is all written into the memory 9 in the display
20 device 6. Fig. 2 is a memory map showing the contents of the
memory 9 in the display device 6. For adjustment at factory,
data to be written can be all set. In a case other than
factory adjustment, namely, for adjustment in a system as
shown in Fig. 1, to prevent data requiring no rewriting,
25 namely, preset values at factory such as, for example, the

number of all data or the data within the corresponding frequency range from being erased by mistake or rewritten, the computer 1 sends the ID number and the microcomputer 7 in the display device 6 checks the ID number with the registered ID number stored in the memory 9.

A flow chart of this check is shown in Fig. 3. As shown in the drawing, when the computer 1 and display device 6 are turned on at Step 1, each device is initialized at Step 2. Concretely, CPU 2 and the microcomputer 7 read the starting system software and put the peripheral circuit to be connected to the CPU into the active state so that the next operation can be performed. Then, at Step 3, the microcomputer 7 in the display device 6 waits for sending of the identification number assigned to the computer 1, that is, the so-called ID number from the computer 1. Next, at Step 4, the microcomputer 7 receives the ID number which is sent from the computer 1 and checks whether the received ID number is registered in the registered ID number list which is stored in the memory 9 in the display device 6.

When it is registered, at Step 5, the computer 1 is allowed to control the display device 6 by external control instructions so that the user control of the display size, position, brightness, and contrast can be performed by control instructions sent from the computer 1 thereafter. On the other hand, when the received ID number is not registered in the

memory 9, at Step 6, the display device 6 is not allowed to be controlled by external control instructions thereafter.

Therefore, even if any control instruction is sent from the computer 1, the display device 6 will not accept it.

5 Or, at Step 5, the computer 1 may be allowed to perform all the adjustments which can be performed by the display device 6, that is, the same control as that for adjustment at factory and at Step 6, a part of the control of the display device 6 such as display control may be allowed.

10 By doing this, the display device 6 can be prevented from careless control.

15 The above is an example that an ID number is sent to the display device 6 from the computer 1. However, needless to say, the reverse case of the above is possible. Namely, an ID number is sent to the computer 1 from the display device 6 so that the computer 1 identifies that the display device 6 having a communication function is connected and the computer 1 compares the ID number with the ID number registered in the computer 1. When the corresponding ID number is registered, 20 the computer 1 controls the display device 6 by a predetermined control instruction. When it is not registered, the computer 1 judges that it cannot control the display device 6 and will not control the display device 6.

By doing this, the computer 1 communicates with a 25 specific display device 6 and can exercise control such as

changing the color temperature of an image displayed on the display device 6 or changing the display size depending on the application software.

According to this embodiment, RS-232C is used as a communication interface. However, a general-purpose interface such as RS-422, RS-423, SCSI or GP-IB, or network interface may be used. Furthermore, the embodiment may be applied to an interface using optical signals instead of electric signals. The above interface may be installed in the neighborhood of the rear cabinet or lower pedestal of the display device 6 for convenience of a user.

Fig. 4 is a block diagram showing the second embodiment of the present invention. According to this embodiment, when the ID number sent from the computer to the display device is not registered in the memory 9, another operation which is different from the operation shown in the first embodiment is performed. Namely, according to this embodiment, when the ID numbers do not match with each other, nothing is displayed on the display device so as to enhance the secrecy of information.

Next, the structure of Fig. 4 will be explained. In the drawing, a reference numeral 6A indicates another display device which is different from the display device 6 shown in Fig. 1, 15 a horizontal deflection circuit, 16 a vertical deflection circuit, 17 a synchronizing signal processing

circuit, 18 a horizontal phase control circuit, 19 a horizontal oscillating circuit, 20 a horizontal driving circuit, 21 a horizontal deflection output circuit, 22 a video pre-amplifier circuit, 23 a video blanking circuit, and 24 a video output circuit. The other reference numerals which are the same as those shown in Fig. 1 indicate the same functions. The video circuit 11 is a general video circuit consisting of the video pre-amplifier circuit 22, video blanking circuit 23, and video output circuit 24. The horizontal deflection circuit 15 is a general deflection circuit consisting of the synchronizing signal processing circuit 17, horizontal phase control circuit 18, horizontal oscillating circuit 19, horizontal driving circuit 20, and horizontal deflection output circuit 21. The vertical deflection circuit 16 is also a general circuit which has a structure similar to that of the horizontal deflection circuit 15.

Next, the operation shown in Fig. 4 will be explained. In the drawing, an ID number sent from the computer 1 is inputted into the microcomputer 7 via the communication controller 8. The microcomputer 7 checks the above ID number with the ID number stored in the memory 9. When the ID number stored in the memory 9 matches with the ID number sent from the computer 1, the microcomputer 7 receives the control from the computer 1.

On the other hand, when the check results do not match,

with each other, the microcomputer 7 controls the horizontal oscillating circuit 19, fixes the oscillation frequency to a predetermined value, and allows the display device 6A to perform a horizontal deflection operation at a value different from the horizontal frequencies of the video signal and synchronizing signal which are sent from the computer. Therefore, the image displayed on the CDT 14 is not synchronized horizontally in this case and the screen content cannot be judged. When the vertical deflection circuit 16 is controlled in the same way, the image displayed on the CDT 14 is not synchronized vertically on the screen. By controlling the video blanking circuit 23 of the video circuit 11, the video display period may be blanked so that no image is displayed on the CDT 14.

By using the aforementioned methods independently or combined, only when a user of the computer system enters a predetermined ID number from the keyboard, it is displayed correctly on the display device 6A and information displayed on the CDT 14 can be prevented from careless indication.

Fig. 5 is a block diagram of the third embodiment of the present invention. According to this embodiment, the display device is provided with a plurality of communication functions and a plurality of display devices can be connected with the communication interface. In the drawing, reference numerals 6B, 6C, and 6D indicate display devices having the same

structure, V1, V2, and V3 lines for video signals and
synchronizing signals, C1, C2, and C3 communication lines for,
for example, RS-232C, and 1 the aforementioned computer. Each
of the display devices 6B, 6C, and 6D has a plurality of video
5 signal I/O terminals and communication interface I/O terminals
and a registered ID number. According to this embodiment, as
shown in Fig. 5, 1 is assigned to the display device 6B as an
ID number, 2 to the display device 6C as an ID number, and 3
to the display device 6D as an ID number.

10 Next, the operation shown in Fig. 5 will be explained. In
the drawing, for example, when controlling the display device
6B from the computer 1, the ID number 1 is sent to the line C1
and the display device 6B is controlled appropriately from the
computer 1. Next, when controlling the display device 6C, the
15 ID number 2 is sent from the computer 1 in the same way. Then,
the ID number is received by the display device 6C via the
lines C1 and C2 and the display device 6C can be controlled
appropriately from the computer 1.

20 Since a plurality of display devices can be controlled by
a computer in this way, a plurality of display devices can be
adjusted at a time, for example, at the time of delivery
adjustment at a factory. Furthermore, by using a multi-display
system for displaying an image by assembling a plurality of
display devices and for displaying various images on each
25 screen, the display devices can be hued and adjusted in

brightness simply.

Fig. 6 is a block diagram showing the internal structure of the display device 6B shown in Fig. 5. In the drawing, a reference numeral 25 indicates a communication controller having two communication ports and 26 a divider of video signals and synchronizing signals. The communication controller 25 sends or receives data to or from the computer 1 in the same way as the communication controller 8 of the display device 6 shown in Fig. 1 and also divides the communication lines and relays other display devices. On the other hand, the divider 26 divides video signals or synchronizing signals sent from the computer 1 or signal source to other display devices. By using such a structure, a plurality of display devices can be connected to a computer as shown in Fig. 5.

Next, the fourth embodiment of the present invention will be described. Fig. 7 is a block diagram showing the fourth embodiment of the present invention. In the drawing, a reference numeral 1B indicates a computer, 31 an audio control circuit for producing a sound, 32 a speaker, 6E a display device, 27 and 28 analog-digital converters (hereinafter abbreviated to ADC), and 29 and 30 digital-analog converters (hereinafter abbreviated to DAC). The other reference numerals which are the same as those shown in Fig. 1 indicate the same functions. The operation of Fig. 7 will be explained hereunder

with reference to the operation flow chart shown in Fig. 8.

When the computer 1B and display device 6E are started at Step 10 as shown in Fig. 8, they start communication with each other via the communication controllers 5 and 8 at Step 11 next. Then, at Step 12, the computer 1B calls the display device 6E. When no response is received, the computer 1B judges that the display device 6E is faulty, starts the audio control circuit 31 at Step 13, and informs the user of the computer 1B that the display device 6E is faulty from the speaker.

When the communication succeeds, at Step 14, the microcomputer 7 fetches information of the operation status of the deflection circuit 10 or video circuit 11 in the display device 6E from the voltage at a predetermined part in the circuit as digital information via the ADCs 27 and 28. Next, at Step 15, the microcomputer 7 judges whether the value which is fetched at Step 14 is a value in the normal operation status. When the microcomputer 7 judges it as an error, it informs the computer 1B of the faulty value via the communication controller 8 and CPU 2 of the computer 1B allows the audio control circuit 31 to operate and generates a message informing an error of the display device 6E from the speaker 32. Furthermore, CPU 2 allows the display controller 3 to operate and displays also a message informing an error on the CDT 14 via the video circuit 11.

In this case, when an indication code informing the faulty part is sent to the computer 1B from the display device 6E simultaneously, the computer 1B judges the indication code and can inform the user or a customer engineer of the display device 6E of the faulty part by sound or display.

When the display device 6E is normal at Step 15, the computer 1B can exercise the communication control such as the display size, hue, and brightness of the display device 6E at Step 17. At this step, when a control instruction is sent to the display device 6E from the computer 1B, the microcomputer 7 decodes the instruction and outputs the control code to the corresponding DAC 29 or 30. The DAC 29 or 30 controls a predetermined control part at the DC control voltage corresponding to the above control code and controls the display size, position, and hue of the image displayed on the CDT 14. When the above series of operations ends, the computer 1B returns to Step 14 and repeats the operations from the monitor mode of a faulty operation of the display device 6E to the normal operation at Step 17.

As mentioned above, the computer 1B can be informed of a faulty operation by using the communication function of the display device 6E. Therefore, the user can judge the faulty part and can maintain the system easily.

Fig. 9 is a block diagram showing the fifth embodiment of the present invention. This embodiment obtains the same effect

as that of the embodiment shown in Fig. 7. In Fig. 9, a reference numeral 6F indicates a display device, 33 a liquid crystal display controller in the display device 6F, and 34 a liquid crystal display panel mounted in the display device 6F.

5 The other reference numerals which are the same as those shown in Figs. 1 and 7 indicate the same functions.

The operation shown in Fig. 9 is basically the same as that shown in Fig. 7. The operation of the deflection circuit 10 or video circuit 11 is monitored by the microcomputer 7 via the ADC 27 or 28. When an error occurs, the microcomputer 7 transmits an indication code informing the occurrence of an error to the computer 1B via the communication line and informs the user of it by voice from the speaker 32.

15 Furthermore, the microcomputer 7 allows the liquid crystal display controller 33 in the display device 6F to operate and displays information of the occurrence of the fault and faulty part on the liquid crystal display panel 34. By doing this, information when an error occurs in the display device 6F can be obtained more surely.

20 Fig. 10 is a block diagram showing the sixth embodiment of the present invention. This embodiment obtains the same effect as that of the embodiment shown in Fig. 9. In Fig. 10, a reference numeral 1C indicates a computer and 35 a liquid crystal display controller in the computer 1C. The other
25 reference numerals which are the same as those shown in Figs.

1 and 9 indicate the same functions. In Fig. 10, the display function for a fault and faulty operation of the display device shown in Fig. 9 is mounted in the computer 1C.

Namely, when an error occurs in the internal circuit of the display device 6E, the voltage detected by the ADC 27 or 28 is digitized and processed by the microcomputer 7 as faulty voltage occurrence information and information informing an error is transmitted to the computer 1C via the communication controller 8. In the computer 1C, CPU 2 decodes the transmitted faulty information. When CPU 2 identifies the faulty part of the display device 6E, it allows the audio control circuit 31 to operate as an audio signal and informs the user of the fault by an audio message from the speaker 32 on one hand. On the other hand, CPU 2 controls the liquid crystal display controller 35 so as to display characters or graphics on the liquid crystal display panel 34. By doing this, the user of the display device 6E can be informed of an error or fault of the display device 6E and can maintain the system easily.

Fig. 11 is a block diagram showing the seventh embodiment of the present invention. In the drawing, a reference numeral 36 indicates a power supply of the deflection circuit 10 and video circuit 11. The other reference numerals which are the same as those shown in Fig. 1 indicate the same functions.

Next, the operation shown in Fig. 11 will be explained.

In Fig. 11, when a control instruction to the display device 6 is issued from CPU 2 of the computer 1, the communication controller 5 changes the control instruction to a one in the signal format suited to communication and sends it to the display device 6. The display device 6 returns the signal received by the communication controller 8 to the control instruction which can be identified by the microcomputer 7 and sends it to the microcomputer 7. The microcomputer 7 judges the control instruction and decides the part of a predetermined section in the display device 6 to be controlled.

When the control instruction relates to control of the power supply 36 and is an instruction for stopping power supply from the power supply 36 to the deflection circuit 10, or video circuit 11, or both circuits, the microcomputer 7 controls the power supply 36 so as to stop the above power supply. Therefore, the image display on the CDT 14 is also stopped.

By doing this, for example, when the computer 1 is not in operation for a predetermined period, the operation power supply for the display device 6 can be automatically put into the off state. Therefore, unnecessary power consumption can be restrained and the life span of the display device can be lengthened. The aforementioned is power supply off control. However, needless to say, power supply on control is also

possible. Namely, in this case, when the computer 1 is turned on or the computer 1 is changed from the function stop state to the active state, the microcomputer 7, power supply 36, deflection circuit 10, and video circuit 11 perform the reverse operation of the aforementioned so that the display device automatically starts to display.

Fig. 12 is a block diagram showing the eighth embodiment of the present invention. In the drawing, a reference numeral 37 indicates a display controller and the other numerals which are the same as those shown in Fig. 1 indicate units performing the same functions as those shown in Fig. 1.

Next, the operation of Fig. 12 will be explained. In Fig. 12, video information is sent to the display device 6 from the communication controller 5 in addition to a control instruction of the display device 6 which is explained in the embodiment shown in Fig. 1. This video information is a digital signal in the same way as a signal which is inputted to the display controller 3 in the embodiment shown in Fig. 1. The communication controller 8 of the display device 6 sends video information among the received signals to the display controller 37. The display controller 37 performs an operation which is the same as that of the display controller shown in Fig. 1 and generates a video signal to be inputted to a general display. By doing this, also in the embodiment shown in Fig. 12, an effect which is the same as that shown in Fig.

1 can be obtained. Furthermore, in Fig. 12, since video information is transmitted via a communication interface which is connected between the computer 1 and display device 6, a video signal line which is conventionally necessary is not
5 necessary.

According to the present invention, a user of a computer can exercise various types of control for an information output device such as a display device from the keyboard of the computer or by the software incorporated in the computer.
10 Therefore, the operability of the computer system is improved so that the system can be used easily and the user can obtain a desired information output status easily.

When an identification number is set to each device, a value which is set by the above control will not be lost by a careless operation of a user. By setting an identification
15 number for a specific user, the secret of information can be protected inversely. Since the power supply for the information output device can be controlled by the computer when necessary, unnecessary power consumption can be
20 restrained.

Since the status of the information output device can be monitored simply, the system can be protected against a malfunction and maintained easily. Furthermore, the
aforementioned control hardware can be realized in a minimum
25 structure.

WHAT IS CLAIMED IS:

Ant B3

1. A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

comparing means for comparing a first identification information which is previously stored in said display unit. and a second identification information which is previously stored in said computer and is sent from said computer; and,

10 a communication prohibition means for prohibiting communication between said computer with respect to display control of said display unit, when said first and second identification information do not match as a result of the comparison by said comparing means.

15 2. A display unit according to claim 1, wherein said first and second identification information include an identification number.

20 3. A display unit according to claim 1, wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

Ant B4

4. A display unit having a communication control circuit for communicating with an externally connected

sub B4

computer, wherein said communication control circuit comprises:

comparing means for comparing a first identification information which is previously stored in said display unit, and a second identification information which is previously stored in said computer and is sent from said computer; and a reception prohibition means for prohibiting reception of a control command from said computer, for controlling at least one of a display size, a display position, a brightness, and a contrast of said display unit, when said first and second identification information do not match as a result of the comparison by said comparing means.

10
00732201.120000
15

4. A display unit according to claim 3, wherein said first and second identification information include an identification number.

6. A display unit according to claim 4, wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

sub B5

7. A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

24

Sub B5

memory means for storing at least data of a frequency range to which said display unit is operable;

comparing means for comparing a first identification information which is previously stored in said display unit, and a second identification information which is previously stored in said computer and is sent from said computer; and

a communication permission means for permitting communication between said computer, at least with respect to said data of a frequency range stored in said memory means, when said first and second identification information match as a result of the comparison by said comparing means.

9. A display unit according to claim 5, wherein said first identification information is stored in said memory means.

10. A display unit according to claim 5, wherein said data relating at least to a display specification of said display unit stored in said memory means, includes data of a frequency range to which said display unit is operable.

11. A display unit according to claim 5, wherein said first and second identification information include an identification number.

29

11. A display unit according to claim 7, wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

5 12. A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

memory means for storing at least data of a frequency range for which said display unit is operable;

10 comparing means for comparing a first identification information which is previously stored in said display unit in advance, and a second identification information which is previously stored in said computer and is sent from said computer; and

15 a communication prohibition means for prohibiting communication between said computer, at least with respect to said data of a frequency range stored in said memory means, when said first and second identification information do not match as a result of the comparison by said comparing means.

20 ¹⁰12. A display unit according to claim ⁹12, wherein the control of said memory means includes rewriting or writing control of said data in said memory means.

0033221-120800

¹¹
~~14~~. A display unit according to claim ⁹~~12~~, wherein said first identification information is stored in said memory means.

¹²
~~15~~. A display unit according to claim ⁹~~12~~, wherein said data relating at least to a display specification of said display unit stored in said memory means, includes data of a frequency range to which said display unit is operable.

¹³
~~16~~. A display unit according to claim ⁹~~12~~, wherein said first and second identification information include an identification number.

~~17. A display unit according to claim 12, wherein said communication control circuit enables bi-directional communication with said display unit and said computer.~~

¹⁴
~~18~~. A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

comparing means for comparing a first identification information which is previously stored in said display unit, and a second identification information which is previously stored in said computer and is sent from said computer; and

a communication permission means for enabling display control by said computer and permitting communication between said computer and said display unit with respect to display control of said display unit, when said first and second
5 identification information match as a result of the comparison by said comparing means,

wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

10 ¹⁵
~~15~~. A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

15 comparing means for comparing a first identification information which is previously stored in said display unit, and a second identification information which is previously stored in said computer and is sent from said computer; and

a reception permission means for enabling control of a display size/position of said display unit by said computer
20 and permitting reception of a control command from said computer for controlling at least the display size/position of said display unit, when said first and second identification information match as a result of the comparison by said comparing means,

wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

16
20. A display unit for displaying an image based upon a
5 digital image information signal, inputting said digital image
information signal from an externally connected computer,
comprising:

comparing means for comparing a first identification information which is previously stored in said display unit, and a second identification information which is previously stored in said computer and is sent from said computer; and a communication permission means for enabling display control by said computer and permitting communication between said computer and said display unit with respect to display control of said display unit, when said first and second identification information match as a result of the comparison by said comparing means,

20 further comprising a communication controller which enables bi-directional communication with said display unit and said computer.

17
21. A display unit for displaying an image based upon a digital image information signal, inputting said digital image information signal from an externally connected computer,

comprising:

comparing means for comparing a first identification information which is previously stored in said display unit, and a second identification information which is previously stored in said computer and is sent from said computer; and

5 a communication prohibition means for disabling control of said memory means by said computer and prohibiting communication between said computer and said memory means of said display unit, when said first and second identification information do not match as a result of the comparison by said comparing means,

10 further comprising a communication controller which enables bi-directional communication with said display unit and said computer.

15 ¹⁸ 22. A display unit for displaying an image based upon an image signal inputted from an externally connected computer, comprising:

memory means for storing an identification number for making said computer recognize that said display unit is communicatable with said computer; and

20 a communication ^{controller} ~~control~~ means for sending said identification number stored in said memory means to said computer,

wherein said communication ^{controller} ~~control~~ means enables bi-

directional communication with said display unit and said computer.

Sub F-1 19
23. ~~A display unit for displaying an image based upon an~~
image signal inputted from an externally connected computer,
5 comprising:

memory means for storing an identification number for making said computer recognize that said display unit is communicatable with said computer; and

00732291-120800
10 a communication control means for sending said identification number stored in said memory means to said computer in response to power on of at least one said display unit and said computer,

15 wherein said communication control means enables bi-directional communication with said display unit and said computer.

20 24. A display unit for displaying an image based upon an image signal inputted from an externally connected computer, comprising:

a memory which stores an identification number for making said computer recognize that said display unit is communicatable with said computer; and

a communication controller connected to said memory which sends said identification number stored in said memory to said

computer,

wherein said communication controller enables bi-directional communication with said display unit and said computer.

5

²¹₂₅. A display unit for displaying an image based upon an image signal inputted from an externally connected computer, comprising:

a memory which stores an identification number for making said computer recognize that said display unit is communicatable with said computer; and

10

a communication controller which sends said identification number stored in said memory to said computer in response to power on of at least one of said display unit and said computer,

15

wherein said communication controller enables bi-directional communication with said display unit and said computer.

20

²²₂₆. A method of communicating between a display unit and a video source from which video signals are sent to the display unit for display, the method comprising the steps of:

communicating display unit information stored in a memory of the display unit from the display unit to the video source, wherein said display unit information includes an

36

identification number for uniquely identifying the display unit; and

sending a signal from the video source to the display unit, wherein said signal is generated based on the display unit information,

wherein information is bi-directionally communicated with the video source and the display unit.

27. A display unit comprising:

a processor adapted to control display of the display unit; and

a communication controller capable of bi-directionally communicating with a video source;

wherein the communication controller communicates information received from the video source to the processor.

28. A display unit according to claim 27, further comprising a video circuit adapted to display video signals sent by the video source, wherein the processor generates control signals for the video circuit.

29. A display unit according to claim 28, further comprising a memory in which at least display unit information is stored.

30. A display unit according to claim 29, wherein the communication controller communicates the display unit information to the video source, and the display unit receives a signal from the video source that is generated based on the display unit information.

31. A display unit according to claim 30, wherein the video source is a computer.

32. A display unit according to claim 27, further comprising a deflection circuit, wherein the processor generates control signals for the deflection circuit.

33. A display unit according to claim 32, further comprising a memory in which at least display unit information is stored.

34. A display unit according to claim 33, wherein the communication controller communicates the display unit information to the video source, and the display unit receives a signal from the video source that is generated based on the display unit information.

35. A display unit according to claim 34, wherein the video source is a computer.

ADD BT

ADD DI

COMBINED DECLARATION AND POWER OF ATTORNEY
(宣誓書及び委任状)

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name, I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

INFORMATION OUTPUT SYSTEM

the specification of which: (check one) ☒ is attached hereto.

☐ was filed on _____
as Application Serial No. _____
and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)	Priority Claimed
<div style="display: flex; justify-content: space-between;"> <div>5-022212 (Number)</div> <div>Japan (Country)</div> <div>10/Feb./1993 (Day/Month/Year Filed)</div> </div>	<div style="display: flex; justify-content: space-around;"> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No </div>
<div style="display: flex; justify-content: space-between;"> <div>_____ (Number)</div> <div>_____ (Country)</div> <div>_____ (Day/Month/Year Filed)</div> </div>	<div style="display: flex; justify-content: space-around;"> <input type="checkbox"/> Yes <input type="checkbox"/> No </div>
<div style="display: flex; justify-content: space-between;"> <div>_____ (Number)</div> <div>_____ (Country)</div> <div>_____ (Day/Month/Year Filed)</div> </div>	<div style="display: flex; justify-content: space-around;"> <input type="checkbox"/> Yes <input type="checkbox"/> No </div>

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.) _____	(Filing Date) _____	(Status) (patented, pending, abandoned)
(Application Serial No.) _____	(Filing Date) _____	(Status) (patented, pending, abandoned)

(Continued on Page 2)

I hereby appoint as principal attorneys; Donald R. Antonelli, Reg. No. 20,296; David T. Terry, Reg. No. 20,178; Melvin Kraus, Reg. No. 22,466; Stanley A. Wal, Reg. No. 26,432; William I. Solomon, Reg. No. 28,565; Gregory E. Montone, Reg. No. 28,141; Ronald J. Shore, Reg. No. 28,577; Donald E. Stout, Reg. No. 26,422; Alan E. Schiavelli, Reg. No. 32,087 and James N. Dresser, Reg. No. 22,973 to prosecute and transact all business connected with this application and any related United States application and international applications. Please direct all communications to the following address:

Antonelli, Terry, Stout & Kraus
Suite 600
1919 Pennsylvania Avenue, N.W.
Washington, D.C. 20006
Telephone: (202) 828-0300

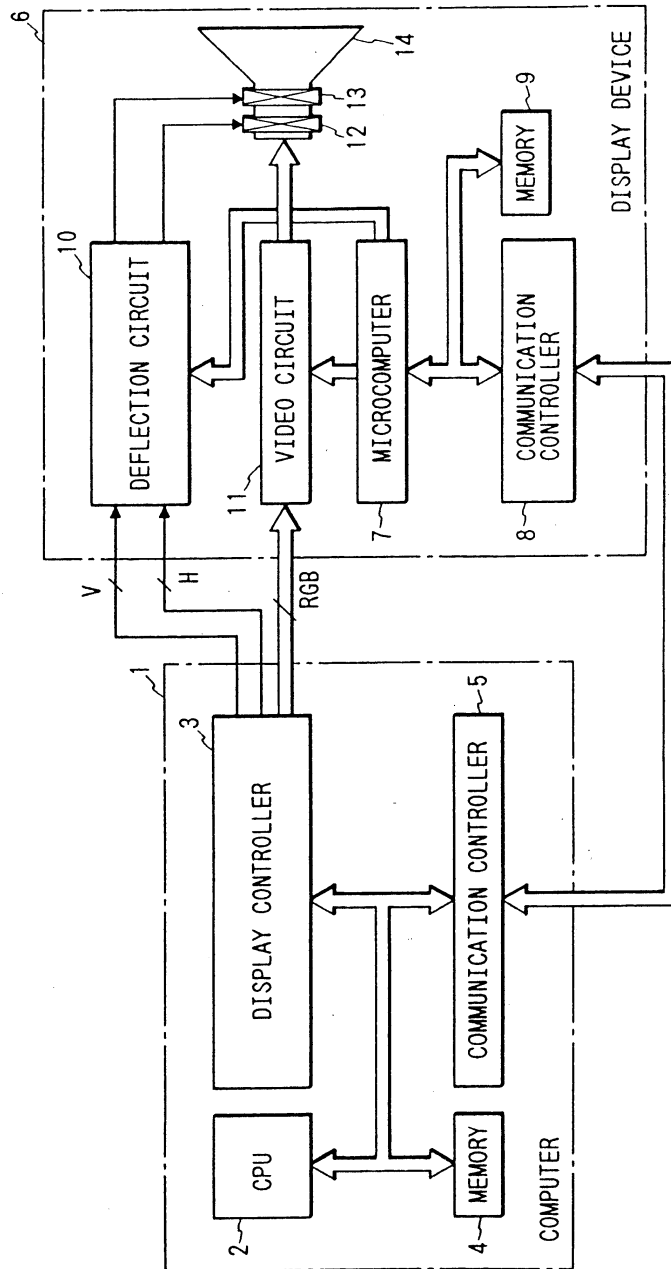
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

宣誓日	発明者フルネームサイン	氏名タイプ欄
Date <u>January 20, 1994</u>	Inventor <u>Ikuya Arai</u>	Ikuya Arai
Residence <u>Yokohama-shi, Japan</u>		Citizenship <u>Japan</u>
Post Office Address <u>#101, Gaadenbira-yokoi, 3-20-31, Shinohara-higashi, Kouhoku-ku, Yokohama-shi, Kanagawa-ken 222, Japan</u>		
Date <u>January 20, 1994</u>	Inventor <u>Kouji Kitou</u>	Kouji Kitou
Residence <u>Yokohama-shi, Japan</u>		Citizenship <u>Japan</u>
Post Office Address <u>#405, Sezaaru-kamioooka, 6-7, Higashi-serigaya, Kounan-ku, Yokohama-shi, Kanagawa-ken 223, Japan</u>		
Date _____	Inventor _____	
Residence _____		Citizenship _____
Post Office Address _____		
Date _____	Inventor _____	
Residence _____		Citizenship _____
Post Office Address _____		
Date _____	Inventor _____	
Residence _____		Citizenship _____
Post Office Address _____		
Date _____	Inventor _____	
Residence _____		Citizenship _____
Post Office Address _____		

210
29

000007 10000000

FIG. 1



0073294 100000

FIG. 2

ADDRESS 1	NUMBER OF DATA SET	REGISTERED ID NUMBERS
ADDRESS 2	DATA AREA 1 FOR DELIVERY ADJUSTMENT	
ADDRESS 3	DATA AREA 2 FOR DELIVERY ADJUSTMENT	
⋮	⋮	
ADDRESS i	ADJUSTMENT DATA AREA 1 FOR USER	
ADDRESS i+1	ADJUSTMENT DATA AREA 2 FOR USER	
⋮	⋮	

FIG. 3

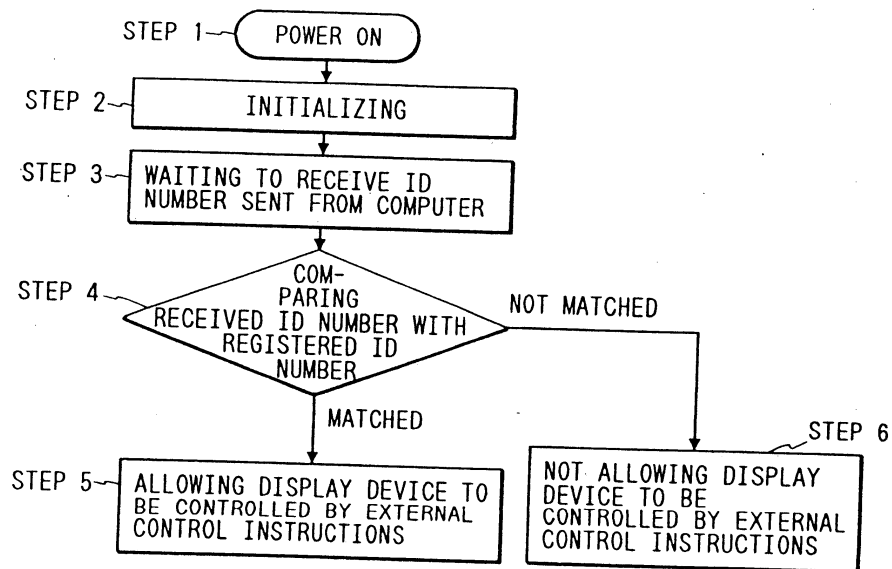
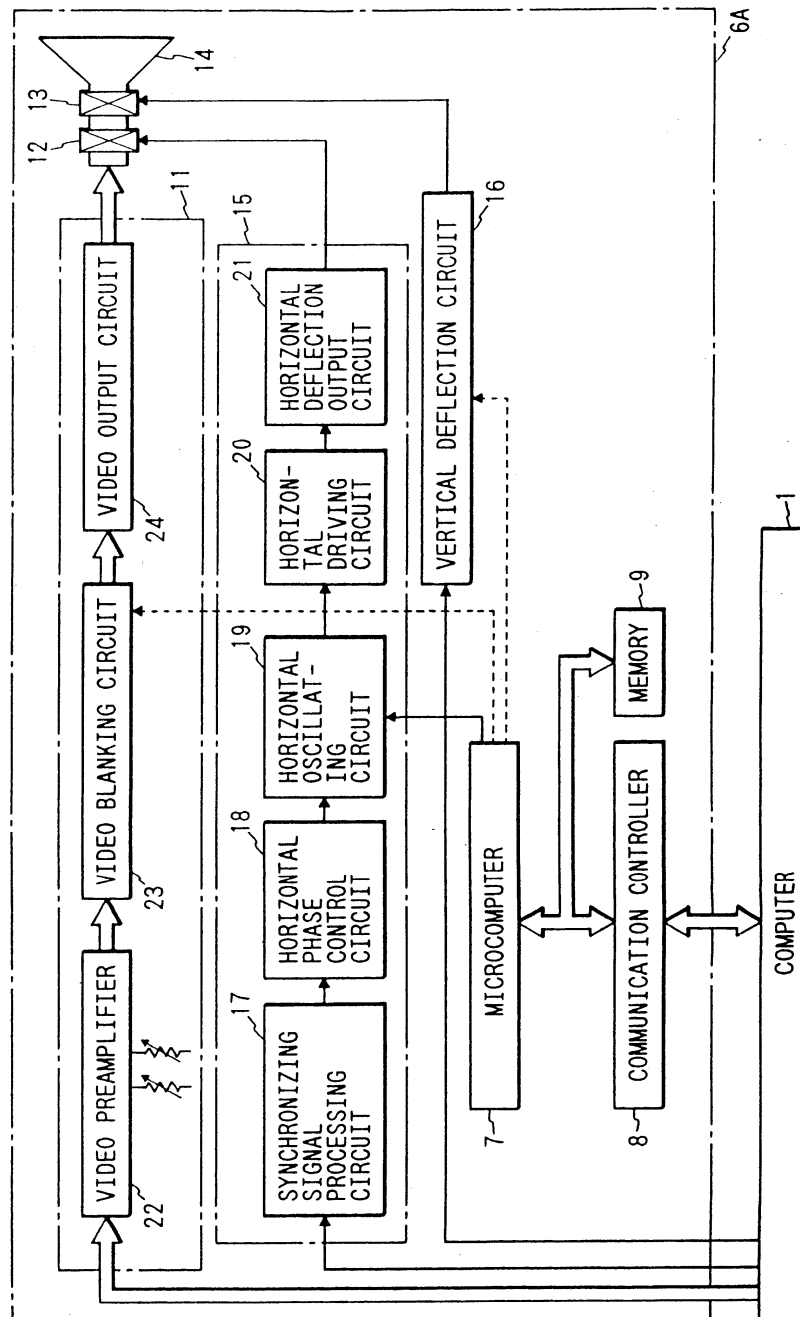
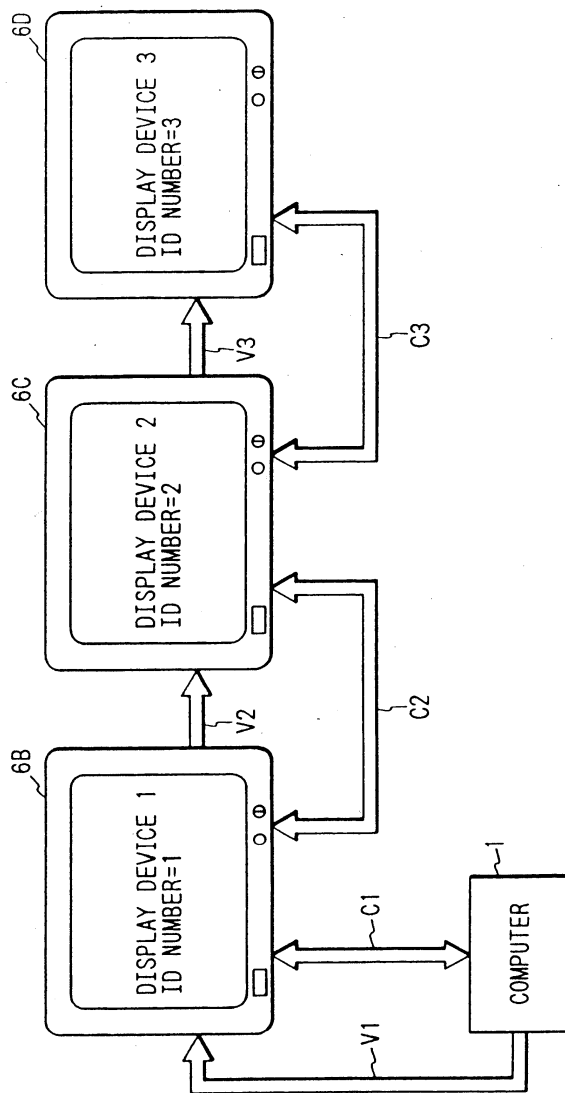


FIG. 4



000021 16222200

FIG. 5



000021-1022200

FIG. 6

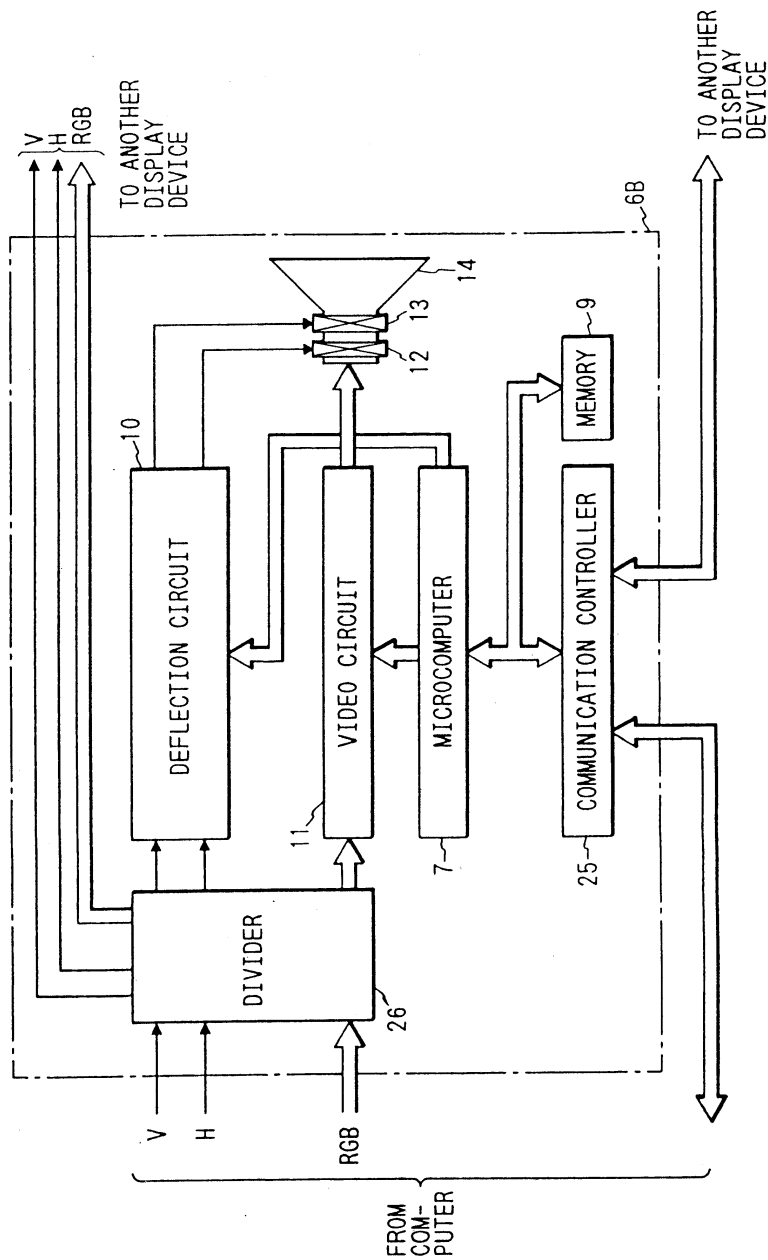


FIG. 7

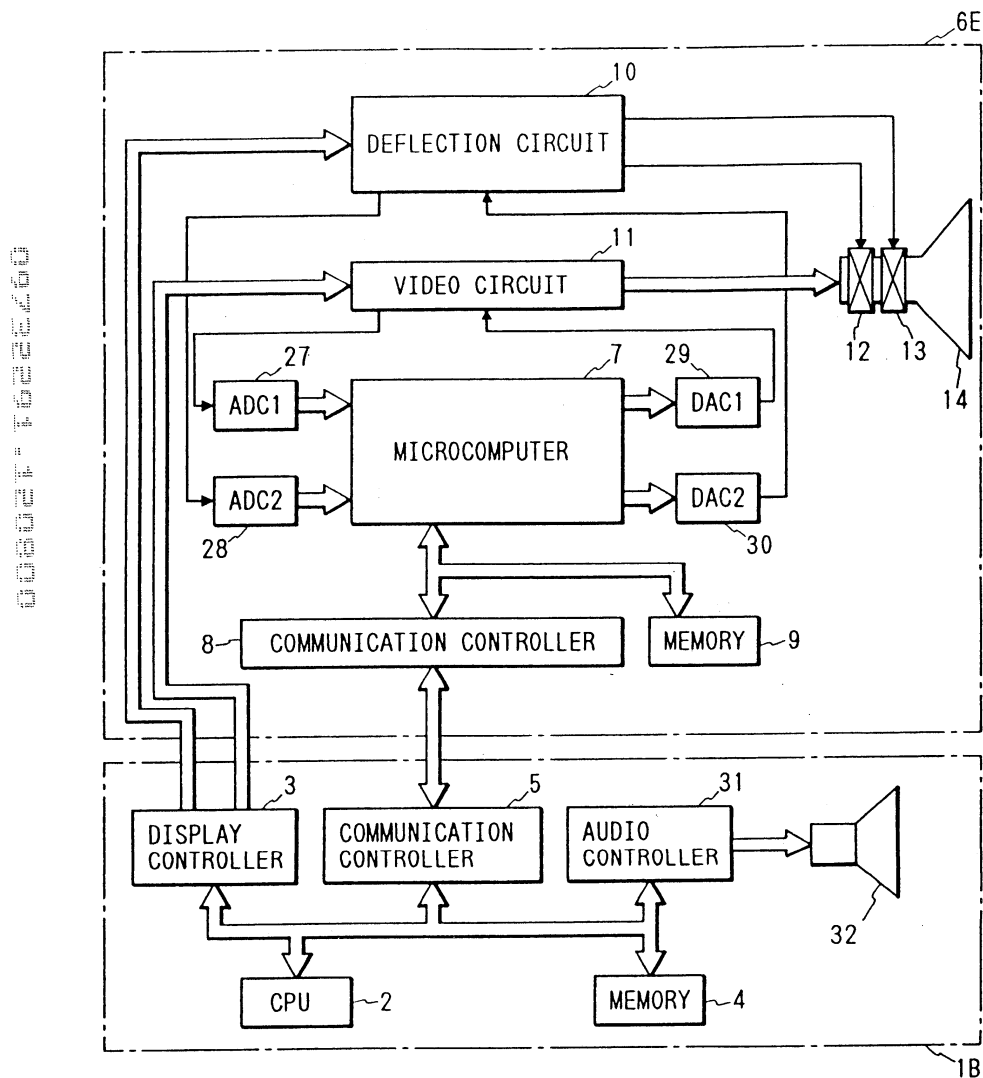


FIG. 8

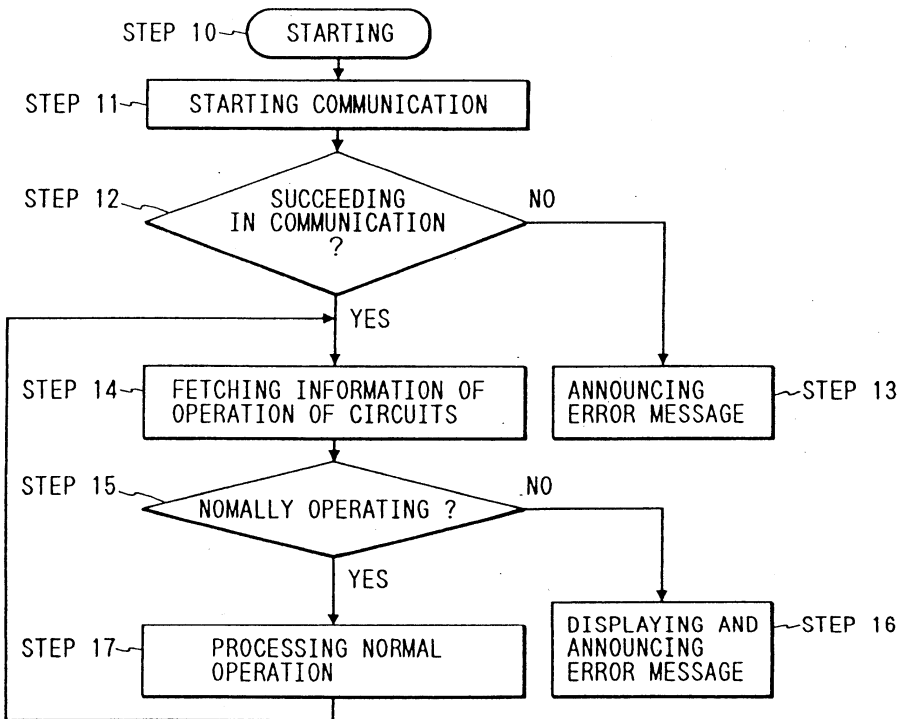


FIG. 9

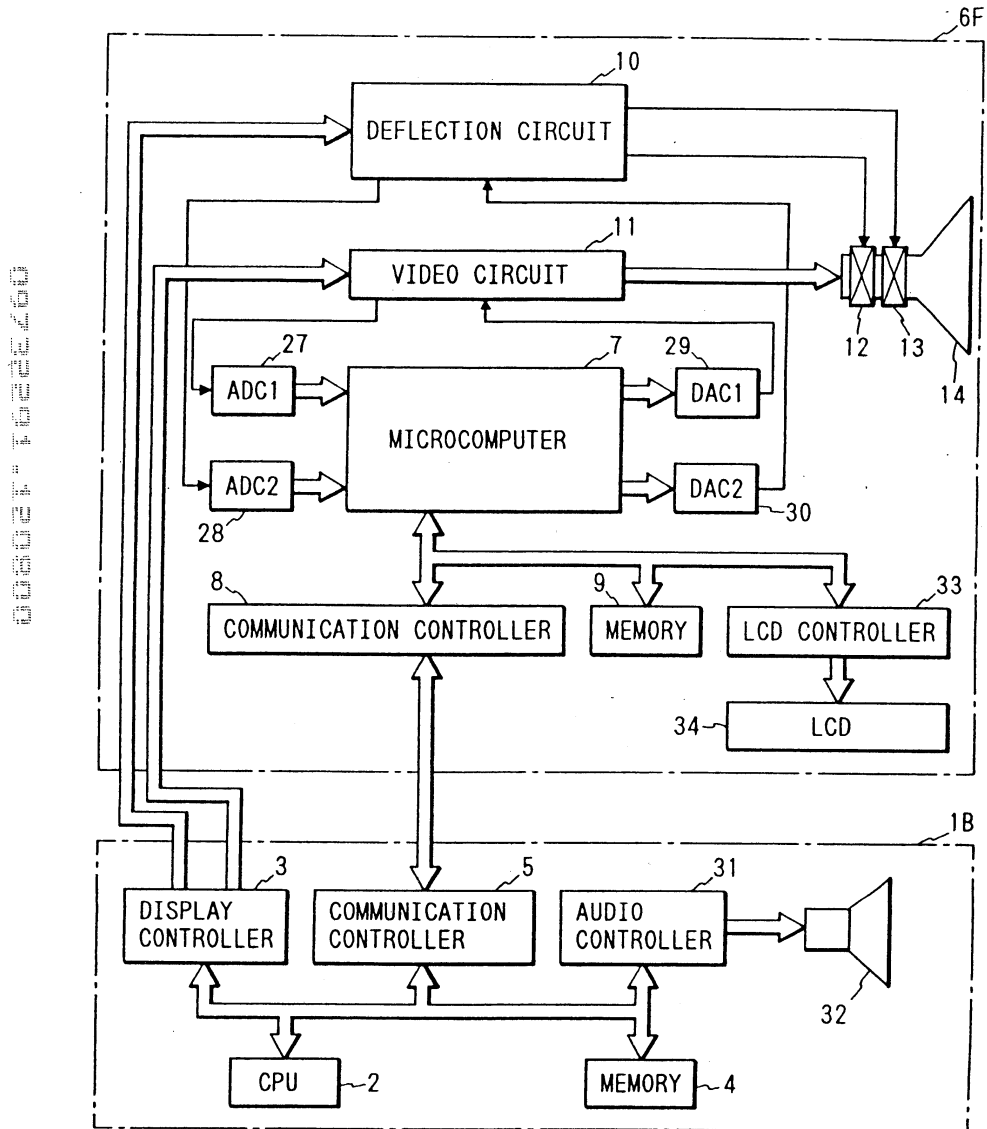
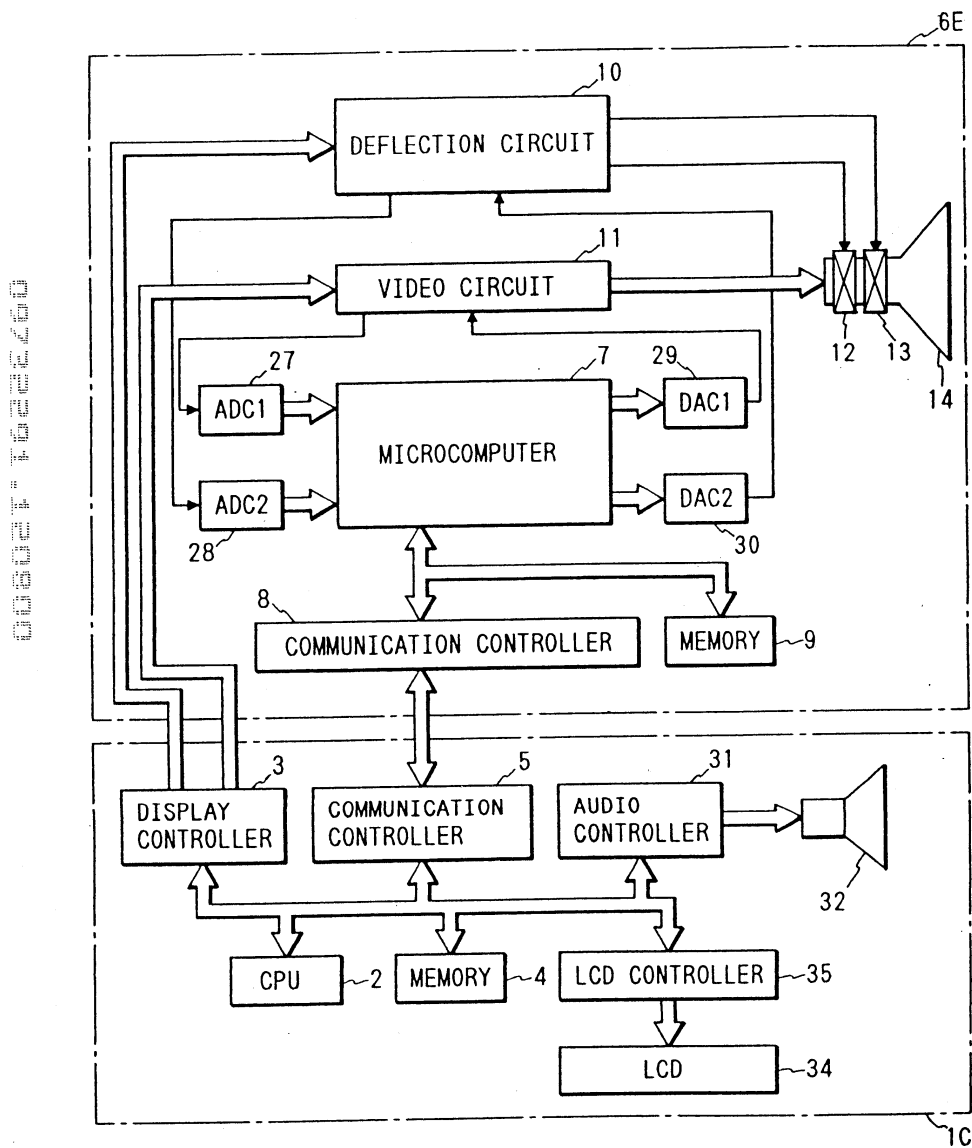


FIG. 10



000027-76222600

FIG. 11

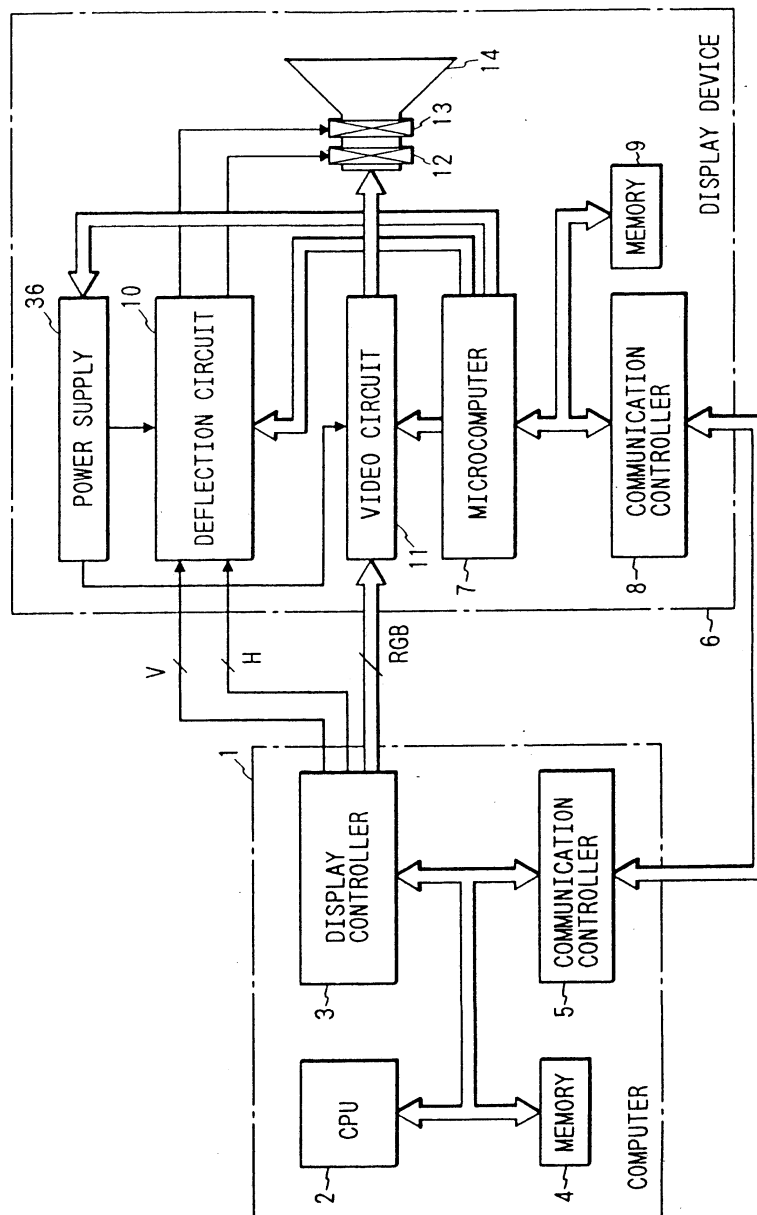
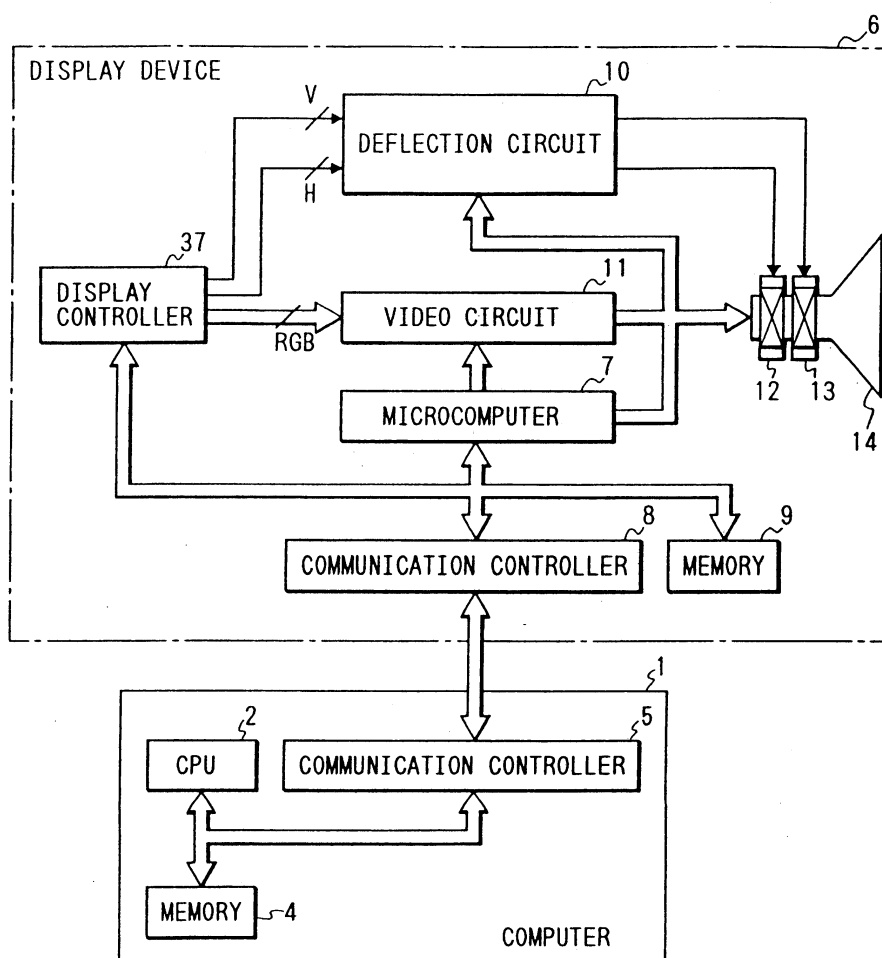


FIG. 12



12/08/00
1-c803 U.S. PRO

Please type a plus sign (+) inside this box → ☒

Approved for use through 09/30/2000. OMB 0651-0032
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Attorney Docket No. 520.32696CX4
First Inventor or Application Identifier Ikuya ARAI, et al
Title INFORMATION OUTPUT SYSTEM
Express Mail Label No.

APPLICATION ELEMENTS See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

- ☒ * Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
- ☒ Specification [Total Pages 39]
(preferred arrangement set forth below)
 - Descriptive title of the Invention
 - Cross References to Related Applications
 - Statement Regarding Fed sponsored R & D
 - Reference to Microfiche Appendix
 - Background of the Invention
 - Brief Summary of the Invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
- ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets 12]
- Oath or Declaration [Total Pages 2]
 - ☐ Newly executed (original or copy)
 - ☒ Copy from a prior application (37 C.F.R. § 1.63(d))
(for continuation/divisional with Box 16 completed)
 - ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).

- ☐ Microfiche Computer Program (Appendix)
- Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)
 - ☐ Computer Readable Copy
 - ☐ Paper Copy (identical to computer copy)
 - ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

- ☐ Assignment Papers (cover sheet & document(s))
- ☐ 37 C.F.R. § 3.73(b) Statement of Power of Attorney (when there is an assignee)
- ☐ English Translation Document (if applicable)
- ☒ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations
- ☐ Preliminary Amendment
- ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
- ☐ * Small Entity Statement(s) filed in prior application (PTO/SB/09-12) ☐ Status still proper and desired
- ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed)
- ☒ Other: Letter & Claim Chart

* NOTE FOR ITEMS 1 & 13 IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).

- If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment:

<input checked="" type="checkbox"/> Continuation	<input type="checkbox"/> Divisional	<input type="checkbox"/> Continuation-in-part (CIP)	of prior application No. 09/265,363
Prior application information: Examiner R. Phan			Group / Art Unit: 2781

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

17. CORRESPONDENCE ADDRESS

☒ Customer Number or Bar Code Label 020457 or ☐ Correspondence address below
(Insert Customer No. or Attach bar code label here)

Name
Address
City State Zip Code
Country Telephone Fax

Name (Print/Type)	Melvin Kraus	Registration No. (Attorney/Agent)	22,466
Signature	<i>Melvin Kraus</i>	Date	Dec. 8, 2000

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

FEE TRANSMITTAL **for FY 2000**

Patent fees are subject to annual revision.
Small Entity payments must be supported by a small entity statement,
otherwise large entity fees must be paid. See Forms PTO/SB/09-12.
See 37 C.F.R. §§ 1.27 and 1.28.

TOTAL AMOUNT OF PAYMENT (\$)**1,860.00**

Complete if Known

Application Number
Filing Date **December 8, 2000**
First Named Inventor **Ikuya ARAI, et al**
Examiner Name
Group / Art Unit
Attorney Docket No. **520.32696CX4**

METHOD OF PAYMENT (check one)

1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to:
Deposit Account Number **01-2135**
Deposit Account Name
☐ Charge Any Additional Fee Required Under 37 CFR §§ 1.18 and 1.17

2. ☒ Payment Enclosed:
☐ Check ☐ Money Order ☒ Other

FEE CALCULATION

1. BASIC FILING FEE
Large Entity Small Entity
Fee Code (\$) Fee Code (\$) Fee Description Fee Paid
101 690 201 345 Utility filing fee **710.00**
106 310 206 155 Design filing fee
107 480 207 240 Plant filing fee
108 690 208 345 Reissue filing fee
114 150 214 75 Provisional filing fee
SUBTOTAL (1) (\$)**710.00**

2. EXTRA CLAIM FEES
Total Claims **35** - 20** = **15** x **18** = **270**
Independent Claims **14** - 3** = **11** x **80** = **880**
Multiple Dependent = **0**
**or number previously paid, if greater; For Reissues, see below

Large Entity Small Entity
Fee Code (\$) Fee Code (\$) Fee Description
103 18 203 9 Claims in excess of 20
102 78 202 39 Independent claims in excess of 3
104 260 204 130 Multiple dependent claim, if not paid
109 78 209 39 ** Reissue independent claims over original patent
110 18 210 9 ** Reissue claims in excess of 20 and over original patent
SUBTOTAL (2) (\$)**1,150.00**

FEE CALCULATION (continued)

3. ADDITIONAL FEES
Large Entity Small Entity
Fee Code (\$) Fee Code (\$) Fee Description Fee Paid
105 130 205 65 Surcharge - late filing fee or oath **0.00**
127 50 227 25 Surcharge - late provisional filing fee or cover sheet **0.00**
139 130 139 130 Non-English specification **0.00**
147 2,520 147 2,520 For filing a request for reexamination **0.00**
112 920* 112 920* Requesting publication of SIR prior to Examiner action **0.00**
113 1,840* 113 1,840* Requesting publication of SIR after Examiner action **0.00**
115 110 215 55 Extension for reply within first month **0.00**
116 380 216 190 Extension for reply within second month **0.00**
117 870 217 435 Extension for reply within third month **0.00**
118 1,360 218 680 Extension for reply within fourth month **0.00**
128 1,850 228 925 Extension for reply within fifth month **0.00**
119 300 219 150 Notice of Appeal **0.00**
120 300 220 150 Filing a brief in support of an appeal **0.00**
121 260 221 130 Request for oral hearing **0.00**
138 1,510 138 1,510 Petition to institute a public use proceeding **0.00**
140 110 240 55 Petition to revive - unavoidable **0.00**
141 1,210 241 605 Petition to revive - unintentional **0.00**
142 1,210 242 605 Utility issue fee (or reissue) **0.00**
143 430 243 215 Design issue fee **0.00**
144 580 244 290 Plant issue fee **0.00**
122 130 122 130 Petitions to the Commissioner **0.00**
123 50 123 50 Petitions related to provisional applications **0.00**
126 240 126 240 Submission of Information Disclosure Stmt **0.00**
581 40 581 40 Recording each patent assignment per property (times number of properties) **0.00**
146 690 246 345 Filing a submission after final rejection (37 CFR § 1.129(a)) **0.00**
149 690 249 345 For each additional invention to be examined (37 CFR § 1.129(b)) **0.00**
Other fee (specify) **0.00**
Other fee (specify) **0.00**
SUBTOTAL (3) (\$)**0.00**

*Reduced by Basic Filing Fee Paid

SUBMITTED BY
Name (Print/Type) **Mevin K. Kaus** Registration No. (Attorney/Agent) **22,466** Telephone **703-312-6600**
Signature **[Signature]** Date **Dec. 8, 2000**

WARNING:

Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

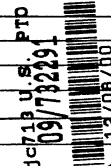
FEE TRANSMITTAL **for FY 2000**

Patent fees are subject to annual revision.
Small Entity payments must be supported by a small entity statement,
otherwise large entity fees must be paid. See Forms PTO/SB/09-12.
See 37 C.F.R. §§ 1.27 and 1.28.

TOTAL AMOUNT OF PAYMENT (\$1,860.00)

Complete if Known

Application Number
Filing Date December 8, 2000
First Named Inventor Ikuya ARAI, et al
Examiner Name
Group / Art Unit
Attorney Docket No. 520.32696CX4



METHOD OF PAYMENT (check one)

1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to:

Deposit Account Number 01-2135

Deposit Account Name

☐ Charge Any Additional Fee Required Under 37 CFR §§ 1.16 and 1.17

2. ☒ Payment Enclosed:
☐ Check ☐ Money Order ☒ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
101 690	201 345	Utility filing fee	710.00
106 310	206 155	Design filing fee	
107 480	207 240	Plant filing fee	
108 690	208 345	Reissue filing fee	
114 150	214 75	Provisional filing fee	

SUBTOTAL (1) (\$ 710.00)

2. EXTRA CLAIM FEES

Total Claims 35 - 20** = 15 x 18 = 270
Independent Claims 14 - 3** = 11 x 80 = 880
Multiple Dependent = 0

**or number previously paid, if greater; For Reissues, see below

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
103 18	203 9	Claims in excess of 20	
102 78	202 39	Independent claims in excess of 3	
104 260	204 130	Multiple dependent claim, if not paid	
109 78	209 39	** Reissue independent claims over original patent	
110 18	210 9	** Reissue claims in excess of 20 and over original patent	

SUBTOTAL (2) (\$ 1,150.00)

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
105 130	205 65	Surcharge - late filing fee or oath	0.00
127 50	227 25	Surcharge - late provisional filing fee or cover sheet	0.00
139 130	139 130	Non-English specification	0.00
147 2,520	147 2,520	For filing a request for reexamination	0.00
112 920*	112 920*	Requesting publication of SIR prior to Examiner action	0.00
113 1,840*	113 1,840*	Requesting publication of SIR after Examiner action	0.00
115 110	215 55	Extension for reply within first month	0.00
116 380	216 190	Extension for reply within second month	0.00
117 870	217 435	Extension for reply within third month	0.00
118 1,360	218 680	Extension for reply within fourth month	0.00
128 1,850	228 925	Extension for reply within fifth month	0.00
119 300	219 150	Notice of Appeal	0.00
120 300	220 150	Filing a brief in support of an appeal	0.00
121 260	221 130	Request for oral hearing	0.00
138 1,510	138 1,510	Petition to institute a public use proceeding	0.00
140 110	240 55	Petition to revive - unavoidable	0.00
141 1,210	241 605	Petition to revive - unintentional	0.00
142 1,210	242 605	Utility issue fee (or reissue)	0.00
143 430	243 215	Design issue fee	0.00
144 580	244 290	Plant issue fee	0.00
122 130	122 130	Petitions to the Commissioner	0.00
123 50	123 50	Petitions related to provisional applications	0.00
126 240	126 240	Submission of Information Disclosure Stmt	0.00
581 40	581 40	Recording each patent assignment per property (times number of properties)	0.00
146 690	246 345	Filing a submission after final rejection (37 CFR § 1.129(a))	0.00
149 690	249 345	For each additional invention to be examined (37 CFR § 1.129(b))	0.00
Other fee (specify)			0.00
Other fee (specify)			0.00

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$ 0.00)

SUBMITTED BY

Name (Print/Type) Melvin Klaus
Signature

Registration No.

(Attorney/Agent) 22,466

Complete (if applicable)

Telephone 703-312-6600

Date Dec. 8, 2000

WARNING:

Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

1 1/2

520.32696CX4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): I. ARAI, et al
Serial No.: (not yet assigned)
Filed: December 8, 2000
For: INFORMATION OUTPUT SYSTEM



INFORMATION DISCLOSURE STATEMENT
UNDER 37 CFR 1.97 & 1.98

Commissioner for Patents
Washington, D.C. 20231

December 8, 2000

Sir:

In the matter of the above-identified application,
this information disclosure statement is being submitted with
the following citation as specified in 37 CFR 1.97(d).

"A copy of any patent, publication or other
information listed in an information disclosure statement
is not required to be provided if it was previously cited
by or submitted to the Office in a prior application,
provided that the prior application is properly
identified in the statement and relied upon for an
earlier filing date under 35 U.S.C. 120."

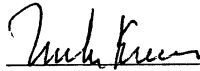
Applicant(s) are submitting herewith a copy of Form PTO-
1449 which list documents cited in parent application(s) U.S.
application Serial No. 09/265,363, filed March 10, 1999, which
is a continuation of U.S. application Serial No. 08/833,346,
filed April 4, 1997, now U.S. Patent No. 5,887,147, issued
March 23, 1999, which is a continuation of U.S. application
Serial No. 08/598,903, filed February 9, 1996, now U.S. Patent

No. 5,652,845, issued July 29, 1997, which is a continuation of U.S. application Serial No. 08/190,848, filed February 3, 1994, now abandoned.

It is respectfully requested that this information disclosure statement be considered by the Examiner.

Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (520.32696CX4) and please credit any excess fees to such deposit account.

Respectfully submitted,



Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
(703) 312-6600

520.32696CX4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): I. ARAI, et al

Serial No.: Continuing Application of Serial No.
09/265,363)

Filed: December 8, 2000

For: INFORMATION OUTPUT SYSTEM



LETTER

Commissioner for Patents
Washington, D.C. 20231

December 8, 2000

Sir:

Applicants note that this continuation application only includes claims of the parent application Serial No. 09/265,363 which were indicated in the Office Action dated August 30, 2000 in such parent application as being allowed or objected to. Thus, this application only includes claims corresponding to claims 3, 9-16, 30, 30-38, and 54-62 of the parent application indicated by the Examiner as being allowed, as well as claims 28, 32, 40, 42-46 and 53 indicated as being objected to and allowable when written in independent form.

Additionally, although in the parent application, the Examiner indicated that claim 29 was rejected over art, claim 29 of the parent application depended from claim 3, which was indicated as being allowed, such that it is assumed that claim

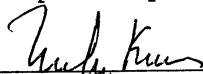
29 should be allowed with its parent claim 3.

As an aid to the Examiner, attached hereto is a claim chart showing the present claim number of this application and the corresponding claim number of the parent application, wherein for ease of examination, dependent claims have been presented following the parent claim. As is apparent from this claim chart, only the claims indicated as allowed or objected to in the parent application, which were canceled from the parent application, other than for claim 29, appear in this application, and applicants submit that such claims should be in condition for allowance.

Accordingly, issuance of an action of a favorable nature is courteously solicited.

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (520.32696CX4) and please credit any excess fees to such deposit account.

Respectfully submitted,



Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
(703) 312-6600

520.32696CX4
6137-5

Claim Chart

Present Claim Number of
the continuing application

Parent Claim Number
of Serial No. 09/265,363

1	3
2	29
3	30
4	9
5	33
6	34
7	10
8	11
9	15
10	35
11	36
12	12
13	13
14	14
15	16
16	37
17	38
18	28
19	32
20	40
21	42
22	43
23	44
24	45
25	46
26	53
27	54
28	55
29	56
30	57
31	58
32	59
33	60
34	61
35	62

Form PTO-1449
Equivalent

U.S. Department of Commerce
Patent and Trademark Office

Atty. Docket No. 520.32696CX4
Serial No. (not yet assigned) 4/73/84
Applicant: I. ARAI, et al
Filing Date: December 8, 2000
Group:
Page 1 of 2


U.S. Patent Documents

Examiner Initials	Document No.	Date	Name	Class Subclass	Filing Date If Approp.
RA	6,012,103	1/00	Sartore et al		
	5,948,091	9/99	Kerigan et al		
	5,909,592	6/99	Shipman		
	5,896,546	4/99	Monahan et al		
	5,887,147	3/99	Arai et al		
	5,599,231	2/97	Hibino et al		
	5,550,966	8/96	Drake et al		
	5,483,255	1/96	Numao		
	5,457,473	10/95	Arai, et al		
	5,375,210	12/94	Monnes et al		
	5,353,423	10/94	Hamid et al		
	5,317,691	5/94	Traeger		
	5,309,504	5/94	Morganstein		
	5,282,247	1/94	McLean et al		
	5,276,875	1/94	Satoh		
	5,276,458	1/94	Sawdon		
	5,010,238	4/91	Kadono et al		
	4,991,023	2/91	Nicols		
	4,922,448	5/90	Kunieda et al		
	4,893,248	1/90	Pitts et al		
	4,800,376	1/89	Suga et al		
	4,747,041	5/88	Engel et al		
	4,450,535	5/84	De Pommery et al		
EP	4,047,158	9/77	Jennings		

Form PTO-1449 U.S. Department of Commerce
Equivalent Patent and Trademark Office

Atty. Docket No. 520.32696CX4
Serial No. (not yet assigned) 5/752/24
Applicant: I. ARAI, et al
Filing Date: December 8, 2000
Group:
Page 2 of 2

Foreign Patent Documents

Document No.	Date	Country	Class Subclass	Translation	
				Yes	No
61-84688	4/86	Japan			
DE 37 22 169 A1	1/89	Germany			
1-321475	12/89	Japan			
2-250576	10/90	Japan			
3-56931	3/91	Japan			
3-116093	5/91	Japan			
3-261995	11/91	Japan			
EP 0 456 923 A1	11/91	European			
5-46106	2/93	Japan			
5-232918	9/93	Japan			
DE 43 36 116 A1	5/94	Germany			
0612053A1	8/94	European			

Other Documents (including Author, Title, Date, Pertinent Pages, etc.)

Examiner RAYMOND PHAN

Date Considered 4-20-02

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
www.uspto.gov

APPLICATION NUMBER	FILING/RECEIPT DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
09/732,291	12/08/2000	Ikuya Arai	520.32696CX4

020457
ANTONELLI TERRY STOUT AND KRAUS
SUITE 1800
1300 NORTH SEVENTEENTH STREET
ARLINGTON, VA 22209

CONFIRMATION NO. 2674

FORMALITIES LETTER



OC00000000572774

Date Mailed: 01/31/2001

NOTICE OF OMITTED ITEM(S) IN A NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

A filing date has been accorded to the above-identified nonprovisional application papers; however, the following item(s) appear to have been omitted from the application:

- Page(s) 38 of the specification (description and claims).

I. Should applicant contend that the above-noted omitted item(s) was in fact deposited in the Patent and Trademark Office (PTO) with the nonprovisional application papers, a copy of this Notice and a petition (and \$130.00 petition fee (37 CFR 1.17(i))) with evidence of such deposit **must** be filed within **TWO MONTHS** of the date of this Notice. The petition fee will be refunded if it is determined that the item(s) was received by the PTO.

II. Should applicant desire to supply the omitted item(s) and accept the date that such omitted item(s) was filed in the PTO as the filing date of the above-identified application, a copy of this Notice, the omitted item(s) (with a supplemental oath or declaration in compliance with 37 CFR 1.63 and 1.64 referring to such items), and a petition under 37 CFR 1.182 (with the \$130.00 petition fee (37 CFR 1.17(h))) requesting the later filing date **must** be filed within **TWO MONTHS** of the date of this Notice.

III. The failure to file a petition (and petition fee) under the above options (I) or (II) within **TWO MONTHS** of the date of this Notice (37 CFR 1.181(f)) will be treated as a constructive acceptance by the applicant of the application as deposited in the PTO. **THIS TWO MONTH PERIOD IS NOT EXTENDABLE UNDER 37 CFR 1.136(a) or (b).** In the absence of a timely filed petition in reply to this Notice, the application will maintain a filing date as of the date of deposit of the application papers in the PTO, and original application papers (*i.e.*, the original disclosure of the invention) will include only those application papers present in the PTO on the date of deposit.

In the event that applicant elects not to take action pursuant to options (I) or (II) above (thereby constructively electing option (III)), amendment of the specification to renumber the pages consecutively and cancel incomplete sentences caused by any omitted page(s), and/or amendment of the specification to cancel all references to any omitted drawing(s), relabel the drawing figures to be numbered consecutively (if necessary), and correct the references in the specification to the drawing figures to correspond with any relabelled drawing figures, is required. Any drawing changes should be accompanied by a copy of the drawing figures showing the proposed changes in red ink. Such amendment and/or correction to the drawing figures, if necessary, should be by way of preliminary amendment submitted prior to the first Office action to avoid

delays in the prosecution of the application.

A copy of this notice MUST be returned with the reply.



Customer Service Center
Initial Patent Examination Division (703) 308-1202

PART 3 - OFFICE COPY



0300

3a

520.32696CX4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): I. ARAI, et al
Serial No.: 09/732,291
Filed: December 8, 2000
For: INFORMATION OUTPUT SYSTEM

PRELIMINARY AMENDMENT AND RESPONSE TO NOTICE OF OMITTED
ITEM(S) IN A NONPROVISIONAL APPLICATION

Commissioner for Patents
Washington, D.C. 20231

February 14, 2001

Sir:

The following amendments and remarks are respectfully
submitted in connection with the above-identified application
in response to the Notice of Omitted Item(s) in a
Nonprovisional Application mailed January 31, 2001.

IN THE SPECIFICATION:

Please renumber page 39 as page 38.

REMARKS


By the above amendment, the specification has been
amended, so as to renumber page 39 as page 38, so that the
page of the abstract should have been numbered page 38 rather
than page 39, the abstract page immediately following the last
page of the claims, wherein claim 35 is the last numbered
claim and appearing at page 37.

Accordingly, applicants elects option III as set forth in the Notice of Omitted Item(s) in a Nonprovisional Application by accepting the filing date of December 8, 2000.

Entry of this preliminary amendment and favorable action in this application are respectfully requested.

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (520.32696CX4) and please credit any excess fees to such deposit account.

Respectfully submitted,



Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

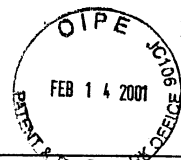
MK/cee
(703) 312-6600



UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
www.uspto.gov

APPLICATION NUMBER	FILING/RECEIPT DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
09/732,291	12/08/2000	Ikuya Arai	520.32696CX4



Page 1 of 2

3

020457
ANTONELLI TERRY STOUT AND KRAUS
SUITE 1800
1300 NORTH SEVENTEENTH STREET
ARLINGTON, VA 22209

CONFIRMATION NO. 2674

FORMALITIES LETTER



OC000000005722774

Date Mailed: 01/31/2001

NOTICE OF OMITTED ITEM(S) IN A NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

A filing date has been accorded to the above-identified nonprovisional application papers; however, the following item(s) appear to have been omitted from the application:

- Page(s) 38 of the specification (description and claims).

I. Should applicant contend that the above-noted omitted item(s) was in fact deposited in the Patent and Trademark Office (PTO) with the nonprovisional application papers, a copy of this Notice and a petition (and \$130.00 petition fee (37 CFR 1.17(i))) with evidence of such deposit **must** be filed within **TWO MONTHS** of the date of this Notice. The petition fee will be refunded if it is determined that the item(s) was received by the PTO.

II. Should applicant desire to supply the omitted item(s) and accept the date that such omitted item(s) was filed in the PTO as the filing date of the above-identified application, a copy of this Notice, the omitted item(s) (with a supplemental oath or declaration in compliance with 37 CFR 1.63 and 1.64 referring to such items), and a petition under 37 CFR 1.182 (with the \$130.00 petition fee (37 CFR 1.17(h))) requesting the later filing date **must** be filed within **TWO MONTHS** of the date of this Notice.

III. The failure to file a petition (and petition fee) under the above options (I) or (II) within **TWO MONTHS** of the date of this Notice (37 CFR 1.181(f)) will be treated as a constructive acceptance by the applicant of the application as deposited in the PTO. **THIS TWO MONTH PERIOD IS NOT EXTENDABLE UNDER 37 CFR 1.136(a) or (b).** In the absence of a timely filed petition in reply to this Notice, the application will maintain a filing date as of the date of deposit of the application papers in the PTO, and original application papers (*i.e.*, the original disclosure of the invention) will include only those application papers present in the PTO on the date of deposit.

In the event that applicant elects not to take action pursuant to options (I) or (II) above (thereby constructively electing option (III)), amendment of the specification to renumber the pages consecutively and cancel incomplete sentences caused by any omitted page(s), and/or amendment of the specification to cancel all references to any omitted drawing(s), relabel the drawing figures to be numbered consecutively (if necessary), and correct the references in the specification to the drawing figures to correspond with any relabelled drawing figures, is required. Any drawing changes should be accompanied by a copy of the drawing figures showing the proposed changes in red ink. Such amendment and/or correction to the drawing figures, if necessary, should be by way of preliminary amendment submitted prior to the first Office action to avoid

delays in the prosecution of the application.

*A copy of this notice **MUST** be returned with the reply.*



Customer Service Center
Initial Patent Examination Division (703) 308-1202

PART 2 - COPY TO BE RETURNED WITH RESPONSE

6



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

C

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/732,291	12/08/00	ARAI	I 520.32696CX4

020457 TM02/0705
ANTONELLI TERRY STOUT AND KRAUS
SUITE 1800
1300 NORTH SEVENTEENTH STREET
ARLINGTON VA 22209

EXAMINER

PHAN, R
ART UNIT PAPER NUMBER

2181
DATE MAILED: 07/05/01

4

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

GM

Office Action Summary	Application No. 09/732,291	Applicant(s) Arai et al.
	Examiner Raymond N. Phan	Group Art Unit 2181

☐ Responsive to communication(s) filed on _____

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1035 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

☒ Claim(s) 1-35 is/are pending in the applicant.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☒ Claim(s) 18-35 is/are allowed.

☒ Claim(s) 1, 2, 4, 5, 7-10, and 12-16 is/are rejected.

☒ Claim(s) 3, 6, 11, and 17 is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☒ None of the CERTIFIED copies of the priority documents have been received.

☐ received in Application No. (Series Code/Serial Number) _____

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

— SEE OFFICE ACTION ON THE FOLLOWING PAGES —

Part III DETAILED ACTION

Notice to Applicant(s)

1. This application has been examined. Claims 1-35 are pending.
2. The Group and/or Art Unit location of your application in the PTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Group Art Unit 2181.

Drawings

3. The drawings submitted with this application were declared informal by the applicant which are acceptable for examination purpose only. Accordingly they have not been reviewed by a draftsperson at this time. When formal drawings are submitted, the draftsperson will perform a review. Formal drawings will be required when the application is allowed.
4. Direct any inquiries concerning drawing review to the Drawing Review Branch (703) 305-8404.

Specification

5. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-2, 4-6, 7-10, 12-16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sawdon (US No. 5,276,458) view of Nicols (US No. 4,991,023)

In regards to claims 1, 12, Sawdon a display system comprising a communication circuit 97 for communicating with an externally connected computer (see figure 1, col. 2, lines 57-67) wherein the communication circuit is having memory 11 contains identification code for the display system (see col. 3, lines 45-60). But Sawdon do not disclose the communication control circuit comprising a comparing means for comparing a first identification information which is previously stored in the display unit and the second identification information which is previously stored in the computer and is sent from computer; and a communication permission means for permitting communication between the computer with respect to the display control of the display unit, when the first and second identification information match as a result of the comparison by the comparing means. However Nicols discloses the communication control circuit comprising a comparing means for comparing a first identification information which is previously stored in the display unit and the second identification information which is previously stored in the computer and is sent from computer; and a communication permission means for permitting communication between the computer with respect to the display control of the display unit, when the first and second identification information match as a result of the comparison by the comparing means (see col. 1, lines 37-65).

Therefore, it would have been obvious to a person of an ordinary skill in the art at the time the invention was made to have combined the teachings of Nicols et al. within the system of Sawdon because it would allow automatic adjustment of the monitor thereby eliminating the need for skilled workers to make these adjustment.

In regards to claims 2, 5, 8, 10, and 16, Sawdon teach the claimed subject matter as discussed above except the use of first identification stored in the memory of the display unit. However Nicols discloses first identification stored in the memory (see col. 1, lines 31-33). Therefore, it would have been obvious to a person of an ordinary skill in the art at the time the invention was made to have combined the teachings of Nicols et al. within the system of Sawdon because it would allow automatic adjustment of the monitor thereby eliminating the need for skilled workers to make these adjustment..

In regards to claim 4, in addition to the rejection of claim 1, Sawdon disclose the reception permission means for permitting reception of the control command for controlling at least a display size/position of the display unit from the computer (see col. 9, lines 6-37).

In regards to claims 7, 9, 15, in addition to the rejection of claim 1, Sawdon further discloses at least with respect to the data of a frequency ranged stored in the memory means when the first and second identification information match as a result of the comparison by the comparing means (see col. 2, lines 18-25).

In regards to claim 13, Sawdon further disclose the control command is generated within the computer, based upon a command inputted from an input means (i.e keyboard) connected to the computer (see col. 1, lines 1-15).

Allowable Subject Matter

8. Claims 18-35 are allowable over the prior of records.

9. Claims 3, 6, 11, 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is an Examiner's statement of reasons for the indication of allowable subject matter: Claims 18-35 are allowable over the prior art of record because the Examiner found neither prior art cited in its entirety, nor based on the prior art, found any motivation to combine any of the said prior arts which teach communication control circuit enables bi-directional communication with the display unit and the computer. The examiner agreed to allow the case after incorporating the above allowable features into the claims 18-27.

Conclusion

11. Claims 1-2, 4-~~6~~, 7-10, 12-16 are rejected. Claims 3, 6, 11, 17 are objected. Claims 18-35 are allowed.

12. The prior arts made of record and not relied upon are considered pertinent to applicant's disclosure.

Hibino et al. (US No. 5,599,231) disclose a security system and methods for a videographics and authentication game/program fabricating device.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Raymond Phan, whose telephone number is (703) 306-2756. The examiner can normally be reached on Monday-Friday from 6:30AM- 4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Beausoleil can be reached on (703) 305-9713 or via e-mail addressed to robert.beausoleil@uspto.gov. The fax phone number for this Group is (703) 305-3718.

Communications via Internet e-mail regarding this application, other than those under 35 U.S.C. 132 or which otherwise require a signature, may be used by the applicant and should be addressed to [raymond.phan@uspto.gov].

Serial Number: 09/732,291
Art Unit: 2181

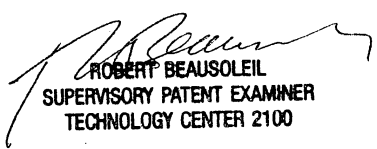
6

All Internet e-mail communications will be made of record in the application file. PTO employees do not engage in Internet communications where there exists a possibility that sensitive information could be identified or exchanged unless the record includes a properly signed express waiver of the confidentiality requirements of 35 U.S.C. 122. This is more clearly set forth in the Interim Internet Usage Policy published in the Official Gazette of the Patent and Trademark on February 25, 1997 at 1195 OG 89.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3900.

RP

Raymond Phan
Jun 29, 2001


ROBERT BEAUSOLEIL
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

05

Notice of References Cited				Application No. 09/732,291		Applicant(s) Aral et al.	
				Examiner Raymond N. Phan		Group Art Unit 2181	
Page 1 of 1							

U.S. PATENT DOCUMENTS						
	DOCUMENT NO.	DATE	NAME	CLASS	SUBCLASS	
A	5,276,458	01/1994	Sawdon	345	132	
B	4,991,023	02/1991	Nicols	358	242	
C	5,599,231	02/1997	Hibino et al.	43	29	
D						
E						
F						
G						
H						
I						
J						
K						
L						
M						

FOREIGN PATENT DOCUMENTS						
	DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUBCLASS
N						
O						
P						
Q						
R						
S						
T						

NON-PATENT DOCUMENTS	
	DOCUMENT (Including Author, Title, Source, and Pertinent Pages)
U	
V	
W	
X	



GAU 2181
520.32696CX4 #5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): ARAI, et al

Serial No.: 09/732,291

Filed: December 8, 2000

For: INFORMATION OUTPUT SYSTEM

Group: 2181

Examiner: R. Phan

RECEIVED
DEC 10 2001
Technology Center 2100

RECEIVED
DEC 07 2001
Technology Center 2800

PETITION FOR EXTENSION OF TIME

Commissioner of Patents
Washington, D.C. 20231

December 5, 2001

Sir:

In the matter of the above-identified application, applicant(s) hereby respectfully petition for an extension of time to permit filing of a response within the second month subsequent to the shortened statutory period set in the outstanding Office Action mailed July 5, 2001. A payment in the amount of \$400.00 to cover the required fee for the requested extension of time is attached hereto.

It is respectfully requested that any shortage in the fee be charged to the account of Antonelli, Terry, Stout & Kraus, LLP, Account No. 01-2135 (520.32696CX4).

Respectfully submitted,

Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
(703) 312-6600

12/05/2001 TECHNOLOGY 00000074 03702231
400.00 OF



520.32696CX4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): ARAI, et al
Serial No.: 09/732,291
Filed: December 8, 2000
For: INFORMATION OUTPUT SYSTEM
Group: 2181
Examiner: R. Phan

RECEIVED
DEC 10 2001
Technology Center 2100

TRANSMITTAL OF SUBSTITUTE FORMAL DRAWING(S)

Commissioner for Patents
Washington, D.C. 20231

December 5, 2001

Sir:

Enclosed are twelve (12) sheets of substitute formal drawings showing Figs. 1-12, in connection with the above-identified application.

Respectfully submitted,

Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
Attachments
(703) 312-6600

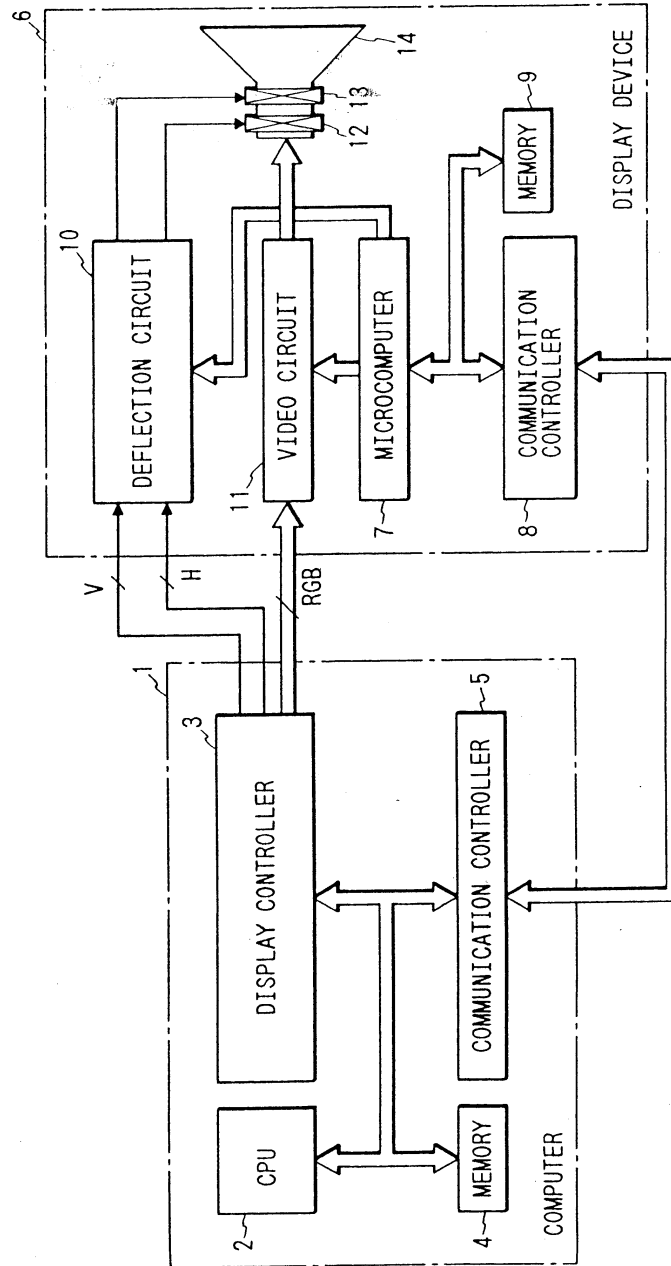
APPROVED	O.G. FIG. 7
BY	CLASS
DRAFTSMAN	710 305

09732291

6549970

008021-1622260

FIG. 1



APPROVED	O.G. FIG. 7	
BY	CLASS	SUBCLASS
DRAFTSMAN	710	305

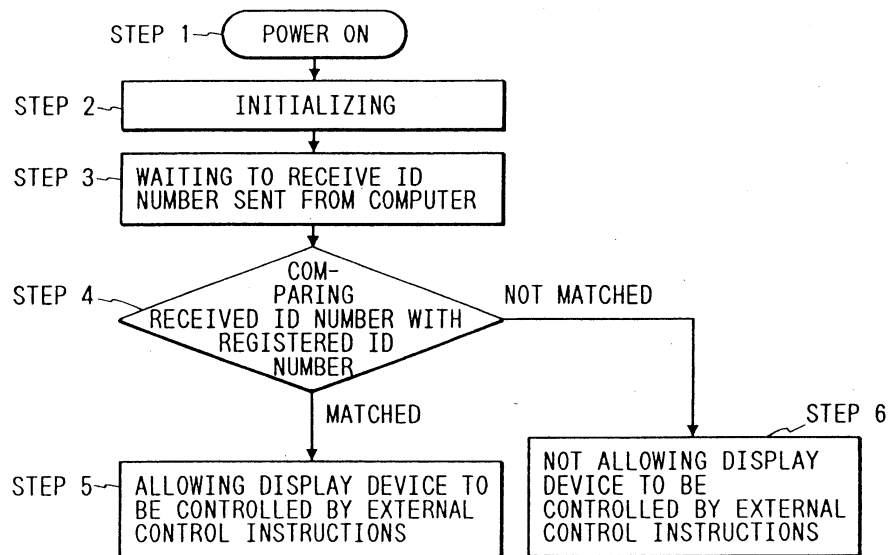
FIG. 2

ADDRESS 1	NUMBER OF DATA SET	REGISTERED ID NUMBERS
ADDRESS 2	DATA AREA 1 FOR DELIVERY ADJUSTMENT	
ADDRESS 3	DATA AREA 2 FOR DELIVERY ADJUSTMENT	
⋮	⋮	
ADDRESS i	ADJUSTMENT DATA AREA 1 FOR USER	
ADDRESS i+1	ADJUSTMENT DATA AREA 2 FOR USER	
⋮	⋮	

000001-100000

APPROVED	O.G. FIG. 7	
BY	CLASS	SUBCLASS
DRAFTSMAN	710	305

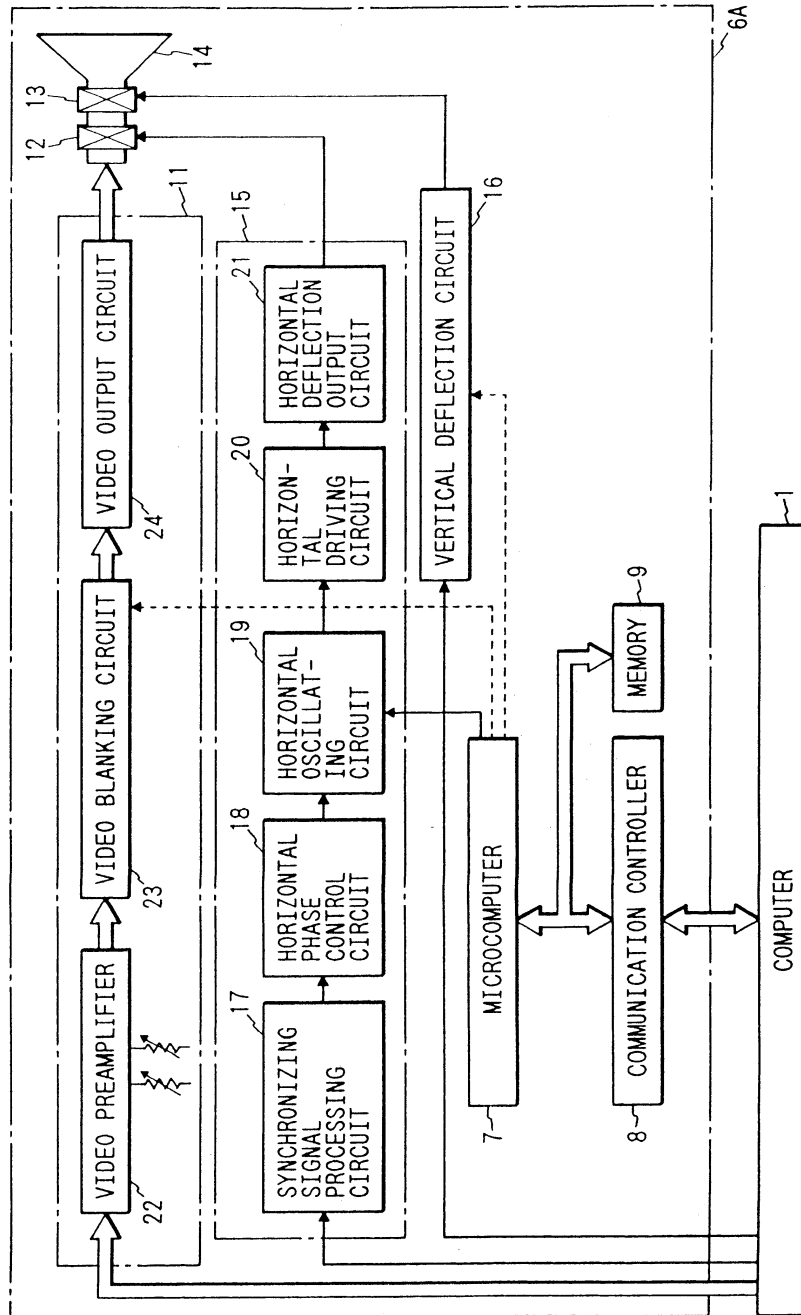
FIG. 3



APPROVED	LOG. FIG. 7
BY	CLASS SUBCLASS
DRAFTSMAN	710 505

000021-1022260

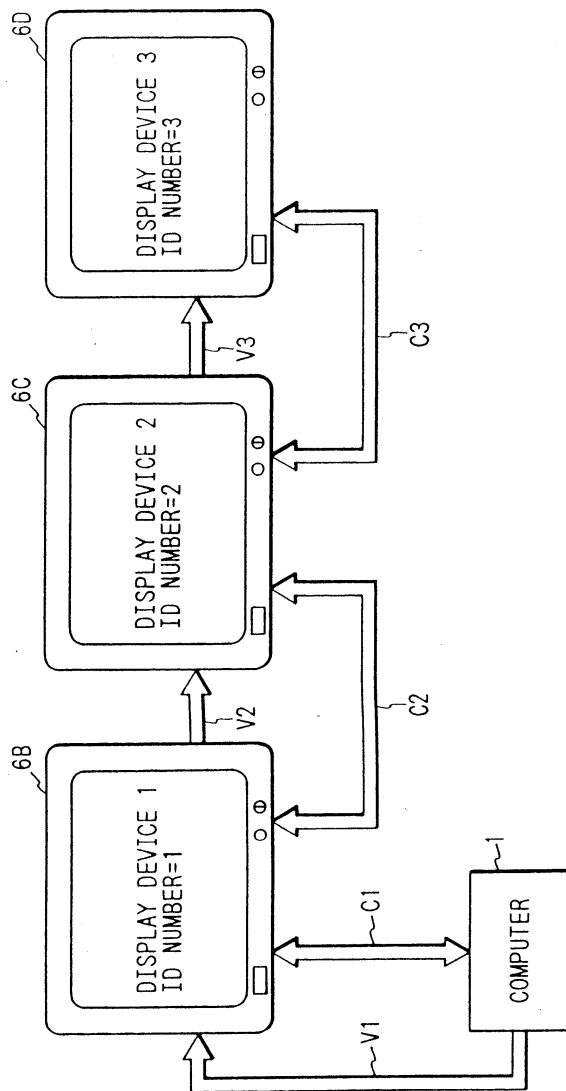
FIG. 4



APPROVED	O.G. FIG. 7	
BY	CLASS	SUBCLASS
DRAFTSMAN	710	305

000027 1622220

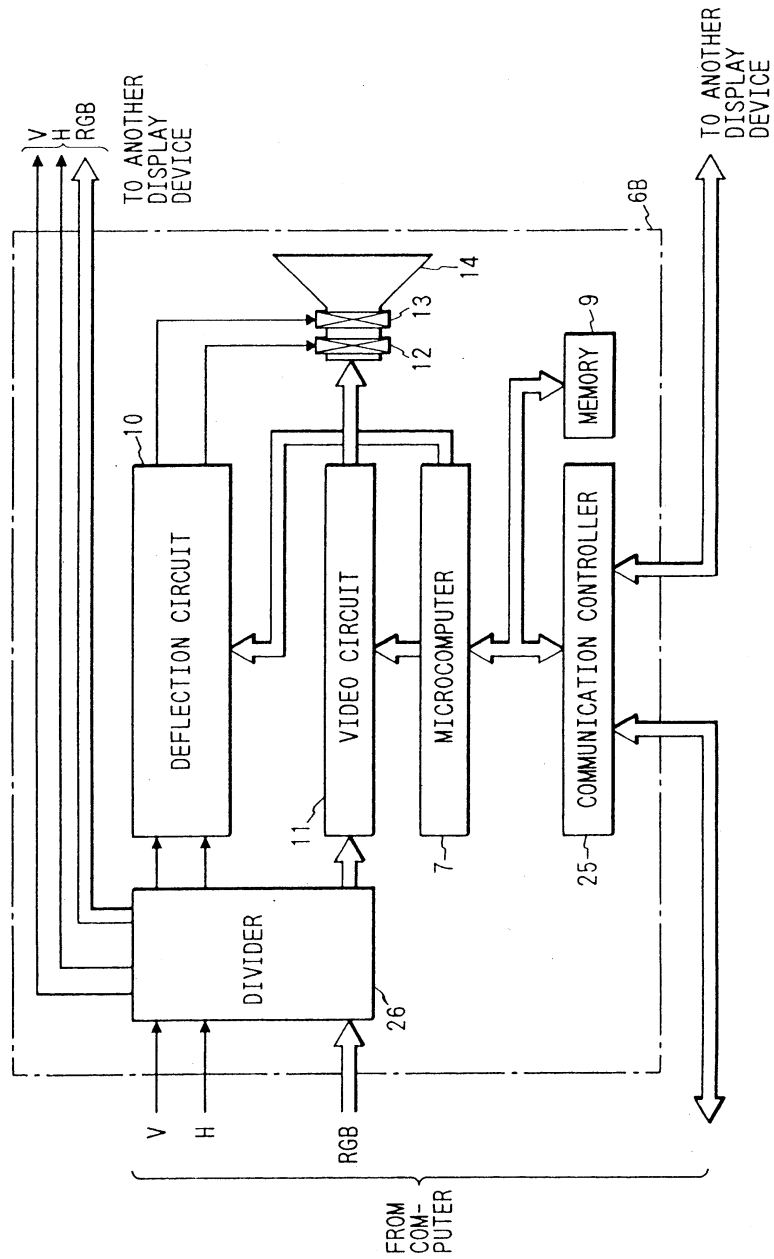
FIG. 5



APPROVED	O.G. FIG. 7	
BY	CLASS	SUBCLASS
DRAFTSMAN	710	305

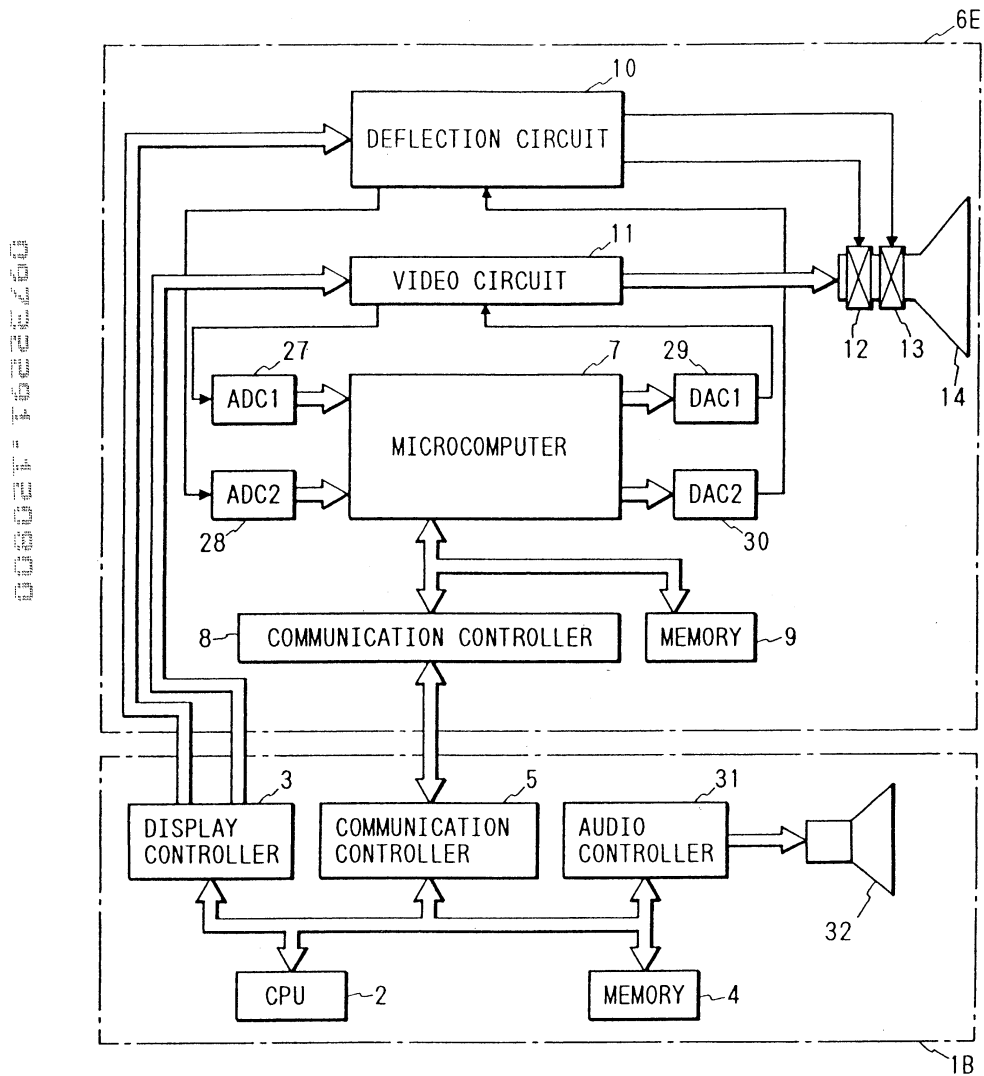
000021-1622260

FIG. 6



APPROVED	O.G. FIG. 7
By	CLASS
DRAFTSMAN	710 305

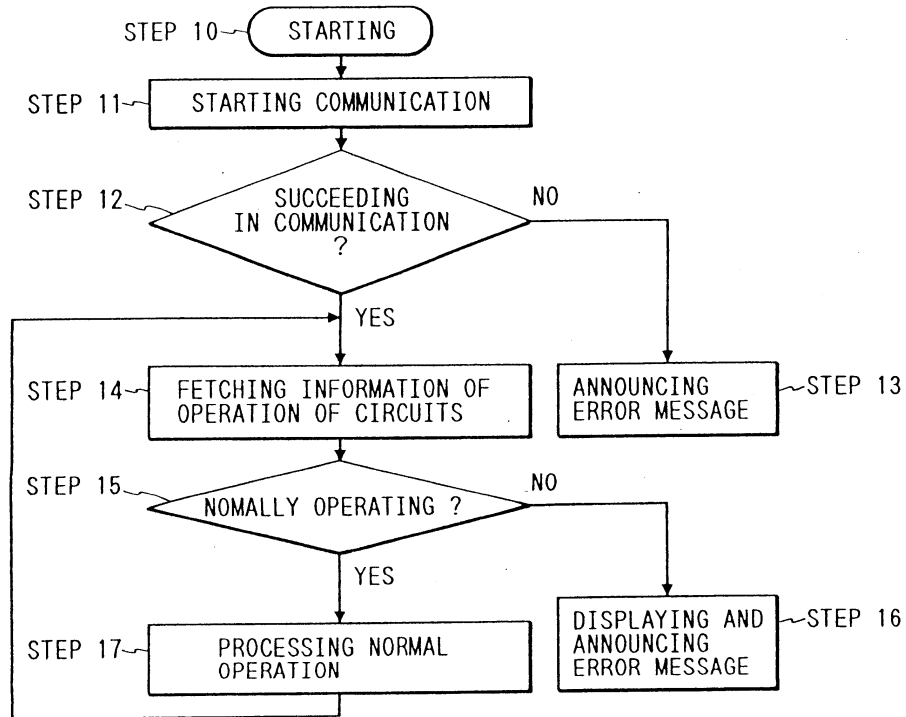
FIG. 7



APPROVED	O.G. FIG. 7	
BY	CLASS	SUBCLASS
DRAFTSMAN	710	305

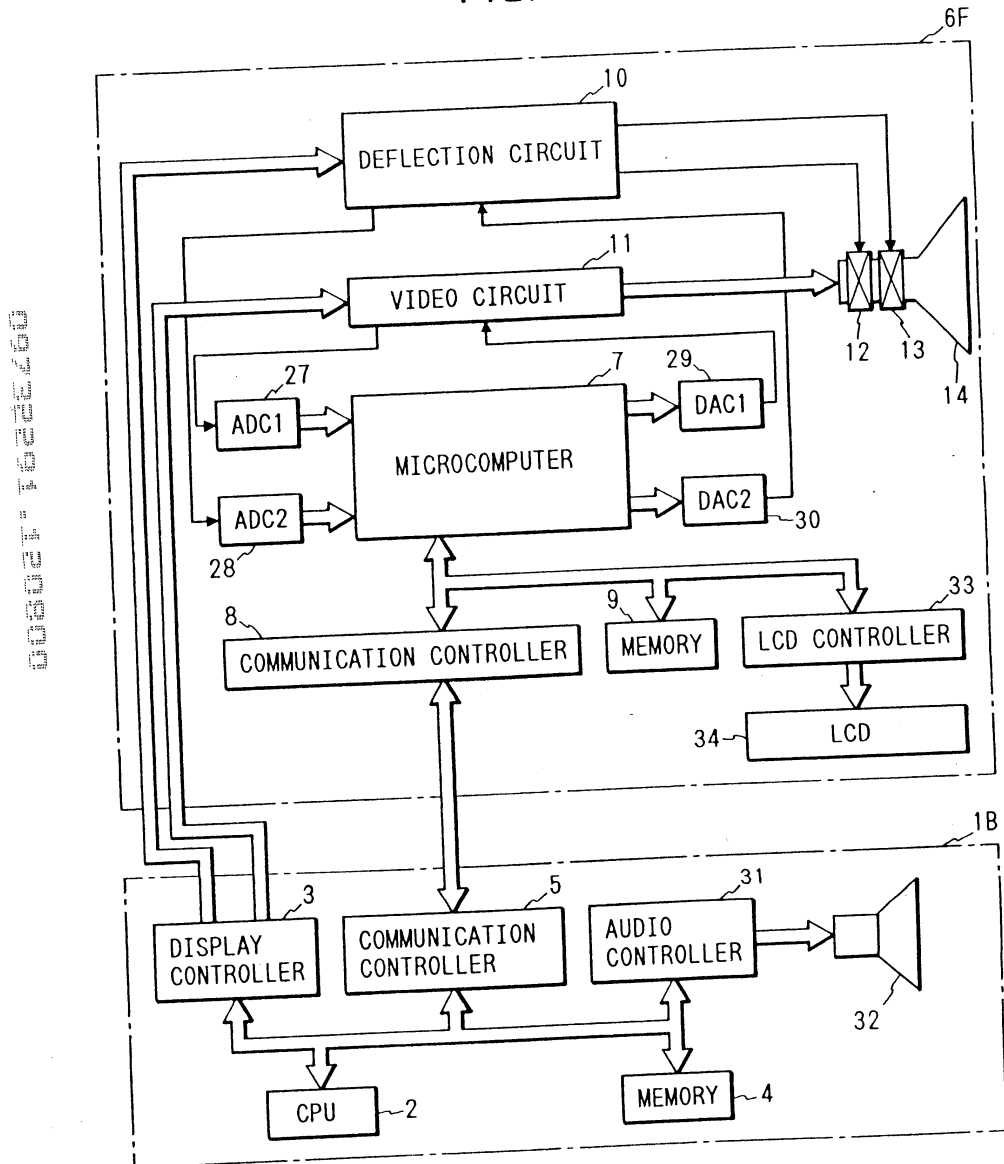
FIG. 8

00732294 120000



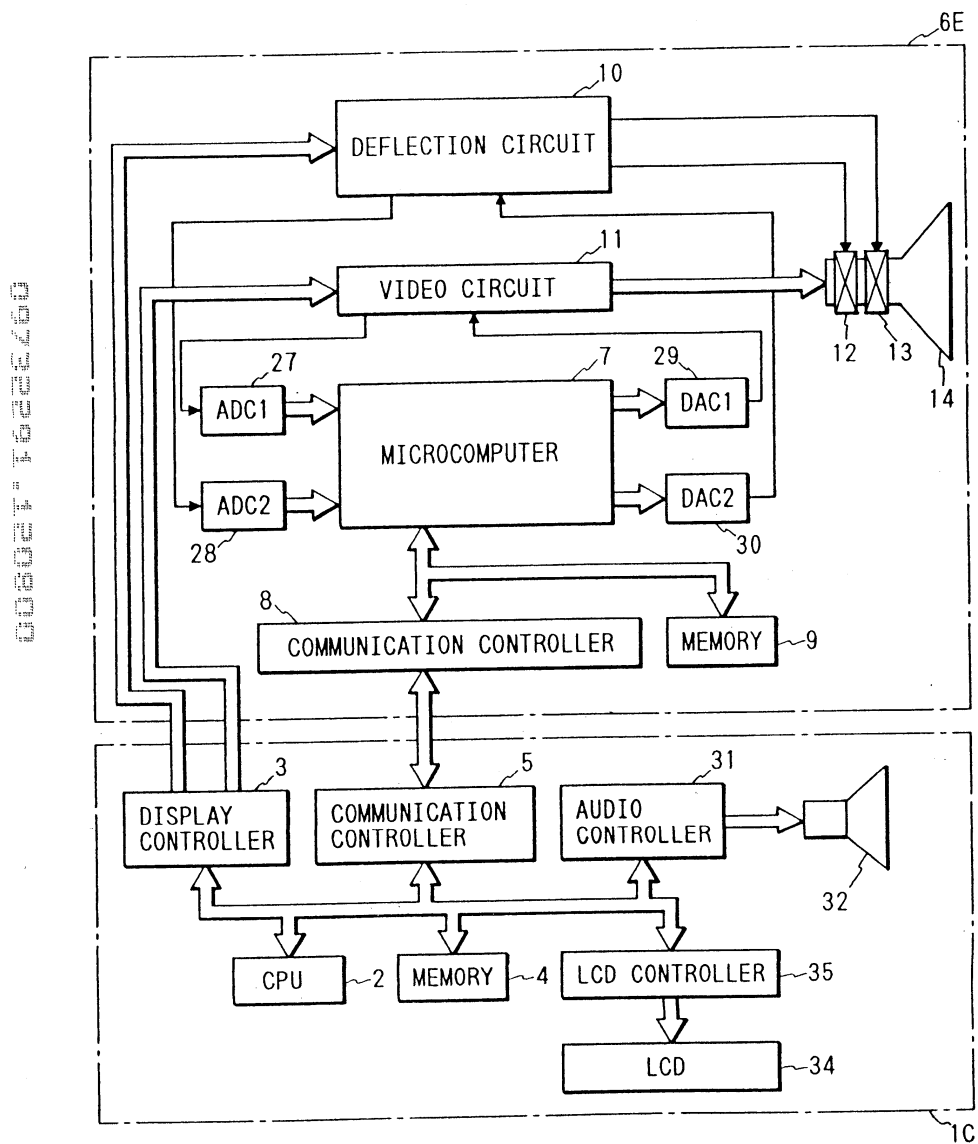
APPROVED	O.G. FIG. 7
BY	CLASS SUBCLASS
DRAFTSMAN	710 301

FIG. 9



APPROVED	O.G. FIG. 7	
BY	CLASS	SUBCLASS
DRAFTSMAN	710	305

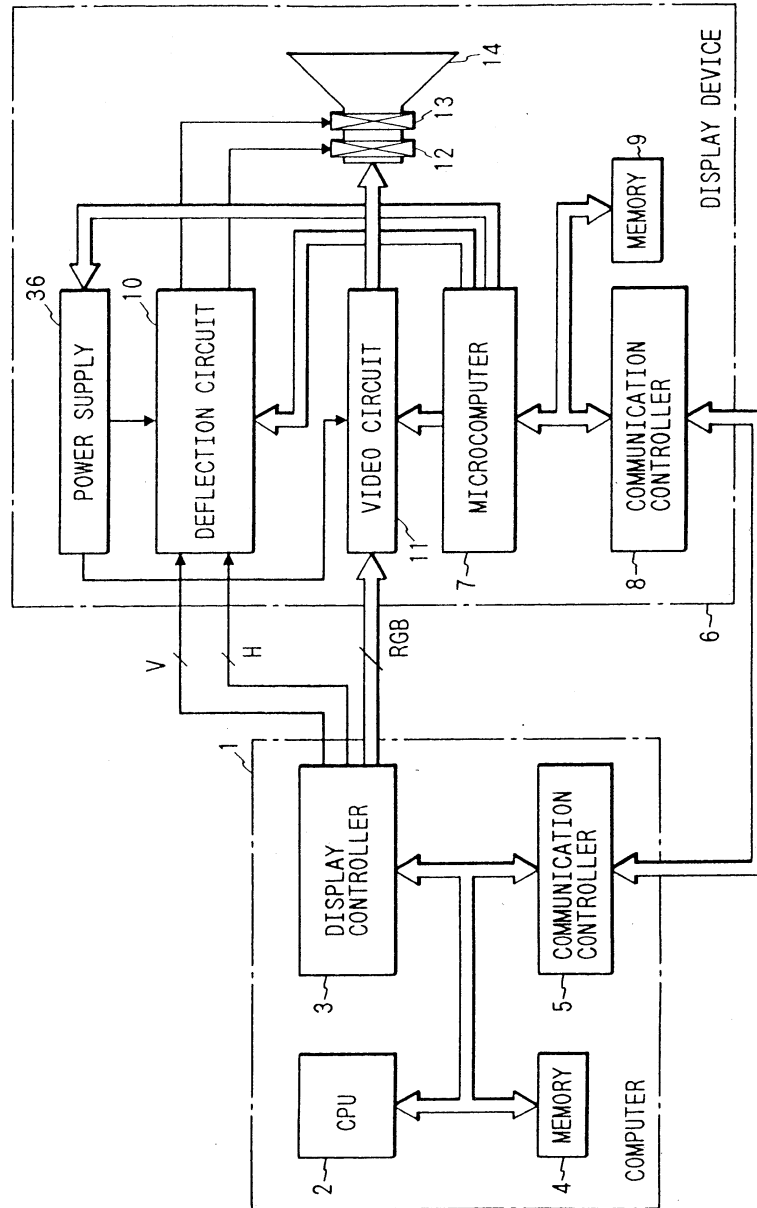
FIG. 10



APPROVED	O.G. FIG. 7
BY	CLASS SUBCLASS
DRAFTSMAN	710 305

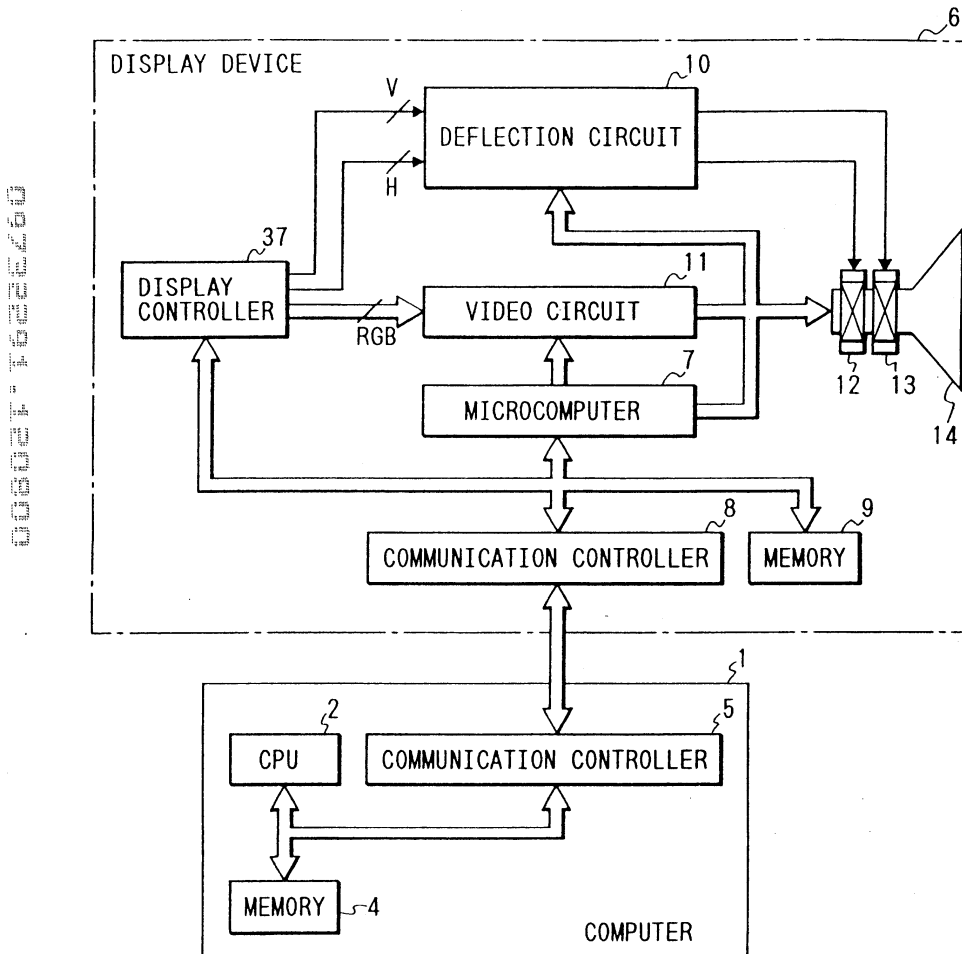
00002-7022260

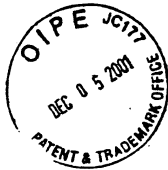
FIG. 11



APPROVED	O.G. FIG. 7
BY	CLASS SUBCLASS
DRAFTSMAN	710 305

FIG. 12





#7
CU
12/13/01

520.32696CX4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): ARAI, et al
Serial No.: 09/732,291
Filed: December 8, 2000
For: INFORMATION OUTPUT SYSTEM
Group: 2181
Examiner: R. Phan

INFORMATION DISCLOSURE STATEMENT
UNDER 37 CFR 1.97 & 1.98

Commissioner for Patents
Washington, D.C. 20231

December 5, 2001

Sir:

In the matter of the above-identified application, this information disclosure statement is being submitted with the following citation as specified in 37 CFR 1.97(d).

"A copy of any patent, publication or other information listed in an information disclosure statement is not required to be provided if it was previously cited by or submitted to the Office in a prior application, provided that the prior application is properly identified in the statement and relied upon for an earlier filing date under 35 U.S.C. 120."

Applicant(s) are submitting herewith a copy of Form PTO-1449 which list documents cited in the parent application Serial No. 09/265,363, filed March 10, 1999, now U.S. Patent No. 6,247,090, on February 26, 2001, which parent application was examined by the Examiner herein.

It is respectfully requested that this information disclosure statement be considered by the Examiner.

12/05/2001 09:00:00 00000074 00732271

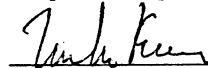
02 FEB 05

180.00 00

1

Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (520.32696CX4) and please credit any excess fees to such deposit account.

Respectfully submitted,



Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
(703) 312-6600

Form PTO-1449 U.S. Department of Commerce
Equivalent Patent and Trademark Office

Atty. Docket No. 520.32696CX4
Serial No. 09/732,291
Applicant: ARAI, et al
Filing Date: December 8, 2000
Group: 2181

U.S. Patent Documents

Examiner Initials	Document No.	Date	Name	Class Subclass If Approp.	Filing Date
----------------------	-----------------	------	------	------------------------------	-------------

RP 4,589,063 5/86 SHAH et al

RP 5,257,350 10/93 HOWARD et al (corresponding, DE 4025295)
Foreign Patent Documents

Document	Date	Country	Class Subclass	Translation
----------	------	---------	----------------	-------------

RP DE 4025295 2/91 German

RP JP-A-3-148697 6/91 Japan (corresponding, DR 4025295)

Other Documents (including Author, Title, Date, Pertinent Pages, etc.)

Examiner RAYMOND PHAN Date Considered

4-14-02

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



#8
cc
12/13/01

520.32696CX4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): ARAI, et al
Serial No.: 09/732,291
Filed: December 8, 2000
For: INFORMATION OUTPUT SYSTEM
Group: 2181
Examiner: R. Phan

RECEIVED
DEC 10 2001
Technology Center 2100

INFORMATION DISCLOSURE STATEMENT
UNDER 37 CFR 1.97 & 1.98

Commissioner for Patents
Washington, D.C. 20231

December 5, 2001

Sir:

In the matter of the above-identified application, applicant(s) is/are submitting herewith a copy of the documents listed in the attached forms equivalent to Form PTO-1449 for the Examiner's consideration.

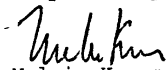
This information disclosure statement is being submitted before the mailing date of either a final action or a notice of allowance and is accompanied by the fee of \$240.00 set forth in 37 CFR 1.17(p).

To the extent that, the documents listed on the attached forms equivalent to Form PTO-1449, are not in the English language, the requirement of 37 CFR 1.98(a)(3) for a concise explanation of the relevance is satisfied by an English language abstract.

It is respectfully requested that this information disclosure statement be considered by the Examiner.

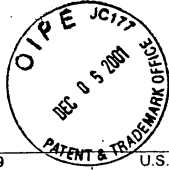
Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (520.32696CX4) and please credit any excess fees to such deposit account.

Respectfully submitted,



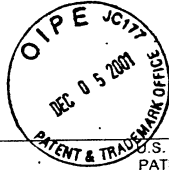
Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
Attachments
(703) 312-6600



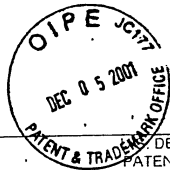
Sheet 1 of 3

FORM PTO-1449 (REV. 7-80)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTY. DOCKET NO. 520.32696CX4	SERIAL NO. 09/732,291	
LIST OF DOCUMENTS CITED BY APPLICANT (Use several sheets if necessary)				APPLICANT I. ARAI et al		
				FILING DATE Dec. 8, 2000		
				GROUP 2181		
U.S. PATENT DOCUMENTS						
* EXAMINER INITIAL	DOCUMENT	DATE	NAME	CLASS	SUBCLASS	FILING DATE (If Appropriate)
	AA 5,270,821	12/14/93	Samuels			
	AB 5,241,281	08/31/93	Wilkes et al			
	AC 5,227,881	07/13/93	Wess et al			
	AD 5,150,109	09/22/92	Berry			
	AE 5,138,305	08/11/92	Tomiyasu			
	AF 5,012,339	04/30/91	Kurata et al			
*	AG 4,991,023	02/05/91	Nicols			
	AH 4,775,857	10/04/88	Staggs			
	AI 4,743,968	05/10/88	Mogi et al			
	AJ 4,680,647	07/14/87	Moriyama			
	AK 4,626,892	12/02/86	Nortrup et al			
FOREIGN PATENT DOCUMENTS						
	DOCUMENT	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES NO
*	AL 1-321475		Japan			<input type="checkbox"/> <input type="checkbox"/>
*	AM 3722169A1		Germany			<input type="checkbox"/> <input type="checkbox"/>
	AN 2-103592	04/16/90	Japan			<input type="checkbox"/> <input type="checkbox"/>
	AO 2-127688		Japan			<input type="checkbox"/> <input type="checkbox"/>
	AP 3-160494		Japan			<input type="checkbox"/> <input type="checkbox"/>
OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, etc.)						
AR	Barco n.v. Video & Communications, The Calibrator Explained, Part 1, April 1990, pp. 1-40.					
AS	NASA Tech Brief, "Interface for Color-Video Monitor", April 1988, pp. 246-247.					
AT						
EXAMINER				DATE CONSIDERED		
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 509; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.						



Sheet 2 of 3

FORM PTO-1449 (REV. 7-80)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTY. DOCKET NO. 520.32696CX4	SERIAL NO. 09/732,291
LIST OF DOCUMENTS CITED BY APPLICANT (Use several sheets if necessary)				APPLICANT I. ARAI et al	GROUP 2181
U.S. PATENT DOCUMENTS					
* EXAMINER INITIAL	DOCUMENT	DATE	NAME	CLASS	SUBCLASS FILING DATE (If Appropriate)
	AA 4,574,279	03/04/86	Roberts		
	AB 4,159,480	06/26/79	Tachi		
	AC 4,990,904	02/00/91	Zenda		
	AD 5,396,593	03/07/95	Mori et al		
	AE 4,736,324	04/00/88	Sainen et al		
	AF 5,068,732	11/00/91	Satoh		
	AG 5,159,683	10/00/92	Lvovsky et al		
	AH 5,251,031	10/00/93	Tagami		
*	AI 5,276,458	01/00/94	Sawdon		
	AJ 5,315,695	05/00/94	Saito et al		
*	AK 5,457,473	10/00/95	Arai et al		
FOREIGN PATENT DOCUMENTS					
	DOCUMENT	DATE	COUNTRY	CLASS	SUBCLASS TRANSLATION YES NO
	AL 2-127688	05/16/90	Japan		<input type="checkbox"/> <input type="checkbox"/>
	AM 3-160494	07/10/91	Japan		<input type="checkbox"/> <input type="checkbox"/>
	AN 3-56993		Japan		<input type="checkbox"/> <input type="checkbox"/>
*	AO 3-116093		Japan		<input type="checkbox"/> <input type="checkbox"/>
*	AP 0456923A1		Europe		<input type="checkbox"/> <input type="checkbox"/>
OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, etc.)					
	AR				
	AS				
	AT				
EXAMINER				DATE CONSIDERED	
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.					



Sheet 3 of 3

FORM PTO-1449
(REV. 7-80)DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

ATTY. DOCKET NO.

SERIAL NO.

520,326,96CX4

09/732,291

LIST OF DOCUMENTS CITED BY APPLICANT
(Use several sheets if necessary)

APPLICANT

I. ARAI et al

FILING DATE

Dec. 8, 2000

GROUP

2181

U.S. PATENT DOCUMENTS

* EXAMINER INITIAL	DOCUMENT	DATE	NAME	CLASS	SUBCLASS	FILING DATE (If Appropriate)
AA	5,506,602	04/00/96	Yokoyama			
AB	5,309,174	05/00/94	Minkus			
AC	5,576,735	11/00/96	Kikuchi et al			
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

RECEIVED
DEC 10 2001
Technology Center 2100

FOREIGN PATENT DOCUMENTS

	DOCUMENT	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
						YES	NO
	AL 61-16643	01/30/86	Japan			<input type="checkbox"/>	<input type="checkbox"/>
*	AM 456923A1	11/21/91	Europe			<input type="checkbox"/>	<input type="checkbox"/>
	AN					<input type="checkbox"/>	<input type="checkbox"/>
	AO					<input type="checkbox"/>	<input type="checkbox"/>
	AP					<input type="checkbox"/>	<input type="checkbox"/>

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, etc.)

AR	
AS	
AT	

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



520.32696CX4

#7/3
12/13/01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): ARAI, et al
Serial No.: 09/732,291
Filed: December 8, 2000
For: INFORMATION OUTPUT SYSTEM
Group: 2181
Examiner: R. Phan

RECEIVED
DEC 10 2001
Technology Center 2100

AMENDMENT

Commissioner of Patents
Washington, DC 20231

December 5, 2001

Sir:

The following amendments and remarks are respectfully submitted in connection with the above-identified application in response to the Office Action dated July 5, 2001.

IN THE TITLE OF THE INVENTION:

Please replace the title of the invention with the following new title:

DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WITH COMPUTER

IN THE SPECIFICATION:

Page 1, please amend the paragraph beginning at line 3 as follows:

CROSS REFERENCE TO RELATED APPLICATION

This is a continuation of U.S. application Serial No.

B2
09/265,363, filed March 10, 1999, now U.S. Patent No. 6,247,090, issued June 12, 2001, which is a continuation of U.S. application Serial No. 08/833,346, filed April 4, 1997, now U.S. Patent No. 5,887,147, issued March 23, 1999, which is a continuation of U.S. application Serial No. 08/598,903, filed February 9, 1996, now U.S. Patent No. 5,652,845, issued July 29, 1997, which is a continuation of U.S. application Serial No. 08/190,848, filed February 3, 1994, now abandoned, the subject matter of which is incorporated by reference herein.

IN THE CLAIMS:

Please amend claim 1 as follows:

B3
1. (amended) A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

comparing means for comparing a first identification information which is previously stored in said display unit. and a second identification information which is previously stored in said computer and is sent from said computer; and

a communication prohibition means for prohibiting communication between said computer with respect to display control of said display unit, when said first and second identification information do not match as a result of the comparison by said comparing means;

wherein said communication control circuit enables bi-

B3

directional communication with said display unit and said computer.

✓
Please cancel claim 3 without prejudice or disclaimer of the subject matter thereof.

Please amend claim 4 as follows:

B4

34. (amended) A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

comparing means for comparing a first identification information which is previously stored in said display unit, and a second identification information which is previously stored in said computer and is sent from said computer; and

a reception prohibition means for prohibiting reception of a control command from said computer, for controlling at least one of a display size, a display position, a brightness, and a contrast of said display unit, when said first and second identification information do not match as a result of the comparison by said comparing means;

wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

✓
Please cancel claim 6 without prejudice or disclaimer of the subject matter thereof.

34

B

Please amend claim 7 as follows:

B5 67. (amended) A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

memory means for storing at least data of a frequency range to which said display unit is operable;

comparing means for comparing a first identification information which is previously stored in said display unit, and a second identification information which is previously stored in said computer and is sent from said computer; and

a communication permission means for permitting communication between said computer, at least with respect to said data of a frequency range stored in said memory means, when said first and second identification information match as a result of the comparison by said comparing means;

wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

Please cancel claim 11 without prejudice or disclaimer of the subject matter thereof.

Please amend claim 12 as follows:

B6 12. (amended) A display unit having a communication control circuit for communicating with an externally connected

computer, wherein said communication control circuit comprises:

36 memory means for storing at least data of a frequency range for which said display unit is operable;

comparing means for comparing a first identification information which is previously stored in said display unit in advance, and a second identification information which is previously stored in said computer and is sent from said computer; and

a communication prohibition means for prohibiting communication between said computer, at least with respect to said data of a frequency range stored in said memory means, when said first and second identification information do not match as a result of the comparison by said comparing means;

wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

✓
Please cancel claim 17 without prejudice or disclaimer of the subject matter thereof.

✓
Please cancel claims 27-35 without prejudice or disclaimer of the subject matter thereof.

✓
Please add the following new claims:

37
- 38. A display unit for displaying an image based on an image signal inputted from an externally connected computer,

comprising:

B1
a processor adapted to control display of the display unit;

a memory which stores an identification number; and

a communication controller which sends the identification number stored in said memory to said computer;

E
wherein said communication controller enables bi-directional communication between said display ^{unit} and said computer.

24/ 23
A display unit according to claim 36, further comprising a deflection circuit, wherein the processor generates control signals for the deflection circuit.

25/ 38
A display unit for displaying an image based on an image signal inputted from an externally connected computer, comprising:

a processor adapted to control display of the display unit;

a memory which stores identification information; and

a communication controller which sends the identification information stored in said memory to said computer in response to power on of at least one of said display unit and said computer;

E
wherein said communication controller enables bi-directional communication between said display ^{unit} and said computer.

B7

²⁶₂₅. A display unit according to claim ²⁵₂₄, further comprising a deflection circuit, wherein the processor generates control signals for the deflection circuit.---

IN THE ABSTRACT OF THE DISCLOSURE:

✓
Please amend the abstract as follows:

ABSTRACT OF THE DISCLOSURE

B8
A display unit having a communication control circuit for communicating with an externally connected computer and which enables bi-directional communication with the display unit and the computer. The communication control circuit includes a comparator for comparing first identification information which is previously stored in said display unit and second identification information which is previously stored in the computer and is sent from the computer. The communication control circuit further includes at least one of a communication prohibitor for prohibiting communication between the computer with respect to display control of the display unit, when the first and second identification information do not match as a result of the comparison by the comparator or communication permitter for enabling communication for display control as a result of a match.

REMARKS

The indication that claims 18-35 are allowed and that claims 3, 6, 11 and 17 are objected to and would be allowable when written in independent form, is acknowledged.

By the present amendment, the features of objected to claims 3, 6, 11 and 17 have been incorporated into their respective parent independent claims 1, 4, 7 and 12, respectively, such that these independent claims represent the objected to claims written in independent form, and such claims should now be in condition for allowance. The previously objected to claims 3, 6, 11 and 17 have been canceled without prejudice or disclaimer of the subject matter thereof, since such features have been incorporated into the parent claims. As such, applicants submit that claims 1, 2, 4, 5, 7-10 and 12-16 should now be in condition for allowance.

By the present amendment, allowed claims 27-35 have been canceled without prejudice or disclaimer of the subject matter thereof and new claims 36-39 presented. Additionally, the title has been amended to be more clearly indicative of the claimed invention, and the abstract has been amended in accordance with the claimed features. It is noted, however, that the abstract should not be considered as limiting in relation to the claims which define the invention.

With regard to the indication that the drawings with this application were declared informal by the applicants, applicants are unaware of any such declaration, and submitted herewith are substitute sheets of drawings which are

considered to be formal drawings and should be considered acceptable at this time.

As to the rejection of claims 1-2, 4-6, 7-10 and 12-16 under 35 U.S.C. §103(a) as being unpatentable over Sawdon (US No. 5,276,458) in view of Nicols (US No. 4,991,023), this rejection is considered to be obviated, in that as pointed out above, the features of objected to claims 3, 6, 11 and 17 have been incorporated in the parent claims with the objected to claims being canceled, such that the independent parent claims represent the objected to claims written in independent form, and these claims should now be in condition for allowance.

Also, with respect to new claims 36-39, claims 36 and 38 are independent claims reciting features of the present invention of a display unit for displaying an image based on an image signal inputted from an externally connected computer, including a communication controller, a processor and a memory, wherein the communication controller enables bi-directional communication between the display and the computer. As recited in claims 36 and 38, the processor is adapted to control display of the display unit. Claim 36 recites the feature of a memory which stores an identification number and the communication controller which sends the identification number stored in the memory to the computer. Claim 38 recites the feature of a memory which stores identification information and a communication controller which sends the identification information stored in the memory to the computer in response to power on of at least one

of the display unit and the computer. Applicants submit that the recited features are not disclosed or taught in the cited art, as recognized by the Examiner in allowing other claims of this application, such that claims 36-39 should also be allowable at this time.

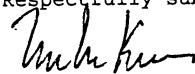
Applicants note that also submitted herewith are two Information Disclosure Statements for consideration by the Examiner. One of the Information Disclosure Statements presents a listing of documents as submitted in the parent application Serial No. 09/265,363, which documents have been considered by the same Examiner herein in such parent application. Accordingly, while a listing of such documents is provided, a copy thereof is not submitted. The second Information Disclosure Statement includes two listings of documents wherein the listings of documents and a copy of the document is submitted where the listing is not marked with an asterisk. That is, where marked with an asterisk, a copy of the document has been previously submitted in this application or the related applications in the form of a parent or grandparent application or the like. Applicants note that one of the listings represents a listing of documents as cited in connection with a copending related application which issued as U.S. Patent No. 5,457,473, assigned to the same assignee as this application and related cases thereof, it being noted that U.S. Patent No. 5,457,473 has been cited in an IDS previously submitted in this application. Hereagain, copies of the documents which are not designated by an asterisk in

such listing are submitted herewith, and it is requested that the Examiner consider the documents. Further, the second listing is a listing of U.S. Patent No. 4,589,063 with a copy of thereof, and consideration of this patent is also requested. Further, such listing further includes a copy of DE 40 25 295 which was cited in the corresponding German application together with a listing of the corresponding Japanese Laid Open Document JP-A 3-148697 and the corresponding U.S. Patent 5,257,350. It is noted that this Information Disclosure Statement also includes the appropriate fee to obtain consideration thereof. Accordingly, consideration of these documents are respectfully requested.

In view of the above amendments and remarks, applicants submit that all claims present in this application should now be in condition for allowance, and issuance of an action of a favorable nature is courteously solicited.

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (520.32696CX4) and please credit any excess fees to such deposit account.

Respectfully submitted,



Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
(703) 312-6600

520.32696CX4
S.N. 09/732,291

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE TITLE OF THE INVENTION:

Please replace the title of the invention with the following new title:

--DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WITH COMPUTER--.

IN THE SPECIFICATION:

Page 1, please amend the paragraph beginning at line 3 as follows:

CROSS REFERENCE TO RELATED APPLICATION

This is a continuation of U.S. application Serial No. 09/265,363, filed March 10, 1999, now U.S. Patent No. 6,247,090, issued June 12, 2001, which is a continuation of U.S. application Serial No. 08/833,346, filed April 4, 1997, now U.S. Patent No. 5,887,147, issued March 23, 1999, which is a continuation of U.S. application Serial No. 08/598,903, filed February 9, 1996, now U.S. Patent No. 5,652,845, issued July 29, 1997, which is a continuation of U.S. application Serial No. 08/190,848, filed February 3, 1994, now abandoned, the subject matter of which is incorporated by reference herein.

IN THE CLAIMS:

Please amend claim 1 as follows:

1. (amended) A display unit having a communication

control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

comparing means for comparing a first identification information which is previously stored in said display unit. and a second identification information which is previously stored in said computer and is sent from said computer; and[,]

a communication prohibition means for prohibiting communication between said computer with respect to display control of said display unit, when said first and second identification information do not match as a result of the comparison by said comparing means;

wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

Please cancel claim 3 without prejudice or disclaimer of the subject matter thereof.

Please amend claim 4 as follows:

4. (amended) A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

comparing means for comparing a first identification information which is previously stored in said display unit, and a second identification information which is previously stored in said computer and is sent from said computer; and

a reception prohibition means for prohibiting reception of a control command from said computer, for controlling at least one of a display size, a display position, a brightness, and a contrast of said display unit, when said first and second identification information do not match as a result of the comparison by said comparing means;

wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

Please cancel claim 6 without prejudice or disclaimer of the subject matter thereof.

Please amend claim 7 as follows:

7. (amended) A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

memory means for storing at least data of a frequency range to which said display unit is operable;

comparing means for comparing a first identification information which is previously stored in said display unit, and a second identification information which is previously stored in said computer and is sent from said computer; and

a communication permission means for permitting communication between said computer, at least with respect to said data of a frequency range stored in said memory means, when said first and second identification information match as

a result of the comparison by said comparing means;

wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

Please cancel claim 11 without prejudice or disclaimer of the subject matter thereof.

Please amend claim 12 as follows:

12. (amended) A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

memory means for storing at least data of a frequency range for which said display unit is operable;

comparing means for comparing a first identification information which is previously stored in said display unit in advance, and a second identification information which is previously stored in said computer and is sent from said computer; and

a communication prohibition means for prohibiting communication between said computer, at least with respect to said data of a frequency range stored in said memory means, when said first and second identification information do not match as a result of the comparison by said comparing means;

wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

Please cancel claim 17 without prejudice or disclaimer of the subject matter thereof.

Please cancel claims 27-35 without prejudice or disclaimer of the subject matter thereof.

Please add the following new claims:

--36. A display unit for displaying an image based on an image signal inputted from an externally connected computer, comprising:

a processor adapted to control display of the display unit;

a memory which stores an identification number; and

a communication controller which sends the identification number stored in said memory to said computer;

wherein said communication controller enables bi-directional communication between said display and said computer.

37. A display unit according to claim 36, further comprising a deflection circuit, wherein the processor generates control signals for the deflection circuit.

38. A display unit for displaying an image based on an image signal inputted from an externally connected computer, comprising:

a processor adapted to control display of the display unit;

a memory which stores identification information; and
a communication controller which sends the identification information stored in said memory to said computer in response to power on of at least one of said display unit and said computer;

wherein said communication controller enables bi-directional communication between said display and said computer.

39. A display unit according to claim 38, further comprising a deflection circuit, wherein the processor generates control signals for the deflection circuit.--

IN THE ABSTRACT OF THE DISCLOSURE:

Please amend the abstract as follows:

ABSTRACT OF THE DISCLOSURE

A display unit having a communication control circuit for communicating with an externally connected computer[, wherein the] and which enables bi-directional communication with the display unit and the computer. The communication control circuit includes a comparator for comparing first identification information which is previously stored in said display unit and second identification information which is previously stored in the computer and is sent from the computer. The communication control circuit further includes at least one of a communication prohibitor for prohibiting communication between the computer with respect to display control of the display unit, when the first and second

identification information do not match as a result of the comparison by the comparator or communication permitter for enabling communication for display control as a result of a match.



2182

10
2-8-02

520.32696CX4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): ARAI, et al

Serial No.: 09/732,291

Filed: December 8, 2000

For: ~~DISPLAY APPARATUS ENABLED TO CONTROL~~
~~INFORMATION OUTPUT SYSTEM~~
B1-DIRECTIONAL COMMUNICABILITY WITH AN
Group: 2181 EXTERNAL COMPUTER USING IDENTIFICATION
INFORMATION

Examiner: R. Phan

RECEIVED

FEB 06 2002

Technology Center 2100

SUPPLEMENTAL AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

February 4, 2002

Sir:

Supplemental to the Amendment filed December 5, 2001 in response to the Office Action dated July 5, 2001, the following supplemental amendments and remarks are respectfully submitted in connection with the above-identified application.

IN THE SPECIFICATION:

Page 1, please amend the paragraph beginning at line 3 as follows:

CROSS REFERENCE TO RELATED APPLICATION

C2
This application is related to U.S. application Serial No. 09/732,292, filed on the same date, and is a continuation of U.S. application Serial No. 09/265,363, filed March 10,

1999, which is a continuation of U.S. application Serial No. 08/833,346, filed April 4, 1997, now U.S. Patent No.

5,887,147, issued March 23, 1999, which is a continuation of U.S. application Serial No. 08/598,903, filed February 9, 1996, now U.S. Patent No. 5,652,845, issued July 29, 1997, which is a continuation of U.S. application Serial No.

08/190,848, filed February 3, 1994, now abandoned, the subject matter of which is incorporated by reference herein.

REMARKS

By the above supplemental amendment, the specification has been updated to refer to the related copending application.

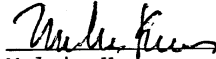
Also, submitted herewith is an Information Disclosure Statement and the appropriate fee so as to obtain consideration of the documents submitted.

In view of the above supplemental amendment and the submission of the Amendment of December 5, 2001, this application should now be in condition for allowance, and issuance of a favorable action is courteously solicited.

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account

No. 01-2135 (520.32696CX4) and please credit any excess fees
to such deposit account.

Respectfully submitted,



Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
(703) 312-6600

520.32696CX4
S.N. 09/732,291

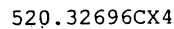
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Page 1, please amend the paragraph beginning at line 3 as follows:

CROSS REFERENCE TO RELATED APPLICATION

This application is related to U.S. application Serial No. 09/732,292, filed on the same date, and is a continuation of U.S. application Serial No. 09/265,363, filed March 10, 1999, which is a continuation of U.S. application Serial No. 08/833,346, filed April 4, 1997, now U.S. Patent No. 5,887,147, issued March 23, 1999, which is a continuation of U.S. application Serial No. 08/598,903, filed February 9, 1996, now U.S. Patent No. 5,652,845, issued July 29, 1997, which is a continuation of U.S. application Serial No. 08/190,848, filed February 3, 1994, now abandoned, the subject matter of which is incorporated by reference herein.



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): I. ARAI, et al

Serial No.: 09/732,291

Filed: December 8, 2000

For: ~~INFORMATION OUTPUT SYSTEM~~

Group: 2181

Examiner: B. Phan

December 8, 2000
 DISPLAY APPARATUS ENABLED TO CONTROL
~~INFORMATION OUTPUT SYSTEM~~
 BI-DIRECTIONAL COMMUNICABILITY WITH EXTERNAL
 COMPUTER USING IDENTIFICATION INFORMATION

INFORMATION DISCLOSURE STATEMENT
UNDER 37 CFR 1.97 & 1.98

Commissioner for Patents
Washington, D.C. 20231

February 4, 2002

Sir:

In the matter of the above-identified application, applicant(s) are submitting herewith a copy of the documents listed in the attached form equivalent to Form PTO-1449 for the Examiner's consideration, noting that the documents marked by an asterisk have already been submitted to the U.S. Patent and Trademark Office.

This information disclosure statement is being submitted before the mailing date of either a final action or a notice of allowance and is accompanied by the fee of \$180.00 set forth in 37 CFR 1.17(p).

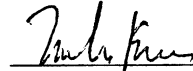
To the extent that, the documents listed on the attached form equivalent to Form PTO-1449, are not in the English language, the requirement of 37 CFR 1.98(a)(3) for a concise

... explanation of the relevance is satisfied by an English language version or corresponding U.S. patent of the document.

It is respectfully requested that this information disclosure statement be considered by the Examiner.

Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (520.32696CX5) and please credit any excess fees to such deposit account.

Respectfully submitted,



Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
Attachments
(703) 312-6600

Form PTO-1449
Equivalent

U.S. Department of Commerce
Patent and Trademark Office

Atty. Docket No. 520.32696CX4
Serial No. 09/732,291
Applicant: ARAI, et al
Filing Date: December 8, 2000
Group: 2181

U.S. Patent Documents

Examiner Initials	Document No.	Date	Name	Class Subclass	Filing Date If Approp.
RP	4,169,262	9/79	Schwartz et al	340/744	
	4,177,462	12/79	Chung	340/703	
	4,197,590	4/80	Sukonick et al	364/900	
	4,342,029	7/82	Hofmanis et al	340/703	
RP	4,882,687	11/89	Gordon	364,518	

Foreign Patent Documents

Document	Date	Country	Class Subclass	Translation
----------	------	---------	----------------	-------------

Other Documents (including Author, Title, Date, Pertinent Pages, etc.)

- RP "Display Function Identification", IBM Technical Disclosure Bulletin, Vol. 28, No. 12, pps. 5568-5579, May 1980
- RP "Monitor Identification Technique", IBM Technical Disclosure Bulletin, Vol. 30, No. 2, pps. 839-840, July 1987
- RP "Display Controller Set up as a Function of Display Monitor Type, Display Jumper Settings and Amount of Vram", IBM Technical Disclosure Bulletin, Vol. 33, No. 2, pps. 352-353, July 1990
- RP "Improved Method of Monitor Identification and Mode Control", IBM Technical Disclosure Bulletin, Vol. 33, No. 5, pps. 289-291, October 1990
- RP "Improvements to Display Identification", IBM Technical Disclosure Bulletin, Vol. 33, No. 6B, pps. 83-85, pps. 83-85
- RP "Self-Identification Protocol Initialization", IBM Technical Disclosure Bulletin, Vol. 33, No. 10A, pps. 406-407, March 1991

Examiner RAYMOND PHAN

Date Considered
4-14-02

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

FORM PTO-1449 (REV. 7-80)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTY. DOCKET NO. 520.32696CX4	SERIAL NO. 09/732,291	
LIST OF DOCUMENTS CITED BY APPLICANT (Use several sheets if necessary)				APPLICANT I. ARAI et al		GROUP 2181
FEB 0 6 2002 OIP TRADEMARK OFFICE				U.S. PATENT DOCUMENTS		
EXAMINER INITIAL	DOCUMENT	DATE	NAME	CLASS	SUBCLASS	FILING DATE (If Appropriate)
RP	AA 5,270,821	12/14/93	Samuels			
RP	AB 5,241,281	08/31/93	Wilkes et al			
RP	AC 5,227,881	07/13/93	Wess et al			
RP	AD 5,150,109	09/22/92	Berry			
RP	AE 5,138,305	08/11/92	Tomiyasu			
RP	AF 5,012,339	04/30/91	Kurata et al			
RP*	AG 4,991,023	02/05/91	Nicols			
RP	AH 4,775,857	10/04/88	Staggs			
RP	AI 4,743,968	05/10/88	Mogi et al			
RP	AJ 4,680,647	07/14/87	Moriyama			
RP	AK 4,626,892	12/02/86	Nortrup et al			
FOREIGN PATENT DOCUMENTS						
	DOCUMENT	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES NO
RP *	AL 1-321475	12/1/87	Japan			<input type="checkbox"/> <input type="checkbox"/>
RP *	AM 3722169A1	11/1/89	Germany			<input type="checkbox"/> <input type="checkbox"/>
RP	AN 2-103592	04/16/90	Japan			<input type="checkbox"/> <input type="checkbox"/>
RP	AO 2-127688	05/16/90	Japan			<input type="checkbox"/> <input type="checkbox"/>
RP	AP 3-160494	07/10/91	Japan			<input type="checkbox"/> <input type="checkbox"/>
OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, etc.)						
RP	AR	Barco n.v. Video & Communications, The Calibrator Explained, Part 1, April 1990, pp. 1-40.				
RP	AS	NASA Tech Brief, "Interface for Color-Video Monitor", April 1988, pp. 246-247.				
	AT					
EXAMINER RAYMOND PHAN			DATE CONSIDERED 4-18-02			

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

FORM PTO-1449 (REV. 7-80)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTY. DOCKET NO. 520.32696CX4	SERIAL NO. 09/732,291	
U.S. PATENT DOCUMENTS CITED BY APPLICANT (Indicate on several sheets if necessary)				APPLICANT I. ARAI et al	GROUP 2181	
U.S. PATENT DOCUMENTS						
* EXAMINER INITIALS	DOCUMENT	DATE	NAME	CLASS	SUBCLASS	FILING DATE (If Appropriate)
RP	AA 4,574,279	03/04/86	Roberts			
	AB 4,159,480	06/26/79	Tachi			
	AC 4,990,904	02/00/91	Zenda			
	AD 5,396,593	03/07/95	Mori et al			
	AE 4,736,324	04/00/88	Sainen et al			
	AF 5,068,732	11/00/91	Satoh			
	AG 5,159,683	10/00/92	Lvovsky et al			
	AH 5,251,031	10/00/93	Tagami			
*	AI 5,276,458	01/00/94	Sawdon			
	AJ 5,315,695	05/00/94	Saito et al			
RP*	AK 5,457,473	10/00/95	Arai et al			
FOREIGN PATENT DOCUMENTS						
	DOCUMENT	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES NO
RP	AL 2-127688	05/16/90	Japan			<input type="checkbox"/> <input type="checkbox"/>
	AM 3-160494	07/10/91	Japan			<input type="checkbox"/> <input type="checkbox"/>
	AN 3-56993	03/1991	Japan			<input type="checkbox"/> <input type="checkbox"/>
*	AO 3-116093	05/1991	Japan			<input type="checkbox"/> <input type="checkbox"/>
RP*	AP 0456923A1	11/1991	Europe			<input type="checkbox"/> <input type="checkbox"/>
OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, etc.)						
	AR					
	AS					
	AT					
EXAMINER RAYMOND PHAN				DATE CONSIDERED 4-18-02		
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.						

FORM PTO-1449 (REV. 7-80)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTY. DOCKET NO. 520.32696CX4	SERIAL NO. 09/732,291	
LIST OF DOCUMENTS CITED BY APPLICANT (Use several sheets if necessary)				APPLICANT I. ARAI et al	FILING DATE Dec. 8, 2000	
				GROUP 2181		
U.S. PATENT DOCUMENTS						
* EXAMINER INITIAL	DOCUMENT	DATE	NAME	CLASS	SUBCLASS	FILING DATE (If Appropriate)
RP	AA 5,506,602	04/00/96	Yokoyama			
	AB 5,309,174	05/00/94	Minkus			
	AC 5,576,735	11/00/96	Kikuchi et al			
	AD 4,641,262	2/3/87	Bryan et al			
	AE 4,970,655	11/13/90	Winn et al			
	AF 5,150,109	9/22/92	Berry			
RP	AG 4,589,063	5/13/86	Shah et al			
	AH					
	AI					
	AJ					
	AK					
FOREIGN PATENT DOCUMENTS						
	DOCUMENT	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES NO
RP	AL 61-16643	01/30/86	Japan			<input type="checkbox"/> <input type="checkbox"/>
*	AM 456923A1	11/21/91	Europe			<input type="checkbox"/> <input type="checkbox"/>
	AN					<input type="checkbox"/> <input type="checkbox"/>
	AO					<input type="checkbox"/> <input type="checkbox"/>
	AP					<input type="checkbox"/> <input type="checkbox"/>
OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, etc.)						
	AR					
	AS					
	AT					
EXAMINER RAYMOND PHAN				DATE CONSIDERED 4-14-02		

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 02-103592

(43)Date of publication of application : 16.04.1990

(51)Int.Cl. G09G 5/00
G09G 5/36

(21)Application number : 63-258040 (71)Applicant : NEC KANSAI LTD

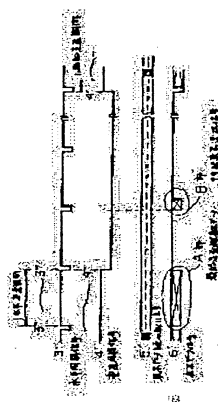
(22)Date of filing : 13.10.1988 (72)Inventor : IWATA KOZO

(54) DISPLAY DEVICE

(57)Abstract:

PURPOSE: To automatically enable special display always in an adequate scene by forming the display device in such a manner that the display method of the display device can be changed by the signal inserted into a display signal line during a vertical synchronization period.

CONSTITUTION: The operation selection of a special display function is automatically executed by the display method selection signal inserted into the display signal line in the vertical synchronization period when there are no more display data signal. Namely, the period from 3'' to 3''' in the horizontal synchronizing signal 3' corresponds to one scanning of the display and the display data for one scanning line is read by repetition of reading of one picture element data. The display for one scanning is thus executed. Display of one picture element can be made by repeating this processing for the period from 4'' to 4''' of the vertical synchronizing signal 4' and the stable images are displayed by repeating this display about 20 times in one second. The automatic display by control with a computer, etc., is possible in this way and the display by the display method most suitable for the processing scene is enabled.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

<http://www1.ipdl.ipo.go.jp/PA1/result/detail/main/wAAAa13390DA402103592P1.htm> 01/10/03

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 02-103592

(43)Date of publication of application : 16.04.1990

(51)Int.Cl.

G09G 5/00
G09G 5/36

(21)Application number : 63-258040

(71)Applicant : NEC KANSAI LTD

(22)Date of filing : 13.10.1988

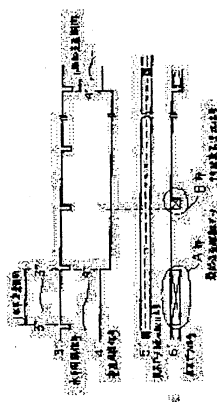
(72)Inventor : IWATA KOZO

(54) DISPLAY DEVICE

(57)Abstract:

PURPOSE: To automatically enable special display always in an adequate scene by forming the display device in such a manner that the display method of the display device can be changed by the signal inserted into a display signal line during a vertical synchronization period.

CONSTITUTION: The operation selection of a special display function is automatically executed by the display method selection signal inserted into the display signal line in the vertical synchronization period when there are no more display data signal. Namely, the period from 3'' to 3''' in the horizontal synchronizing signal 3' corresponds to one scanning of the display and the display data for one scanning line is read by repetition of reading of one picture element data. The display for one scanning is thus executed. Display of one picture element can be made by repeating this processing for the period from 4'' to 4''' of the vertical synchronizing signal 4' and the stable images are displayed by repeating this display about 20 times in one second. The automatic display by control with a computer, etc., is possible in this way and the display by the display method most suitable for the processing scene is enabled.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

<http://www1.ipdl.jpo.go.jp/PA1/result/detail/main/wAAAA13390DA402103592P1.htm> 01/10/03

Searching PAJ

2/2 ページ

[Date of extinction of right]

Copyright (C); 1998,2000 Japan Patent Office

<http://www1.ipdl.jpo.go.jp/PA1/result/detail/main/wAAAa13390DA402103592P1.htm> 01/10/03

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 03-160494

(43)Date of publication of application : 10.07.1991

(51)Int.Cl.

G09G 5/00
G06F 3/153

(21)Application number : 01-291399

(71)Applicant : INTERNATL BUSINESS MACH
CORP <IBM>

(22)Date of filing : 10.11.1989

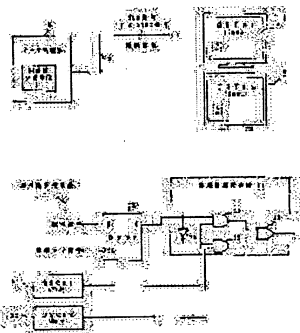
(72)Inventor : MORI MASAYA
MORIMOTO YUTAKA

(54) DATA PROCESSOR

(57)Abstract:

PURPOSE: To supply data signals and control signals to a data display means without the need of the switching operation of a switch kind by an operator by providing an identification signal generation means in the data display means and providing a frequency decision means for making a decision corresponding to identification signals in a data processing means.

CONSTITUTION: When a first CRT monitor 1 is connected through a cable 3 to the data processing means 5, the identification signals for which a bit pattern is '1' are supplied to the data processing means 5 and RGB signals (video signals) as the data signals and H-SYNC signals (horizontal synchronizing signals) and V-SYNC signals (vertical synchronizing signals) as the control signals are supplied to the first CRT monitor 1. The data processing means 5 is provided with the frequency decision means 11, the frequency of the data signals and the control signals to be transferred is decided corresponding to the identification signals and the data signals and the control signals are supplied to the CRT 1 by the frequency decided by the frequency decision means 11. Thus, without the need of the switching operation of the switch kind by the operator, the data signals and the control signals are supplied from the data processing means to the data display means.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

Searching PAJ

2/2 ページ

[Number of appeal against examiner's decision
of rejection]

[Date of requesting appeal against examiner's
decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2000 Japan Patent Office

<http://www1.ipdl.jpo.go.jp/PA1/result/detail/main/wAAAa13390DA403160494P1.htm> 01/10/03

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 03-056993

(43)Date of publication of application : 12.03.1991

(51)Int.Cl.

G09G 3/36
G02F 1/13
G02F 1/133

(21)Application number : 01-193624

(71)Applicant : HITACHI LTD
HITACHI VIDEO ENG CO LTD

(22)Date of filing : 26.07.1989

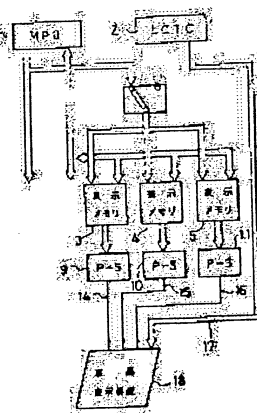
(72)Inventor : NISHIOKA KIYOKAZU
TSUCHIYA NOBUO
MANO HIROYUKI

(54) DISPLAY SYSTEM AND LIQUID CRYSTAL DISPLAY DEVICE

(57)Abstract:

PURPOSE: To reduce the quantity of data required to be transmitted between a host device and a liquid crystal display device by providing the host device outputting logical display information and the display device converting the logical information to physical display information and making the information into a video.

CONSTITUTION: A system is provided with the host device 1, and the display device 18 converting the input of the logical display information to the physical display information and making the information into the video. The logical display information is read out by the display memories 3-5 and converted into serial data at parallel/serial converting circuits 9-11, and the converted serial data is outputted to the liquid crystal device 18. By paying attention to the fact that the logical information is restricted, and by directly outputting the logical display information to the liquid crystal display device 18, the quantity of the transmitted data and the number of the signal lines of cables connected to the liquid display device 18 can be reduced.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

<http://www1.ipdl.jpo.go.jp/PA1/result/detail/main/wAAAa15049DA403056993P1.htm> 01/10/03

Searching PAJ

2/2 ページ

[Number of appeal against examiner's decision
of rejection]

[Date of requesting appeal against examiner's
decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2000 Japan Patent Office

<http://www1.ipdl.jpo.go.jp/PA1/result/detail/main/wAAAa15049DA403056993P1.htm> 01/10/03

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 03-056993
 (43)Date of publication of application : 12.03.1991

(51)Int.Cl. G09G 3/36
 G02F 1/13
 G02F 1/133

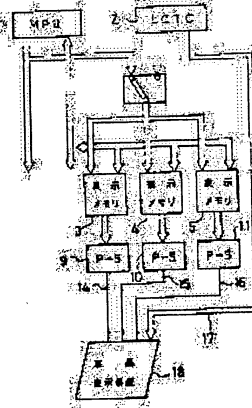
(21)Application number : 01-193624 (71)Applicant : HITACHI LTD
 HITACHI VIDEO ENG CO LTD
 (22)Date of filing : 26.07.1989 (72)Inventor : NISHIOKA KIYOKAZU
 TSUCHIYA NOBUO
 MANO HIROYUKI

(54) DISPLAY SYSTEM AND LIQUID CRYSTAL DISPLAY DEVICE

(57)Abstract:

PURPOSE: To reduce the quantity of data required to be transmitted between a host device and a liquid crystal display device by providing the host device outputting logical display information and the display device converting the logical information to physical display information and making the information into a video.

CONSTITUTION: A system is provided with the host device 1, and the display device 18 converting the input of the logical display information to the physical display information and making the information into the video. The logical display information is read out by the display memories 3-5 and converted into serial data at parallel/serial converting circuits 9-11, and the converted serial data is outputted to the liquid crystal device 18. By paying attention to the fact that the logical information is restricted, and by directly outputting the logical display information to the liquid display device 18, the quantity of the transmitted data and the number of the signal lines of cables connected to the liquid display device 18 can be reduced.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

<http://www1.ipdl.jpo.go.jp/PA1/result/detail/main/wAAAa15049DA403056993P1.htm> 01/10/03

[Number of appeal against examiner's decision
of rejection]

[Date of requesting appeal against examiner's
decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2000 Japan Patent Office

<http://www1.ipdl.jpo.go.jp/PA1/result/detail/main/wAAAa15049DA403056993P1.htm> 01/10/03

P4A

Notice of Allowability	Application No.	Applicant(s)	
	09/732,291	Arai et al.	
	Examiner	Art Unit	
	Raymond Phan	2181	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance and Issue Fee Due or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the amendment and remarks filed on Feb 6, 2002.
2. ☒ The allowed claim(s) is/are 1-2, 4-5, 7-10, 12-16, 18-26, 36-39 (Now 1-26).
3. ☐ The drawings filed on _____ are acceptable as formal drawings.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.
5. ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**


6. ☐ Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient. A SUBSTITUTE OATH OR DECLARATION IS REQUIRED.
7. ☐ Applicant MUST submit NEW FORMAL DRAWINGS
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review(PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No. _____.
 - (b) ☐ including changes required by the proposed drawing correction filed _____, which has been approved by the examiner.
 - (c) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings. The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.
8. ☐ Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Any reply to this letter should include, in the upper right hand corner, the APPLICATION NUMBER (SERIES CODE / SERIAL NUMBER). If applicant has received a Notice of Allowance and Issue Fee Due, the ISSUE BATCH NUMBER and DATE of the NOTICE OF ALLOWANCE should also be included.

Attachment(s)

1 <input type="checkbox"/> Notice of References Cited (PTO-892) 3 <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 5 <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449), Paper No. <u>7-8.</u> 7 <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material	2 <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) 4 <input type="checkbox"/> Interview Summary (PTO-413), Paper No. _____ 6 <input type="checkbox"/> Examiner's Amendment/Comment 8 <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance 9 <input type="checkbox"/> Other
---	---


PETER WONG
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

Allowable Subject Matter

1. Claims 1-2, 4-5, 7-10, 12-16, 18-26, 36-39 are allowable over the prior art of records.
2. The instant application is deemed to be directed to an unobvious improvement over the invention patented in the combination of Pat. No. 5,276,458 and 4,991,023. The improvement features comprises a display unit having communication control circuit for communicating with an externally connected computer wherein the communication control circuit enables bi-directional communication with the display unit and the computer. The examiner agreed to allow the case after incorporating the above allowable features into the claims 1, 4, 7, 12, 18-26, 36, and 38.
3. Any comments considered necessary by applicant must be submitted no later than the payment of the Issue Fee and, to avoid processing delays, should preferable **accompany** the Issue Fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Raymond Phan, whose telephone number is (703) 306-2756. The examiner can normally be reached on Monday-Friday from 7:30AM-4:00 PM.

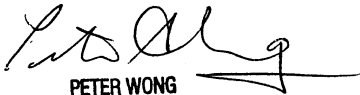
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Wong can be reached on (703) 305-3477 or via e-mail addressed to peter.wong@uspto.gov. The fax phone number for this Group is (703) 746-7238.

Communications via Internet e-mail regarding this application, other than those under 35 U.S.C. 132 or which otherwise require a signature, may be used by the applicant and should be addressed to [raymond.phan@uspto.gov].

All Internet e-mail communications will be made of record in the application file. PTO employees do not engage in Internet communications where there exists a possibility that sensitive information could be identified or exchanged unless the record includes a properly signed express waiver of the confidentiality requirements of 35 U.S.C. 122. This is more clearly set forth in the Interim Internet Usage Policy published in the Official Gazette of the Patent and Trademark on February 25, 1997 at 1195 OG 89.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3900.

Raymond Phan
April 18, 2002 *RP*


PETER WONG
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

020457 7590 04/22/2002
ANTONELLI TERRY STOUT AND KRAUS
SUITE 1800
1300 NORTH SEVENTEENTH STREET
ARLINGTON, VA 22209

EXAMINER

PHAN, RAYMOND NGAN

ART UNIT

CLASS-SUBCLASS

2181

710-305000

DATE MAILED: 04/22/2002

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,291	12/08/2000	Ikuya Arai	520.32696CX4	2674

TITLE OF INVENTION: DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WITH COMPUTER

TOTAL CLAIMS	APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
26	nonprovisional	NO	\$1280	\$300	\$1580	07/22/2002

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS** FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above. If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is changed, pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above and notify the United States Patent and Trademark Office of the change in status, or

B. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check the box below and enclose the PUBLICATION FEE and 1/2 the ISSUE FEE shown above.

☐ Applicant claims SMALL ENTITY status.
See 37 CFR 1.27.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Box ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and mail this form, together with applicable fee(s), to:

Box ISSUE FEE
Assistant Commissioner for Patents
Washington, D.C. 20231

MAILING INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Legibly mark-up with any corrections or use Block 1)

020457 7590 04/22/2002

ANTONELLI TERRY STOUT AND KRAUS
SUITE 1800
1300 NORTH SEVENTEENTH STREET
ARLINGTON, VA 22209

Note: The certificate of mailing below can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing.

Certificate of Mailing

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Box Issue Fee address above on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,291	12/08/2000	Ikuya Arai	520.32696CX4	2674

TITLE OF INVENTION: DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WITH COMPUTER

TOTAL CLAIMS	APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
26	nonprovisional	NO	\$1280	\$300	\$1580	07/22/2002

EXAMINER	ART UNIT	CLASS-SUBCLASS
PHAN, RAYMOND NGAN	2181	710-305000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363). Use of PTO form(s) and Customer Number are recommended, but not required.</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47) attached.</p>	<p>2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.</p> <p>1 _____</p> <p>2 _____</p> <p>3 _____</p>
--	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) ☐ individual ☐ corporation or other private group entity ☐ government

4a. The following fee(s) are enclosed:

- ☐ Issue Fee
- ☐ Publication Fee
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s):

- ☐ A check in the amount of the fee(s) is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Commissioner is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

The COMMISSIONER OF PATENTS AND TRADEMARKS is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

(Authorized Signature)	(Date)
<p>NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.</p> <p>Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending on the needs of the individual case. Any comments on the amount of time required to complete this form should be sent to the Chief Information Officer, United States Patent and Trademark Office, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND FEES AND THIS FORM TO: Box Issue Fee, Assistant Commissioner for Patents, Washington, D.C. 20231</p> <p>Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.</p>	

TRANSMIT THIS FORM WITH FEE(S)

PTOL-85 (REV. 07-01) Approved for use through 01/31/2004. OMB 0651-0033

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,291	12/08/2000	Ikuya Arai	520.32696CX4	2674
EXAMINER				
PHAN, RAYMOND NGAN				
ART UNIT			PAPER NUMBER	
2181				
DATE MAILED: 04/22/2002				

020457 7590 04/22/2002
ANTONELLI TERRY STOUT AND KRAUS
SUITE 1800
1300 NORTH SEVENTEENTH STREET
ARLINGTON, VA 22209

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The patent term adjustment to date is 0 days. If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the term adjustment will be 0 days.

If a continued prosecution application (CPA) was filed in the above-identified application, the filing date that determines patent term adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) system. (<http://pair.uspto.gov>)

REQUEST FOR CONTINUED EXAMINATION (RCE) TRANSMITTAL	
<p>Address to: Commissioner for Patents, Box RCE, Washington, DC 20231</p>	
Application Number	09/732,291 #13
Filing Date	December 8, 2000
First Named Inventor	I. ARAI, et al
Art Unit	2181
Examiner Name	B. Phan
Attorney Docket Number	520.32696CX4

This is a Request for Continued Examination (RCE) under 37 C.F.R. § 1.114 of the above-identified application. Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. ☒ Submission required under 37 C.F.R. § 1.114

a. ☐ Previously submitted

i. ☐ Consider the amendment(s)/reply under 37 C.F.R. § 1.116 previously filed on _____
(Any unentered amendment(s) referred to above will be entered).

ii. ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

iii. ☐ Other _____

b. ☒ Enclosed

i. ☐ Amendment/Reply

ii. ☐ Affidavit(s)/Declaration(s)

iii. ☒ Information Disclosure Statement (IDS)

iv. ☐ Other _____

2. ☒ Miscellaneous

a. ☐ Suspension of action on the above-identified application is requested under 37 C.F.R. § 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 C.F.R. § 1.17(i) required)

b. ☐ Other _____

3. ☒ Fees The RCE fee under 37 C.F.R. § 1.17 (e) is required by 37 C.F.R. § 1.114 when RCE is filed.

a. ☒ The Director is hereby authorized to charge the following fees, or credit any overpayments, to Deposit Account No. 01-2135

i. ☒ RCE fee required under 37 C.F.R. § 1.17 (e)

ii. ☐ Extension of time fee (37 C.F.R. §§ 1.136 and 1.17)

iii. ☐ Other _____

b. ☐ Check in the amount of \$ _____ enclosed

c. ☒ Payment by credit card (Form PTO-2038 enclosed)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Name (Print/Type)	Melvin Kraus	Registration No. (Attorney/Agent)	22,466
Signature	<i>Melvin Kraus</i>	Date	June 4, 2002

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner For Patents, Box RCE, Washington, DC 20231, or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below:

Name (Print/Type)		Date	
Signature			

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND Fees and Completed Forms to the following address: Assistant Commissioner for Patents, Box RCE, Washington, DC 20231.

06/05/2002 MGBREM1 00000004 09732291

01 FC:179

740.00 OP

06/05/2002 MGBREM1 00000004 09732291

01 FC:179

740.00 OP

#14

520.32696CX4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): I. ARAI, et al

Serial No.: 09/732,291

Filed: December 8, 2000

For: INFORMATION OUTPUT SYSTEM

Group: 2181

Examiner: R. Phan

Received

APR 16 2002

Technology Center 2100

INFORMATION DISCLOSURE STATEMENT
UNDER 37 CFR 1.97 & 1.98

Commissioner for Patents
Washington, D.C. 20231

April 16, 2002

Sir:

In the matter of the above-identified application, applicant(s) is/are submitting herewith a copy of the document listed in the attached form equivalent to Form PTO-1449 for the Examiner's consideration.

This information disclosure statement is being submitted before the mailing date of either a final action or a notice of allowance and is accompanied by the following certification specified in 37 CFR 1.97(e).

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application or, to the knowledge of the person signing the certification after making reasonable inquiry, was known to any individual designated in §1.56(c) more than three months period to the filing of the statement.

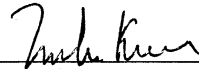
Match & Return

Each of the documents listed on the attached form
equivalent to Form PTO-1449 is in the English language.

It is respectfully requested that this information
disclosure statement be considered by the Examiner.

Please charge any shortage in the fees due in connection
with the filing of this paper, including extension of time
fees, to Deposit Account No. 01-2135 (520.32696CX4) and
please credit any excess fees to such deposit account.

Respectfully submitted,



Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
Attachments
(703) 312-6600

Form PTO-1449 U.S. Department of Commerce
Equivalent Patent and Trademark Office

Atty. Docket No. 520.32696CX4
Serial No. 09/732,291
Applicant: I. ARAI, et al
Filing Date: December 8, 2000
Group: 2181

U.S. Patent Documents

Examiner Initials	Document No.	Date	Name	Class Subclass	Filing Date If Approp.
----------------------	-----------------	------	------	----------------	---------------------------

/

Foreign Patent Documents

Document No.	Date	Country	Class Subclass	Translation Yes No
-----------------	------	---------	----------------	-----------------------

/

Other Documents (including Author, Title, Date, Pertinent Pages, etc.)

EX "ACCESS.bus, an Open Desktop Bus", Peter A. Sichel, Digital Technical
Journal, Vol. 3, No. 4, Fall 1991

Examiner

RAYMOND PHAN

Date Considered

6-27-02

*Examiner: Initial if reference considered, whether or not citation is in
conformance with MPEP 609; Draw line through citation if not in conformance
and not considered. Include copy of this form with next communication to
applicant.



520.32696CX4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): I. ARAI, et al

Serial No.: 09/732,291

Filed: December 8, 2000

For: DISPLAY UNIT AND METHOD ENABLING BI-DIRECTIONAL
COMMUNICATION WITH VIDEO SOURCE

Group: 2181

Examiner: B. Phan

INFORMATION DISCLOSURE STATEMENT
UNDER 37 CFR 1.97 & 1.98

Commissioner for Patents
Washington, D.C. 20231

June 4, 2002

Sir:

In the matter of the above-identified application,
applicant(s) is/are submitting herewith a copy of the
documents listed in the attached form equivalent to Form PTO-
1449 for the Examiner's consideration.

This information disclosure statement is being submitted
with the accompanying RCE transmittal.

To the extent that, the documents listed on the attached
form equivalent to Form PTO-1449, are not in the English
language, the requirement of 37 CFR 1.98(a)(3) for a concise
explanation of the relevance is satisfied by an English
language abstract or translation.

It is respectfully requested that this information
disclosure statement be considered by the Examiner.

Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (520.32696CX4) and please credit any excess fees to such deposit account.

Respectfully submitted,



Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
Attachments
(703) 312-6600

Form PTO-1449
Equivalent

U.S. Department of Commerce
Patent and Trademark Office

Atty. Docket No. 520.32696CX4
Serial No. 09/732,291
Applicant: I. ARAI, et al
Filing Date: December 8, 2000
Group: 2181



U.S. Patent Documents

Examiner Initials	Document No.	Date	Name	Class Subclass	Filing Date If Approp.
RP	4,007,443	2/77	Bromberg et al		
RP	4,415,985	11/83	McDaniel et al		
RP	4,727,947	3/88	Naito		
RP	6,057,812	5/00	Arai et al		

RECEIVED
JUN 07 2002
Technology Center 2100

Foreign Patent Documents

Document No.	Date	Country	Class Subclass	Translation Yes No
RP	2-127688	5/90	Japan	(abstract)
RP	2-257196	10/90	Japan	(abstract)
RP	3-118595	5/91	Japan	(abstract)
RP	4-21024	1/92	Japan	(abstract)

Other Documents (including Author, Title, Date, Pertinent Pages, etc.)

Examiner

RAYMOND PHAN

6-27-02
Date Considered

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 02-127688

(43)Date of publication of application : 16.05.1990

(51)Int.Cl. G09G 5/18

(21)Application number : 63-281900

(71)Applicant : NEC CORP

(22)Date of filing : 07.11.1988

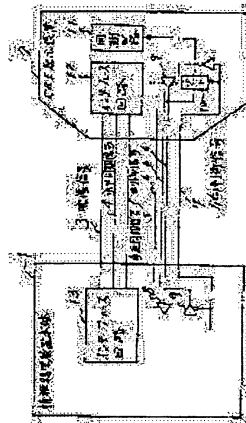
(72)Inventor : MATSUBARA KIYOTAKA

(54) CONTROL SYSTEM FOR CATHODE-RAY TUBE DISPLAY DEVICE

(57)Abstract:

PURPOSE: To interchange data between a main body and the CRT display device by adding a two-way control signal between the main body and CRT display device.

CONSTITUTION: The control signal 6 is connected to an input buffer 8 and an output buffer 9 on the side of the information processor main body 1 and connected to an output buffer 9 and a latch 10 on the side of the CRT display device 2. When a synchronizing frequency is set, a direction control signal 7 is held at L level to direct the control signal 6 from the information processor main body 1 to the CRT display device 2, and the numeral determined by the specification previously is sent to the CRT display device 2. When the CRT device identification number is sent, the direction control signal 7 is held at H level to direct the control signal 6 from the CRT display device 2 to the information processor main body 1, and the predetermined number characteristic to the device is outputted to the information processor main body 1.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Searching PAJ

2/2 ページ

Copyright (C); 1998,2000 Japan Patent Office

<http://www1.ipdl.jpo.go.jp/PA1/result/detail/main/wAAAa13390DA402127688P1.htm> 01/10/03

Notice of Allowability	Application No.	Applicant(s)	
	09/732,291	ARAI ET AL.	
	Examiner	Art Unit	
	Raymond Phan	2181	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the Information Disclosure Statement filed on June 20, 2002.
2. ☒ The allowed claim(s) is/are 1-2, 4-5, 7-10, 12-16, 18-26, 36-39 (Now 1-26).
3. ☒ The drawings filed on 08 December 2000 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: ____.
5. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 - (a) ☐ The translation of the foreign language provisional application has been received.
6. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE**

7. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
8. ☐ CORRECTED DRAWINGS must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No. ____.
 - (b) ☐ including changes required by the proposed drawing correction filed ____, which has been approved by the Examiner.
 - (c) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. ____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the top margin (not the back) of each sheet. The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.
9. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1 <input type="checkbox"/> Notice of References Cited (PTO-892) 3 <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 5 <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449), Paper No. <u>14.15</u> 7 <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material	2 <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) 4 <input type="checkbox"/> Interview Summary (PTO-413), Paper No. ____ 6 <input type="checkbox"/> Examiner's Amendment/Comment 8 <input type="checkbox"/> Examiner's Statement of Reasons for Allowance 9 <input type="checkbox"/> Other
--	---

PETER WONG
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

020457 7590 06/28/2002
ANTONELLI TERRY STOUT AND KRAUS
SUITE 1800
1300 NORTH SEVENTEENTH STREET
ARLINGTON, VA 22209

EXAMINER

PHAN, RAYMOND NGAN

ART UNIT

CLASS-SUBCLASS

2187

710-305000

DATE MAILED: 06/28/2002

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,291	12/08/2000	Ikuya Arai	520.32696CX4	2674

TITLE OF INVENTION: DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WITH COMPUTER

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1280	\$300	\$1580	09/30/2002

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.**

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above. If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

- A. If the status is changed, pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above and notify the United States Patent and Trademark Office of the change in status, or
- B. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check the box below and enclose the PUBLICATION FEE and 1/2 the ISSUE FEE shown above.

- ☐ Applicant claims SMALL ENTITY status.
See 37 CFR 1.27.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Box ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail Box ISSUE FEE
Commissioner for Patents
Washington, D.C. 20231
Fax (703)746-4000**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Legibly mark-up with any corrections or use Block 1)

020457 7590 06/28/2002

ANTONELLI TERRY STOUT AND KRAUS
SUITE 1800
1300 NORTH SEVENTEENTH STREET
ARLINGTON, VA 22209

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Box Issue Fee address above, or being facsimile transmitted to the USPTO, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,291	12/08/2000	Ikuya Arai	520.32696CX4	2674

TITLE OF INVENTION: DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WITH COMPUTER

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1280	\$300	\$1580	09/30/2002

EXAMINER	ART UNIT	CLASS-SUBCLASS
PHAN, RAYMOND NGAN	2181	710-305000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47) attached. Use of a Customer Number is required.</p>	<p>2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p>
--	--

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY AND STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) ☐ individual ☐ corporation or other private group entity ☐ government

4a. The following fee(s) are enclosed:

- ☐ Issue Fee
- ☐ Publication Fee
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s):

- ☐ A check in the amount of the fee(s) is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Commissioner is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

Commissioner for Patents is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

(Authorized Signature)

(Date)

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant, a registered attorney or agent, or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, Washington, DC 20231.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMIT THIS FORM WITH FEE(S)

PTOL-85 (REV. 04-02) Approved for use through 01/31/2004. OMB 0651-0033

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,291	12/08/2000	Ikuya Arai	520.32696CX4	2674
020457	7590	06/28/2002	EXAMINER	
ANTONELLI TERRY STOUT AND KRAUS SUITE 1800 1300 NORTH SEVENTEENTH STREET ARLINGTON, VA 22209			PHAN, RAYMOND NGAN	
			ART UNIT	PAPER NUMBER
			2181	16
DATE MAILED: 06/28/2002				

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The patent term adjustment to date is 0 days. If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the term adjustment will be 0 days.

If a continued prosecution application (CPA) was filed in the above-identified application, the filing date that determines patent term adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) system. (<http://pair.uspto.gov>)



J.32696CX4

PART B - FEE(S) TRANSMITTAL

Complete and mail this form together with applicable fee(s), to: Mail Box ISSUE FEE
Commissioner for Patents
Washington, D.C. 20231
Fax (703)746-4800

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

020457 7590 06/28/2002
ANTONELLI TERRY STOUT AND KRAUS
SUITE 1800
1300 NORTH SEVENTEENTH STREET
ARLINGTON, VA 22209

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Box Issue Fee address above, or being facsimile transmitted to the USPTO, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,291	12/08/2000	Ikuya Arai	520.32696CX4	2674

TITLE OF INVENTION: DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WITH COMPUTER

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1280	\$300	\$1580	09/30/2002

EXAMINER	ART UNIT	CLASS-SU/CLASS
PHAN, RAYMOND NGAN	2181	710-305000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

Antonelli, Terry,
Stout & Kraus, LLP
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE (CITY AND STATE OR COUNTRY)

Hitachi, Ltd.

Tokyo, Japan

Please check the appropriate assignee category or categories (will not be printed on the patent) ☐ individual ☒ corporation or other private group entity ☐ government

4a. The following fee(s) are enclosed:

4b. Payment of Fee(s):

☒ Issue Fee☐ A check in the amount of the fee(s) is enclosed.☒ Publication Fee☐ Payment by credit card. Form PTO-2038 is attached.☐ Advance Order - # of Copies _____☐ The Commissioner is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number 01-2125 (enclose an extra copy of this form).

Commissioner for Patents is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

(Authorized Signature)

Melvin Kraus 22,466 7/24/02

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant, a registered attorney or agent, or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, Washington, DC 20231.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMIT THIS FORM WITH FEE(S)

PTOL-85 (REV. 04-02) Approved for use through 01/31/2004. OMB 0651-0033

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

07/25/2002 INVOICE 00000040 0772291

01 FC:195
02 FC:142304.00 00
1280.00 00

RECEIVED
AUG 5 2002
Technology Center 2100

⑦

#176
8-28-02

PTO/SB/30 (10-01)
Approved for use through 10/31/2002. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
This form is a request for continued examination (RCE) under 37 C.F.R. § 1.114 of the above-identified application. Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

REQUEST FOR CONTINUED EXAMINATION (RCE) TRANSMITTAL	
Address to: Commissioner for Patents Box RCE Washington, DC 20231	
Application Number	09/732,291
Filing Date	December 8, 2000
First Named Inventor	I. ARAI, et al
Art Unit	2181
Examiner Name	R. Phan
Attorney Docket Number	520.32696CX4

1. **Submission** required under 37 C.F.R. § 1.114

a. ☐ Previously submitted

i. ☐ Consider the amendment(s)/reply under 37 C.F.R. § 1.116 previously filed on (Any unentered amendment(s) referred to above will be entered).

ii. ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed

iii. ☐ Other _____

b. ☒ Enclosed

i. ☒ Amendment/Reply

ii. ☐ Affidavit(s)/Declaration(s)

iii. ☐ Information Disclosure Statement (IDS)

iv. ☒ Other Petition to Withdraw from Issue & Request for Interview.

2. **Miscellaneous**

a. ☐ Suspension of action on the above-identified application is requested under 37 C.F.R. § 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 C.F.R. § 1.17(f) required)

b. ☐ Other _____

3. **Fees** The RCE fee under 37 C.F.R. § 1.17 (e) is required by 37 C.F.R. § 1.114 when RCE is filed.

a. ☒ The Director is hereby authorized to charge the following fees, or credit any overpayments, to Deposit Account No. 01-2135

i. ☒ RCE fee required under 37 C.F.R. § 1.17 (e)

ii. ☐ Extension of time fee (37 C.F.R. §§ 1.136 and 1.17)

iii. ☐ Other _____

b. ☐ Check in the amount of \$ _____ enclosed

c. ☒ Payment by credit card (Form PTO-2036 enclosed)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2036.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Name (Print/Type)	Mei Yin Klaus	Registration No. (Attorney/Agent)	22,466
Signature	<i>Mei Yin Klaus</i>	Date	August 5, 2002

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner For Patents, Box RCE, Washington, DC 20231, or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below:

Name (Print/Type)		Date	
Signature			

RECEIVED
AUG 5 2002
Technology Center 2100

08/28/2002
01 FC:122 130.00 CH
02 FC:179 740.00 CH
03 FC:102 1092.00 CH
04 FC:103 162.00 CH

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND Fees and Completed Forms to the following address: Assistant Commissioner for Patents, Box RCE, Washington, DC 20231.

117 RCE

PATENT APPLICATION FEE DETERMINATION RECORD Effective December 29, 1999					Application or Docket Number	
CLAIMS AS FILED - PART I						
(Column 1)		(Column 2)				
FOR	NUMBER FILED	NUMBER EXTRA				
BASIC FEE						
TOTAL CLAIMS	29	minus 20=	9			
INDEPENDENT CLAIMS	13	minus 3=	13			
MULTIPLE DEPENDENT CLAIM PRESENT						
* If the difference in column 1 is less than zero, enter "0" in column 2						
CLAIMS AS AMENDED - PART II						
(Column 1)		(Column 2)		(Column 3)		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total	•	Minus	**	=	
	Independent	•	Minus	***	=	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM					
(Column 1)		(Column 2)		(Column 3)		
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total	•	Minus	**	=	
	Independent	•	Minus	***	=	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM					
(Column 1)		(Column 2)		(Column 3)		
AMENDMENT C		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total	•	Minus	**	=	
	Independent	•	Minus	***	=	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM					
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20." *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3." The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.						

SMALL ENTITY TYPE <input type="checkbox"/>		OR	OTHER THAN SMALL ENTITY	
RATE	FEE		RATE	FEE
	345.00	OR		740.00 630.00
X\$ 9=		OR	X\$18=	162.00
X39=		OR	X78=	1092.00
+130=		OR	+260=	
TOTAL		OR	TOTAL	1994

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDI- TIONAL FEE		RATE	ADDI- TIONAL FEE
X\$ 9=		OR	X\$18=	
X39=		OR	X78=	
+130=		OR	+260=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDI- TIONAL FEE		RATE	ADDI- TIONAL FEE
X\$ 9=		OR	X\$18=	
X39=		OR	X78=	
+130=		OR	+260=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDI- TIONAL FEE		RATE	ADDI- TIONAL FEE
X\$ 9=		OR	X\$18=	
X39=		OR	X78=	
+130=		OR	+260=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

RECEIVED
AUG 5 2002
Technology Center 2100

520.32696CX4

181
ack
8-28-02

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): 1. ARI, et al

Serial No.: 09/732,291

Filed: December 8, 2000

For: DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WITH COMPUTER

Group: 2181

Examiner: R. Phan

Attention: Frances Hicks - Office of Publications

RECEIVED
AUG 5 2002
Technology Center 2100

SUBMISSION UNDER 37 CFR 1.114
(AMENDMENT)

Commissioner for Patents
Washington, D.C. 20231

August 5, 2002

Sir:

The following amendments and remarks are respectfully submitted in connection with the above-identified application, noting that an RCE and Petition accompany this Amendment.

IN THE CLAIMS:

Please add the following new claims:

27. A display unit for displaying an image based on an image signal inputted from an externally connected video source, comprising:
a processor adapted to control display of the display unit;
a memory in which at least display unit information is stored, wherein the display unit information includes an identification number for identifying the display unit; and

a communication controller capable of bi-directionally communicating with the video source;

wherein the communication controller communicates the display unit information from the display unit to the video source and the display unit receives a signal from the video source that is generated based on the display unit information.

²⁸₄₁. A display unit according to claim ²⁷₄₀, wherein the video source is a computer.

²⁹₄₂. A display unit according to claim ²⁸₄₁, further comprising a deflection circuit, wherein the processor generates control signals for the deflection circuit.--

REMARKS

By the above amendment, new claims 40-42 have been presented for consideration in the RCE and which recite features which differ from the claims allowed in the parent application.

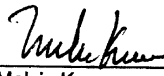
Applicants request that the Examiner contact the undersigned attorney to schedule an interview prior to acting on this application. A separate paper requesting an interview is also submitted herewith.

Applicants request favorable action in this application.

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing

of this paper, including extension of time fees, to Deposit Account No. 01-2135
(520.32696CX4) and please credit any excess fees to such deposit account.

Respectfully submitted,



Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
(703) 312-6600

520.32696CX4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): I. ARAI, et al
Serial No.: 09/732,291
Filed: December 8, 2000
For: DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WITH COMPUTER
Group: 2181
Examiner: R. Phan

REQUEST FOR INTERVIEW

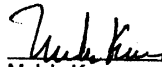
Commissioner for Patents
Washington, D.C. 20231

August 5, 2002

Sir:

Applicants request that the Examiner contact the undersigned attorney to schedule an interview prior to acting on this application.

Respectfully submitted,



Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
(703) 312-6600

#19
9/3/02

520.32696CX4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): ARAI, et al

Serial: 09/732,291

Filed: December 8, 2000

For: DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WITH COMPUTER

Group: 2181

Examiner: R. Phan

Attention: Frances Hicks - Office of Publications

PETITION TO WITHDRAW FROM ISSUE
BASED ON 37 CFR 1.313(c)(2)

Commissioner for Patents
Washington, D.C. 20231

August 5, 2002

Sir:

Applicants, through their attorney, respectfully petition the Commissioner, under 37 CFR 1.313(a) and pursuant to 37 CFR 1.313(c)(2), to withdraw the above-identified application from issue, after payment of the Issue Fee on July 24, 2002.

This petition is being filed concurrently with a Request for Continued Examination (RCE) and Submission, in order to have the Examiner consider the Submission. This concurrently filed Submission includes an Amendment.


Also submitted with this Petition is the necessary fee under 37 CFR 1.17(i). See 37 CFR 1.313(a).

Granting of this Petition, and withdrawal of the above-identified application from issue, in due course, for consideration of the aforementioned Request for Continued Examination (RCE) and of the aforementioned Submission (Amendment), is respectfully requested.

Match & Return

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (520.32696CX4) and please credit any excess fees to such deposit account.

Respectfully submitted,



Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
(703) 312-6600



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
Washington, D.C. 20231
www.uspto.gov

Paper No. 20

ANTONELLI TERRY STOUT AND KRAUS
1300 NORTH SEVENTHEETH STREET
SUITE 1800
ARLINGTON VA 22209

COPY MAILED

SEP 04 2002

In re Application of	:	OFFICE OF PETITIONS
Ikuya Arai et al	:	
Application No. 09/732,291	:	ON PETITION
Filed: December 8, 2000	:	
Attorney Docket No. 520.32696CX4	:	

This is a decision on the petition, filed August 5, 2002, under 37 CFR 1.313(c)(2) to withdraw the above-identified application from issue after payment of the issue fee.


The petition is **GRANTED**.

The above-identified application is withdrawn from issue for consideration of a submission under 37 CFR 1.114 (request for continued examination). See 37 CFR 1.313(c)(2).

Petitioner is advised that the issue fee paid on July 24, 2002 in the above-identified application cannot be refunded. If, however, the above-identified application is again allowed, petitioner may request that it be applied towards the issue fee required by the new Notice of Allowance.¹

Telephone inquiries should be directed to the undersigned at (703) 305-8680.

Upon receipt of the file in the Office of Petitions, the file will be forwarded to Technology Center AU 2181 for processing of the request for continued examination under 37 CFR 1.114 and for consideration of the concurrently filed amendment.


Frances Hicks
Petitions Examiner
Office of Petitions
Office of the Deputy Commissioner
for Patent Examination Policy

¹ The request to apply the issue fee to the new Notice must be made in writing and should be accompanied by the new Issue Fee Transmittal Form PTOL-85(b), along with a copy of this decision. Additionally, if the issue fee has increased from the previously paid issue fee, the balance due must be submitted. **Failure to timely request in writing that the previously paid issue fee be applied towards the new Notice and payment of any balance due will result in the abandonment of the application.**

#21F
9-25-02

520.32696CX4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): I. ARAI, et al

Serial No.: 09/732,291

Filed: December 8, 2000

For: DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WITH COMPUTER

Group: 2181

Examiner: R. Phan

Received

SEP 24 2002

SUPPLEMENTAL AMENDMENT

Technology Center 2100

Commissioner for Patents
Washington, D.C. 20231

September 24, 2002

Sir:

Further to the Amendment filed August 5, 2002, the following supplemental amendment and remarks are respectfully submitted in connection with the above-identified application.

IN THE CLAIMS:

Please amend claim 23 as follows:

19 ~~23~~. (amended) A display unit for displaying an image based upon an image signal inputted from an externally connected computer, comprising:

memory means for storing an identification number for making said computer recognize that said display unit is communicatable with said computer; and

a communication controller means for sending said identification number stored in said memory means to said computer in response to power on of at least one said display unit and said computer,

wherein said communication controller means enables bi-directional communication with said display unit and said computer.

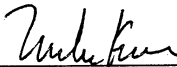
REMARKS

By the above supplemental amendment, claim 23 has been amended to correct a minor error therein.

Entry of the supplemental amendment and favorable action is respectfully requested.

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (520.32696CX4) and please credit any excess fees to such deposit account.

Respectfully submitted,



Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
(703) 312-6600

520.32696CX4
S.N. 09/732,291

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please amend claim 23 as follows:

23. (amended) A display unit for displaying an image based upon an image signal inputted from an externally connected computer, comprising:

memory means for storing an identification number for making said computer recognize that said display unit is communicatable with said computer; and

a communication ~~control~~ controller means for sending said identification number stored in said memory means to said computer in response to power on of at least one said display unit and said computer,

wherein said communication ~~control~~ controller means enables bi-directional communication with said display unit and said computer.

Notice of Allowability	Application No.	Applicant(s)	
	09/732,291	ARAI ET AL.	
	Examiner	Art Unit	
	Raymond Phan	2181	

– The MAILING DATE of this communication appears on the cover sheet with the correspondence address–

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the RCE filed on August 5, 2002.
2. ☒ The allowed claim(s) is/are 1-2, 4-5, 7-9, 12-16, 18-26, 36-42 (Now 1-29).
3. ☒ The drawings filed on 08 December 2000 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

5. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 - (a) ☐ The translation of the foreign language provisional application has been received.
6. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE**


7. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
8. ☐ CORRECTED DRAWINGS must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No. _____.
 - (b) ☐ including changes required by the proposed drawing correction filed _____, which has been approved by the Examiner.
 - (c) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the top margin (not the back) of each sheet. The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.

9. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1 <input type="checkbox"/> Notice of References Cited (PTO-892) 3 <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 5 <input type="checkbox"/> Information Disclosure Statements (PTO-1449), Paper No. _____. 7 <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material	2 <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) 4 <input type="checkbox"/> Interview Summary (PTO-413), Paper No. _____. 6 <input checked="" type="checkbox"/> Examiner's Amendment/Comment 8 <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance 9 <input type="checkbox"/> Other
---	---


RUPAL DHARIA
PRIMARY EXAMINER

Allowable Subject Matter

1. Claims 1-2, 4-5, 7-9, 12-16, 18-26, 36-42 are allowable over the prior art of records.
2. The following is an Examiner's statement of reasons for the indication of allowable subject matter: Claims 1, 4, 7, 12, 18-26, 36, 38, 40, are allowable over the prior art of record because the Examiner found neither prior art cited in its entirety, nor based on the prior art, found any motivation to combine any of the said prior arts which teach or suggest with (1) comparing means for comparing a first identification information and a second identification information; (2) a communication prohibition/permission means or a reception prohibition/permission means; and (3) a communication control circuit enables bi-directional communication with the display unit and the computer (claims 1, 2, 4, 5, 7-10, 12-16, 18-21, 36-40); (1) memory means for storing an identification number for making the computer recognize that the display unit is communicatable with the computer and (2) a communication controller means for sending the identification number stored in the memory means to the computer, wherein the communication control means enables bi-directional communication with the display unit and the computer (claims 22-25); method of communicating between a display unit and a video source where (1) display unit information, including an identification number for uniquely identifying the display unit, is sent from the display unit to the video source; (2) a signal based on the display unit information is sent from the video source to the display unit; and (3) the video source and the display unit communicate bi-directionally (claim 26); (1) a memory which stores display unit information including an identification number and (2) a communication controller which bi-directionally communicates with a video source and communicates the

Application/Control Number: 09/732,291
Art Unit: 2181

Page 3

display unit information from the display unit to the video source and the display unit receives a signal from the video source that is generated based on the display unit information (claims 40-42).

3. Any comments considered necessary by applicant must be submitted no later than the payment of the Issue Fee and, to avoid processing delays, should preferably **accompany** the Issue Fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Raymond Phan, whose telephone number is (703) 306-2756. The examiner can normally be reached on Monday-Friday from 7:30AM-4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Wong can be reached on (703) 305-3477 or via e-mail addressed to peter.wong@uspto.gov. The fax phone number for this Group is (703) 746-7239.

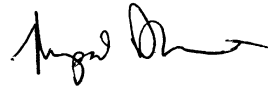
Communications via Internet e-mail regarding this application, other than those under 35 U.S.C. 132 or which otherwise require a signature, may be used by the applicant and should be addressed to [raymond.phan@uspto.gov].

All Internet e-mail communications will be made of record in the application file. PTO employees do not engage in Internet communications where there exists a possibility that sensitive information could be identified or exchanged unless the record includes a properly signed express waiver of the confidentiality requirements of 35 U.S.C. 122. This is more clearly set forth in the Interim Internet Usage Policy published in the Official Gazette of the Patent and Trademark on February 25, 1997 at 1195 OG 89.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3900.


Raymond Phan
September 25, 2002

RUPAL DHARIA
PRIMARY EXAMINER



file copy
EX Amt E

Application/Control Number: 09/732,291
Art Unit: 2181

Page 2

Examiner's Amendment

1. Claims 1-2, 4-5, 7-9, 12-16, 18-26, 36-42 are allowable over the prior art of records.

2. An Examiner's Amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 C.F.R. ' 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the Issue Fee.

Authorization for this Examiner's Amendment was given in a telephone interview with Mr. Melvin Kraus (Reg. #22,466) on September 26, 2002.

3. The application has been amended as follows:

- a. Claim 22 (page 33, lines 21 and 24), replace "control with controller—following "communication".
- b. Claim 36 (page 42, line 9), insert —unit—following "display".
- c. Claim 38 (page 42, line 12), insert —unit—following "display".

4. Any comments considered necessary by applicant must be submitted no later than the payment of the Issue Fee and, to avoid processing delays, should preferable **accompany** the Issue Fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Raymond Phan, whose telephone number is (703) 306-2756. The examiner can normally be reached on Monday-Friday from 7:30AM-4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Wong can be reached on (703) 305-3477 or via e-mail addressed to peter.wong@uspto.gov. The fax phone number for this Group is (703) 746-7238.

Communications via Internet e-mail regarding this application, other than those under 35 U.S.C. 132 or which otherwise require a signature, may be used by the applicant and should be addressed to [raymond.phan@uspto.gov].

All Internet e-mail communications will be made of record in the application file. PTO employees do not engage in Internet communications where there exists a possibility that sensitive information could be identified or

Application/Control Number: 09/732,291
Art Unit: 2181

Page 3

exchanged unless the record includes a properly signed express waiver of the confidentiality requirements of 35 U.S.C. 122. This is more clearly set forth in the Interim Internet Usage Policy published in the Official Gazette of the Patent and Trademark on February 25, 1997 at 1195 OG 89.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3900.

PR

Raymond Phan
September 25, 2002


RUPAL DHARIA
PRIMARY EXAMINER



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

020457 7590 10/02/2002
ANTONELLI TERRY STOUT AND KRAUS
SUITE 1800
1300 NORTH SEVENTEENTH STREET
ARLINGTON, VA 22209

EXAMINER

PHAN, RAYMOND NGAN

ART UNIT

CLASS-SUBCLASS

2181

710-305000

DATE MAILED: 10/02/2002

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,291	12/08/2000	Ikuya Arai	520.32696CX4	2674

TITLE OF INVENTION: DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WITH COMPUTER

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$0	\$0	\$0	01/02/2003

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

- A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.
- B. If the status is changed, pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above and notify the United States Patent and Trademark Office of the change in status, or

If the SMALL ENTITY is shown as NO:

- A. Pay TOTAL FEE(S) DUE shown above, or
- B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check the box below and enclose the PUBLICATION FEE and 1/2 the ISSUE FEE shown above.
- ☐ Applicant claims SMALL ENTITY status.
See 37 CFR 1.27.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Box ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail Box ISSUE FEE
Commissioner for Patents
Washington, D.C. 20231
Fax (703)746-4000**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Legibly mark-up with any corrections or use Block 1)
020457 7590 10/02/2002

**ANTONELLI TERRY STOUT AND KRAUS
SUITE 1800
1300 NORTH SEVENTEENTH STREET
ARLINGTON, VA 22209**

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Box Issue Fee address above, or being facsimile transmitted to the USPTO, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,291	12/08/2000	Ikuya Arai	520.32696CX4	2674

TITLE OF INVENTION: DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WITH COMPUTER

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$0	\$0	\$0	01/02/2003

EXAMINER	ART UNIT	CLASS-SUBCLASS
PHAN, RAYMOND NGAN	2181	710-305000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.</p>	<p>2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.</p> <p>1 _____</p> <p>2 _____</p> <p>3 _____</p>
--	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY AND STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) ☐ individual ☐ corporation or other private group entity ☐ government

4a. The following fee(s) are enclosed:

- ☐ Issue Fee
☐ Publication Fee
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s):

- ☐ A check in the amount of the fee(s) is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Commissioner is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

Commissioner for Patents is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

(Authorized Signature)	(Date)
<p>NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant, a registered attorney or agent, or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.</p> <p>This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, Washington, DC 20231.</p> <p>Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.</p>	

TRANSMIT THIS FORM WITH FEE(S)



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,291	12/08/2000	Ikuya Arai	520.32696CX4	2674
020457	7590	10/02/2002	EXAMINER	
ANTONELLI TERRY STOUT AND KRAUS SUITE 1800 1300 NORTH SEVENTEENTH STREET ARLINGTON, VA 22209			PHAN, RAYMOND NGAN	
			ART UNIT	PAPER NUMBER
			2181	228
DATE MAILED: 10/02/2002				

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The patent term adjustment to date is 0 days. If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the term adjustment will be 0 days.

If a continued prosecution application (CPA) was filed in the above-identified application, the filing date that determines patent term adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) system. (<http://pair.uspto.gov>)



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,291	12/08/2000	Ikuya Arai	520.32696CX4	2674
020457	7590	10/02/2002	EXAMINER	
ANTONELLI TERRY STOUT AND KRAUS SUITE 1800 1300 NORTH SEVENTEENTH STREET ARLINGTON, VA 22209			PHAN, RAYMOND NGAN	
			ART UNIT	PAPER NUMBER
			2181	
DATE MAILED: 10/02/2002				

Notice of Possible Fee Increase on October 1, 2002

If a reply to a "Notice of Allowance and Fee(s) Due" is filed in the Office on or after October 1, 2002, then the amount due may be higher than that set forth in the "Notice of Allowance and Fee(s) Due" since there may be an increase in fees effective on October 1, 2002. See Revision of Patent and Trademark Fees for Fiscal Year 2003: Notice of Proposed Rulemaking, 67 Fed. Reg. 30634, 30636 (May 7, 2002). Although a change to the amount of the publication fee is not currently proposed for October 2002, if the issue fee or publication fee is to be paid on or after October 1, 2002, applicant should check the USPTO web site for the current fees before submitting the payment. The USPTO Internet address for the fee schedule is: <http://www.uspto.gov/main/howtofees.htm>.

If the issue fee paid is the amount shown on the "Notice of Allowance and Fee(s) Due," but not the correct amount in view of any fee increase, a "Notice to Pay Balance of Issue Fee" will be mailed to applicant. In order to avoid processing delays associated with mailing of a "Notice to Pay Balance of Issue Fee," if the response to the Notice of Allowance and Fee(s) due form is to be filed on or after October 1, 2002 (or mailed with a certificate of mailing on or after October 1, 2002), the issue fee paid should be the fee that is required at the time the fee is paid. If the issue fee was previously paid, and the response to the "Notice of Allowance and Fee(s) Due" includes a request to apply a previously-paid issue fee to the issue fee now due, then the difference between the issue fee amount at the time the response is filed and the previously paid issue fee should be paid. See Manual of Patent Examining Procedure, Section 1308.01 (Eighth Edition, August 2001).

Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.



4
OK to Enter

520.32696CX4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: ARAI et al

Serial No.: 09/732,291

Filed: December 8, 2000

For: Display Unit With Controller Enabling Bi-Directional
Communication With Computer

Group: 2181

Examiner: Phan, Raymond

Match and Return

LETTER RE CLARIFICATION OF ALLOWED CLAIMS

Assistant Commissioner For Patents
Washington, D.C. 20231

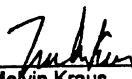
October 31, 2002

Sir:

Accompanying this letter is the payment of the issue fee for allowed claims 1-2, 4-5, 7-10, 12-16, 18-26, 36-42 (which, as indicated in section 2 of the Notice of Allowability, have been renumbered as claims 1-29) even though claim 10 is not mentioned. See also the paper entitled "Allowable Subject Matter" wherein claim 10 is not mentioned in paragraph 1 while being mentioned at line 9 of paragraph 2. Claim 10 is dependent on allowed parent claim 7 and is considered to be an allowed claim.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP



Melvin Kraus
Registration No. 22,466

MK/jla
(703) 312-6600

Match and Return



520.32696CX4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Arai, et al

Serial No. : 09/732,291

Filed: December 8, 2000

For: DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL
COMMUNICATION WITH COMPUTER

Attention: Issue Fee Branch

Match and Return

LETTER

Assistant Commissioner for Patents
Washington, D.C. 20231

October 31, 2002

Sir:

It is submitted that the above-referenced application was first allowed on June 28, 2002 for which the Issue Fee was due on September 30, 2002 and was paid on July 24, 2002. However, in order to permit consideration of a Submission under 37 CFR 1.114 (Amendment) filed on August 5, 2002, a Petition to withdraw the above-referenced application from issue was filed on August 5, 2002. Upon granting the Petition in the Decision dated September 4, 2002, the United States Patent and Trademark Office indicated that the Issue Fee, if Applicants wish, can be applied to the new Issue Fee now due.


Therefore, Applicants respectfully requested that the Issue Fee paid on July 24, 2002 be applied to the new Issue Fee now due as per the Issue Fee Transmittal filed on even date herewith. A copy of the Decision granting the Petition is attached herewith.

Match and Return

Please charge any shortage in fees due in connection with the filing of this paper, or credit any overpayment of fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (500.38349X00).

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP



Melvin Kraus
Registration No. 22,466

MK/tao
1300 North Seventeenth Street
Suite 1800
Arlington, VA 22209
Tel.: 703-312-6600
Fax.: 703-312-6666



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
Washington, D.C. 20231
www.uspto.gov

Paper No. 20

ANTONELLI TERRY STOUT AND KRAUS
1300 NORTH SEVENTHEETH STREET
SUITE 1800
ARLINGTON VA 22209



COPY MAILED

SEP 04 2002

OFFICE OF PETITIONS

ON PETITION 520.32696CX

MK

In re Application of
Ikuya Arai et al
Application No. 09/732,291
Filed: December 8, 2000
Attorney Docket No. 520.32696CX4

This is a decision on the petition, filed August 5, 2002, under 37 CFR 1.313(c)(2) to withdraw the above-identified application from issue after payment of the issue fee.

The petition is **GRANTED**.

The above-identified application is withdrawn from issue for consideration of a submission under 37 CFR 1.114 (request for continued examination). See 37 CFR 1.313(c)(2).

Petitioner is advised that the issue fee paid on July 24, 2002 in the above-identified application cannot be refunded. If, however, the above-identified application is again allowed, petitioner may request that it be applied towards the issue fee required by the new Notice of Allowance.

Telephone inquiries should be directed to the undersigned at (703) 305-8680.

Upon receipt of the file in the Office of Petitions, the file will be forwarded to Technology Center AU 2181 for processing of the request for continued examination under 37 CFR 1.114 and for consideration of the concurrently filed amendment.

Frances Hicks
Frances Hicks
Petitions Examiner
Office of Petitions
Office of the Deputy Commissioner
for Patent Examination Policy

The request to apply the issue fee to the new Notice must be made in writing and should be accompanied by the new Issue Fee Transmittal Form PTOL-85(b), along with a copy of this decision. Additionally, if the issue fee has increased from the previously paid issue fee, the balance due must be submitted. Failure to timely request in writing that the previously paid issue fee be applied towards the new Notice and payment of any balance due will result in the abandonment of the application.

PART B - FEE(S) TRANSMITTAL

520.32696CX4

Complete and send this form, together with applicable fee(s), to: **Mail Box ISSUE FEE**
Commissioner for Patents
Washington, D.C. 20231
Fax (703)746-4000

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Legibly mark-up with any corrections in use Block 1)
020457 7590 10/02/2002

ANTONELLI TERRY STOUT AND KRAUS
SUITE 1800
1300 NORTH SEVENTEENTH STREET
ARLINGTON, VA 22209



Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Box Issue Fee address above, or being facsimile transmitted to the USPTO, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,291	12/08/2000	Ikuys Arai	520.32696CX4	2674

TITLE OF INVENTION: DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WITH COMPUTER

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$0	\$0	\$0	01/02/2003

EXAMINER	ART UNIT	CLASS-SUBCLASS
PHAN, RAYMOND NGAN	2181	710-305000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

Antonelli, Terry,
Stout & Kraus, LLP
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

Hitachi, Ltd.

(B) RESIDENCE: (CITY AND STATE OR COUNTRY)

Tokyo, Japan

Please check the appropriate assignee category or categories (will not be printed on the patent) ☐ individual ☒ corporation or other private group entity ☐ government

4a. The following fee(s) are enclosed:

☒ Issue Fee☒ Publication Fee☐ Advance Order - # of Copies

4b. Payment of Fee(s):

☐ A check in the amount of the fee(s) is enclosed.☐ Payment by credit card. Form PTO-2038 is attached.☒ The Commissioner is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number 01-2135 (enclose an extra copy of this form).

Commissioner for Patents is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

(Authorized Signature) Melvin Kraus (Date) 10/31/02
22,466

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, Washington, DC 20231.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

02/13/2003 RJOHNG01 00000002 09732291
01 FC:1501 1280.00 0P
02 FC:1504 300.00 0P

TRANSMIT THIS FORM WITH FEE(S)

PTOL-85 (REV. 04-02) Approved for use through 01/31/2004. OMB 0651-0033

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Interview Summary	Application No.	Applicant(s)	
	09/732,291	ARAI ET AL.	
	Examiner	Art Unit	
	Raymond Phan	2181	

All participants (applicant, applicant's representative, PTO personnel):

(1) Raymond Phan. (3) _____.

(2) ATTY-Melvin Kraus (Reg# 22,466). (4) _____.

Date of Interview: 03 December 2002.

Type: a) ☒ Telephonic b) ☐ Video Conference
c) ☐ Personal [copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.
If Yes, brief description: _____.

Claim(s) discussed: 10.

Identification of prior art discussed: None.

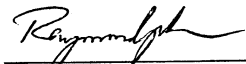
Agreement with respect to the claims f) ☒ was reached. g) ☐ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: In response to the Letter for Clarification of allowed claims mailed by applicant on October 31, 2002, Examiner confirmed claim 10 was allowed.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

i) ☒ It is not necessary for applicant to provide a separate record of the substance of the interview (if box is checked).

Unless the paragraph above has been checked, THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.



Examiner's signature, if required

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

#25 FEE PPR ✓

***RETURN TO FMF - LOCATION 7540**

QUERY CONTROL FORM		RTIS USE ONLY
Application No. <u>091733,291</u>	Prepared by <u>CW</u>	Tracking Number
Examiner-GAU <u>PHAN, RAYMOND NGAN</u>	Date <u>12/17/02</u>	Week Date
<u>2181</u>	No. of queries <u>1</u>	

JACKET			
a. Serial No.	f. Foreign Priority	k. Print Claim(s)	p. PTO-1449
b. Applicant(s)	g. Disclaimer	l. Print Fig.	q. PTOL-85b
c. Continuing Data	h. Microfiche Appendix	m. Searched Column	r. Abstract
d. PCT	i. Title	n. PTO-270/328	s. Sheets/Figs
e. Domestic Priority	j. Claims Allowed	o. PTO-892	t. Other

SPECIFICATION	MESSAGE
a. Page Missing	<p><u>PTOL-85b</u></p> <p><u>(1) "There is no fee stamps and no money due. please reversed the old issue fee and reply in response to the current Notice of Allowance!"</u></p> <p style="text-align: right; font-size: 1.2em;"><u>Thank you</u></p> <div style="text-align: center; border: 1px solid black; padding: 5px; margin: 10px auto; width: 150px;"> RECEIVED DEC 18 2002 <small>PUBLISHING DIVISION</small> 13 </div> <p style="text-align: right;">initials <u>CW</u></p> <p>RESPONSE <u>Done</u></p>
b. Text Continuity	
c. Holes through Data	
d. Other Missing Text	
e. Illegible Text	
f. Duplicate Text	
g. Brief Description	
h. Sequence Listing	
i. Appendix	
j. Amendments	
k. Other	
CLAIMS	
a. Claim(s) Missing	
b. Improper Dependency	
c. Duplicate Numbers	
d. Incorrect Numbering	
e. Index Disagrees	
f. Punctuation	
g. Amendments	
h. Bracketing	
i. Missing Text	
j. Duplicate Text	
k. Other	

RAM Fee History Query

Revenue Accounting and Management

Name/Number: 09732291

Total Records Found: 13

Start Date: Any Date

End Date: Any Date

Accounting Date	Sequence Num.	Tran Type	Fee Code	Fee Amount	Mailroom Date	Payment Method
12/12/2000	00000038	<u>1</u>	<u>101</u>	\$710.00	12/08/2000	OP
12/12/2000	00000039	<u>1</u>	<u>102</u>	\$880.00	12/08/2000	OP
12/12/2000	00000040	<u>1</u>	<u>103</u>	\$270.00	12/08/2000	OP
12/06/2001	00000104	<u>1</u>	<u>116</u>	\$400.00	12/05/2001	OP
12/06/2001	00000105	<u>1</u>	<u>126</u>	\$180.00	12/05/2001	OP
02/05/2002	00000059	<u>1</u>	<u>126</u>	\$180.00	02/04/2002	OP
06/05/2002	00000007	<u>1</u>	<u>179</u>	\$740.00	06/04/2002	OP
07/26/2002	00000085	<u>1</u>	<u>195</u>	\$300.00	07/24/2002	OP
07/26/2002	00000086	<u>1</u>	<u>142</u>	\$1,280.00	07/24/2002	OP
08/28/2002	00000001	<u>1</u>	<u>122</u>	\$130.00	08/05/2002	DA 012135
08/28/2002	00000002	<u>1</u>	<u>179</u>	\$740.00	08/05/2002	DA 012135
08/28/2002	00000003	<u>1</u>	<u>102</u>	\$1,092.00	08/05/2002	DA 012135
08/28/2002	00000004	<u>1</u>	<u>103</u>	\$162.00	08/05/2002	DA 012135

CLAIMS ONLY						SERIAL NO. 09732291		FILING DATE 12/08/00	
						APPLICANT(S)			
CLAIMS									
AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT		*		*	
IND.	DEP.	IND.	DEP.	IND.	DEP.	IND.	DEP.	IND.	DEP.
1	/					51			
2		/				52			
3		/				53			
4	/					54			
5		/				55			
6		/				56			
7	/					57			
8		/				58			
9		/				59			
10		/				60			
11		/				61			
12	/					62			
13		/				63			
14		/				64			
15		/				65			
16		/				66			
17		/				67			
18	/					68			
19	/					69			
20	/					70			
21	/					71			
22	/					72			
23	/					73			
24	/					74			
25	/					75			
26	/					76			
27	/					77			
28		/				78			
29		/				79			
30		/				80			
31		/				81			
32		/				82			
33		/				83			
34		/				84			
35		/				85			
36						86			
37						87			
38						88			
39						89			
40						90			
41						91			
42						92			
43						93			
44						94			
45						95			
46						96			
47						97			
48						98			
49						99			
50						100			
TOTAL IND.	14					TOTAL IND.			
TOTAL DEP.	21					TOTAL DEP.			
TOTAL CLAIMS	35					TOTAL CLAIMS			

* MAY BE USED FOR ADDITIONAL CLAIMS OR ADMENDMENTS

FORM PTO-2022 (1-98)

U.S.DEPARTMENT OF COMMERCE
Patent and Trademark Office

*U.S. GPO: 1998-443-593/89152

PATENT APPLICATION FEE DETERMINATION RECORD Effective October 1, 2000				Application or Docket Number <div style="font-size: 1.2em; margin-top: 5px;">09732291.</div>																									
CLAIMS AS FILED - PART I (Column 1) (Column 2)																													
TOTAL CLAIMS	35																												
FOR	NUMBER FILED	NUMBER EXTRA																											
TOTAL CHARGEABLE CLAIMS	35 minus 20 =	15																											
INDEPENDENT CLAIMS	14 minus 3 =	11																											
MULTIPLE DEPENDENT CLAIM PRESENT <input type="checkbox"/>																													
* If the difference in column 1 is less than zero, enter "0" in column 2																													
CLAIMS AS AMENDED - PART II (Column 1) (Column 2) (Column 3)																													
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA																									
	Total	*	Minus	**	=																								
	Independent	*	Minus	***	=																								
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>																												
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA																									
	Total	*	Minus	**	=																								
	Independent	*	Minus	***	=																								
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>																												
AMENDMENT C		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA																									
	Total	*	Minus	**	=																								
	Independent	*	Minus	***	=																								
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>																												
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> SMALL ENTITY TYPE <input type="checkbox"/> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 30%;">RATE</td><td style="width: 70%;">FEE</td></tr> <tr><td>BASIC FEE</td><td>355.00</td></tr> <tr><td>X\$ 9=</td><td></td></tr> <tr><td>X40=</td><td></td></tr> <tr><td>+135=</td><td></td></tr> <tr><td>TOTAL</td><td></td></tr> </table> </div> <div style="width: 10%; text-align: center;">OR</div> <div style="width: 45%;"> OTHER THAN SMALL ENTITY <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 30%;">RATE</td><td style="width: 70%;">FEE</td></tr> <tr><td>BASIC FEE</td><td>710.00</td></tr> <tr><td>X\$18=</td><td>270</td></tr> <tr><td>X80=</td><td>880</td></tr> <tr><td>+270=</td><td></td></tr> <tr><td>TOTAL</td><td>1860</td></tr> </table> </div> </div>						RATE	FEE	BASIC FEE	355.00	X\$ 9=		X40=		+135=		TOTAL		RATE	FEE	BASIC FEE	710.00	X\$18=	270	X80=	880	+270=		TOTAL	1860
RATE	FEE																												
BASIC FEE	355.00																												
X\$ 9=																													
X40=																													
+135=																													
TOTAL																													
RATE	FEE																												
BASIC FEE	710.00																												
X\$18=	270																												
X80=	880																												
+270=																													
TOTAL	1860																												
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> SMALL ENTITY <input type="checkbox"/> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 30%;">RATE</td><td style="width: 70%;">ADDI- TIONAL FEE</td></tr> <tr><td>X\$ 9=</td><td></td></tr> <tr><td>X40=</td><td></td></tr> <tr><td>+135=</td><td></td></tr> <tr><td>TOTAL ADDIT. FEE</td><td></td></tr> </table> </div> <div style="width: 10%; text-align: center;">OR</div> <div style="width: 45%;"> OTHER THAN SMALL ENTITY <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 30%;">RATE</td><td style="width: 70%;">ADDI- TIONAL FEE</td></tr> <tr><td>X\$18=</td><td></td></tr> <tr><td>X80=</td><td></td></tr> <tr><td>+270=</td><td></td></tr> <tr><td>TOTAL ADDIT. FEE</td><td></td></tr> </table> </div> </div>						RATE	ADDI- TIONAL FEE	X\$ 9=		X40=		+135=		TOTAL ADDIT. FEE		RATE	ADDI- TIONAL FEE	X\$18=		X80=		+270=		TOTAL ADDIT. FEE					
RATE	ADDI- TIONAL FEE																												
X\$ 9=																													
X40=																													
+135=																													
TOTAL ADDIT. FEE																													
RATE	ADDI- TIONAL FEE																												
X\$18=																													
X80=																													
+270=																													
TOTAL ADDIT. FEE																													
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 30%;">RATE</td><td style="width: 70%;">ADDI- TIONAL FEE</td></tr> <tr><td>X\$ 9=</td><td></td></tr> <tr><td>X40=</td><td></td></tr> <tr><td>+135=</td><td></td></tr> <tr><td>TOTAL ADDIT. FEE</td><td></td></tr> </table> </div> <div style="width: 10%; text-align: center;">OR</div> <div style="width: 45%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 30%;">RATE</td><td style="width: 70%;">ADDI- TIONAL FEE</td></tr> <tr><td>X\$18=</td><td></td></tr> <tr><td>X80=</td><td></td></tr> <tr><td>+270=</td><td></td></tr> <tr><td>TOTAL ADDIT. FEE</td><td></td></tr> </table> </div> </div>						RATE	ADDI- TIONAL FEE	X\$ 9=		X40=		+135=		TOTAL ADDIT. FEE		RATE	ADDI- TIONAL FEE	X\$18=		X80=		+270=		TOTAL ADDIT. FEE					
RATE	ADDI- TIONAL FEE																												
X\$ 9=																													
X40=																													
+135=																													
TOTAL ADDIT. FEE																													
RATE	ADDI- TIONAL FEE																												
X\$18=																													
X80=																													
+270=																													
TOTAL ADDIT. FEE																													
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 30%;">RATE</td><td style="width: 70%;">ADDI- TIONAL FEE</td></tr> <tr><td>X\$ 9=</td><td></td></tr> <tr><td>X40=</td><td></td></tr> <tr><td>+135=</td><td></td></tr> <tr><td>TOTAL ADDIT. FEE</td><td></td></tr> </table> </div> <div style="width: 10%; text-align: center;">OR</div> <div style="width: 45%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 30%;">RATE</td><td style="width: 70%;">ADDI- TIONAL FEE</td></tr> <tr><td>X\$18=</td><td></td></tr> <tr><td>X80=</td><td></td></tr> <tr><td>+270=</td><td></td></tr> <tr><td>TOTAL ADDIT. FEE</td><td></td></tr> </table> </div> </div>						RATE	ADDI- TIONAL FEE	X\$ 9=		X40=		+135=		TOTAL ADDIT. FEE		RATE	ADDI- TIONAL FEE	X\$18=		X80=		+270=		TOTAL ADDIT. FEE					
RATE	ADDI- TIONAL FEE																												
X\$ 9=																													
X40=																													
+135=																													
TOTAL ADDIT. FEE																													
RATE	ADDI- TIONAL FEE																												
X\$18=																													
X80=																													
+270=																													
TOTAL ADDIT. FEE																													

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.



**United States
Patent and
Trademark Office**

Patent Bibliographic Data				02/19/2008 10:45 AM	
Patent Number:	6549970		Application Number:	09732291	
Issue Date:	04/15/2003		Filing Date:	12/08/2000	
Title:	DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WIT				
Status:	8th year fee window opens: 04/15/2010			Entity:	Large
Window Opens:	04/15/2010	Surcharge Date:	10/18/2010	Expiration:	N/A
Fee Amt Due:	Window not open	Surchg Amt Due:	Window not open	Total Amt Due:	Window not open
Fee Code:	1552	MAINTENANCE FEE DUE AT 7.5 YEARS			
Surcharge Fee Code:					
Most recent events (up to 7):	09/29/2006 09/27/2006	Payor Number Assigned. Payment of Maintenance Fee, 4th Year, Large Entity. --- End of Maintenance History ---			
Address for fee purposes:	OLCOTT INTERNATIONAL & CO. 62 HACKENSACK PLANK ROAD P.O. 3014 WEEHAWKEN, NJ 07087				

Patent Assignment Abstract of Title

NOTE: Results display only for issued patents and published applications. For pending or abandoned applications please consult USPTO staff.

Total Assignments: 1

Patent #: [6549970](#) Issue Dt: 04/15/2003 Application #: 09732291 Filing Dt: 12/08/2000

Publication #: [20010002474](#) Pub Dt: 05/31/2001

Inventors: Ikuya Arai, Kouji Kitou

Title: **DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL
COMMUNICATION WITH COMPUTER**

Assignment: 1

Reel/Frame: [020218/0791](#)

Recorded: 12/07/2007

Pages: 4

Conveyance: **ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR
DETAILS).**

Assignor: [HITACHI, LTD.](#)

Exec Dt: 10/30/2007

Assignee: [MONDIS TECHNOLOGY LTD.](#)

19 PERRINS LANE

HAMPSTEAD, LONDON NW3 1Q7, ENGLAND

Correspondent: **ANTONELLI, TERRY, STOUT & KRAUS, LLP**

1300 NORTH 17TH STREET, SUITE 1800

ARLINGTON, VIRGINIA 22209



US006549970B2

(12) **United States Patent**
Arai et al.

(10) **Patent No.:** **US 6,549,970 B2**
(45) **Date of Patent:** **Apr. 15, 2003**

(54) **DISPLAY UNIT WITH CONTROLLER
ENABLING BI-DIRECTIONAL
COMMUNICATION WITH COMPUTER**

4,169,262 A 9/1979 Schwartz et al. 340/744

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

DE 37 22 169 A1 1/1989
DE 4025295 2/1991
DE 43 36 116 A1 5/1994

(List continued on next page.)

OTHER PUBLICATIONS

Barco n. v. Video & Communications, The Calibrator Explained, Part 1, Apr. 1990, pp. 1-40.
NASA Tech Brief, "Interface for Color-Video Monitor", Apr. 1988, pp. 246-247.
"Display Function Identification", IBM Technical Disclosure Bulletin, vol. 28, No. 12, pp. 5568-5579, May 1980.

(List continued on next page.)

Primary Examiner—Rupal Dharja

Assistant Examiner—Raymond N Phan

(74) *Attorney, Agent, or Firm*—Antonelli, Terry, Stout & Kraus, LLP

ABSTRACT

A display unit having a communication control circuit for communicating with an externally connected computer and which enables bi-directional communication with the display unit and the computer. The communication control circuit includes a comparator for comparing first identification information which is previously stored in said display unit and second identification information which is previously stored in the computer and is sent from the computer. The communication control circuit further includes at least one of a communication prohibitor for prohibiting communication between the computer with respect to display control of the display unit, when the first and second identification information do not match as a result of the comparison by the comparator or communication permitter for enabling communication for display control as a result of a match.

29 Claims, 12 Drawing Sheets

(75) Inventors: **Ikuya Arai**, Yokohama (JP); **Kouji Kitou**, Yokohama (JP)

(73) Assignee: **Hitachi, Ltd.**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/732,291**

(22) Filed: **Dec. 8, 2000**

(65) **Prior Publication Data**

US 2001/0002474 A1 May 31, 2001

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/265,363, filed on Mar. 10, 1999, now Pat. No. 6,247,090, which is a continuation of application No. 08/833,346, filed on Apr. 4, 1997, now Pat. No. 5,887,147, which is a continuation of application No. 08/598,903, filed on Feb. 9, 1996, now Pat. No. 5,652,845, which is a continuation of application No. 08/190,848, filed on Feb. 3, 1994, now abandoned.

(30) **Foreign Application Priority Data**

Feb. 10, 1993 (JP) 5-022212

(51) **Int. Cl.**⁷ **G06F 13/28**

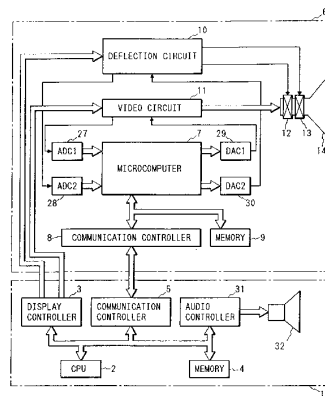
(52) **U.S. Cl.** **710/305; 710/62; 710/64; 345/99; 345/132**

(58) **Field of Search** 710/101-103, 710/129, 62, 63-65, 72, 8-11, 14-15; 345/58, 98-100, 132, 204; 709/236, 237, 249-250

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,007,443 A 2/1977 Bromberg et al.
4,047,158 A 9/1977 Jennings
4,159,480 A 6/1979 Tachi



US 6,549,970 B2

Page 2

U.S. PATENT DOCUMENTS

4,177,462 A 12/1979 Chung 340/703
 4,197,590 A 4/1980 Sukonick et al. 364/900
 4,342,029 A 7/1982 Hofmanis et al. 340/703
 4,415,985 A 11/1983 McDaniel et al.
 4,450,535 A 5/1984 De Pommery et al.
 4,574,279 A 3/1986 Roberts
 4,589,063 A * 5/1986 Shah et al.
 4,626,892 A 12/1986 Nortrup et al.
 4,641,262 A * 2/1987 Bryan et al.
 4,680,647 A 7/1987 Moriyama
 4,727,947 A 3/1988 Naito
 4,736,324 A 4/1988 Sainen et al.
 4,743,968 A 5/1988 Mogi et al.
 4,747,041 A 5/1988 Engel et al.
 4,775,857 A 10/1988 Staggs
 4,800,376 A 1/1989 Suga et al.
 4,882,687 A 11/1989 Gordon 364/518
 4,893,248 A 1/1990 Pitts et al.
 4,922,448 A 5/1990 Kunieda et al.
 4,970,655 A * 11/1990 Winn et al.
 4,990,904 A 2/1991 Zenda
 4,991,023 A * 2/1991 Nicols 358/242
 5,010,238 A 4/1991 Kadono et al.
 5,012,339 A 4/1991 Kurata et al.
 5,068,732 A 11/1991 Satoh
 5,138,305 A 8/1992 Tomiyasu
 5,150,109 A 9/1992 Berry
 5,159,683 A 10/1992 Lvovsky et al.
 5,227,881 A 7/1993 Wess et al.
 5,241,281 A 8/1993 Wilkes et al.
 5,251,031 A 10/1993 Tagami
 5,257,350 A 10/1993 Howard et al.
 5,270,821 A 12/1993 Samuels
 5,276,458 A * 1/1994 Sawdon 345/132
 5,276,875 A 1/1994 Satoh
 5,282,247 A 1/1994 McLean et al.
 5,309,174 A * 5/1994 Minkus
 5,309,504 A 5/1994 Morganstein
 5,315,695 A 5/1994 Saito et al.
 5,317,691 A 5/1994 Traeger
 5,353,423 A 10/1994 Hamid et al.
 5,375,210 A 12/1994 Monnes et al.
 5,396,593 A 3/1995 Mori et al.
 5,457,473 A 10/1995 Arai et al.
 5,483,255 A 1/1996 Numao
 5,506,602 A * 4/1996 Yokoyama
 5,550,966 A 8/1996 Drake et al.
 5,576,735 A * 11/1996 Kikuchi et al.

5,599,231 A * 2/1997 Hibino et al. 43/29
 5,887,147 A 3/1999 Arai et al.
 5,896,546 A 4/1999 Monahan et al.
 5,909,592 A 6/1999 Shipman
 5,948,091 A 9/1999 Kerigan et al.
 6,012,103 A 1/2000 Sartore et al.
 6,057,812 A 5/2000 Arai et al.

FOREIGN PATENT DOCUMENTS

EP 456923 A1 * 11/1991
 EP 0612053 A1 8/1994
 JP 61-16643 * 1/1986
 JP 61-84688 4/1986
 JP 1-321475 12/1989
 JP 2-103592 4/1990
 JP 2-127688 5/1990
 JP 2-250576 10/1990
 JP 2-257196 10/1990
 JP 3-56931 3/1991
 JP 3-56993 3/1991
 JP 3-116093 5/1991
 JP 3-118595 5/1991
 JP 3-148697 6/1991
 JP 3-160494 7/1991
 JP 3-261995 11/1991
 JP 4-21024 1/1992
 JP 5-46106 2/1993
 JP 5-232918 9/1993

OTHER PUBLICATIONS

“Monitor Identification Technique”, IBM Technical Disclosure Bulletin, vol. 30, No. 2, pp. 839–840, Jul. 1987.
 “Display Controller Set up as a Function of Display Monitor Type, Display Jumper Settings and Amount of Vram”, IBM Technical Disclosure Bulletin, vol. 33, No. 2, pp. 352–353, Jul. 1990.
 “Improved Method of Monitor Identification and Mode Control”, IBM Technical Disclosure Bulletin, vol. 33, No. 5, pp. 289–291, Oct. 1990.
 “Improvements to Display Identification”, IBM Technical Disclosure Bulletin, vol. 33, No. 6B, pp. 83–85, pp. 83–85.
 “Self-Identification Protocol Initialization”, IBM Technical Disclosure Bulletin, vol. 33, No. 10A, pp. 406–407, Mar. 1991.
 “ACCESS.bus, an Open Desktop Bus”, Peter A. Sichel, Digital Technical Journal, vol. 3, No. 4, Fall 1991.

* cited by examiner

FIG. 1

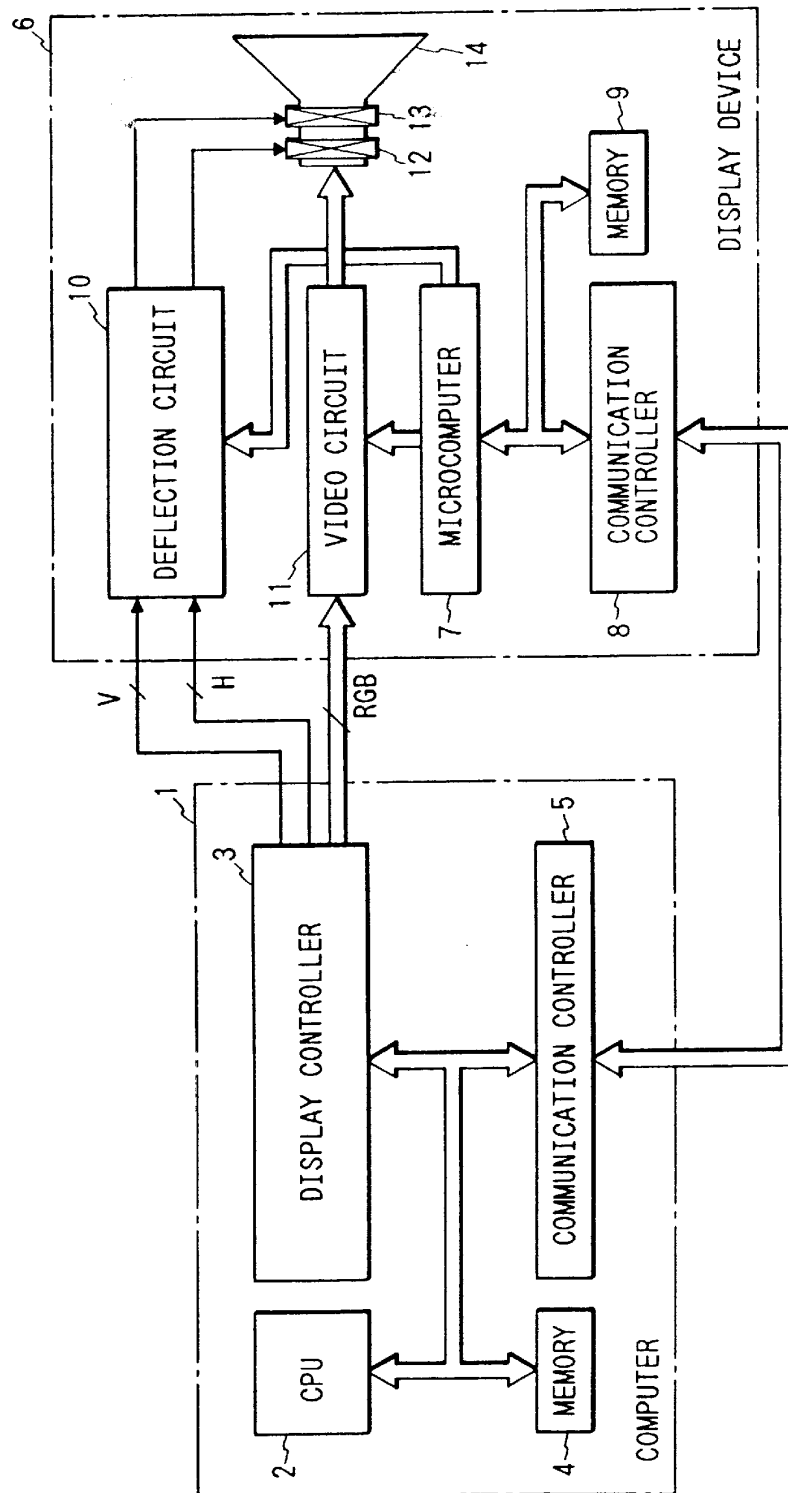


FIG. 2

ADDRESS 1	NUMBER OF DATA SET	REGISTERED ID NUMBERS
ADDRESS 2	DATA AREA 1 FOR DELIVERY ADJUSTMENT	
ADDRESS 3	DATA AREA 2 FOR DELIVERY ADJUSTMENT	
⋮	⋮	
ADDRESS i	ADJUSTMENT DATA AREA 1 FOR USER	
ADDRESS i+1	ADJUSTMENT DATA AREA 2 FOR USER	
⋮	⋮	

FIG. 3

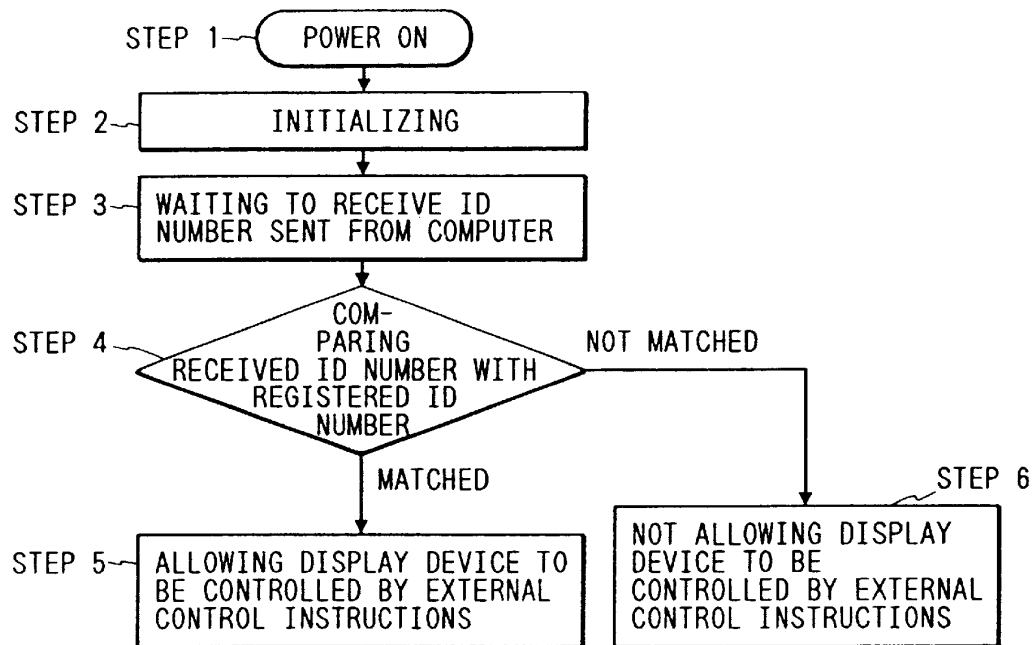


FIG. 4

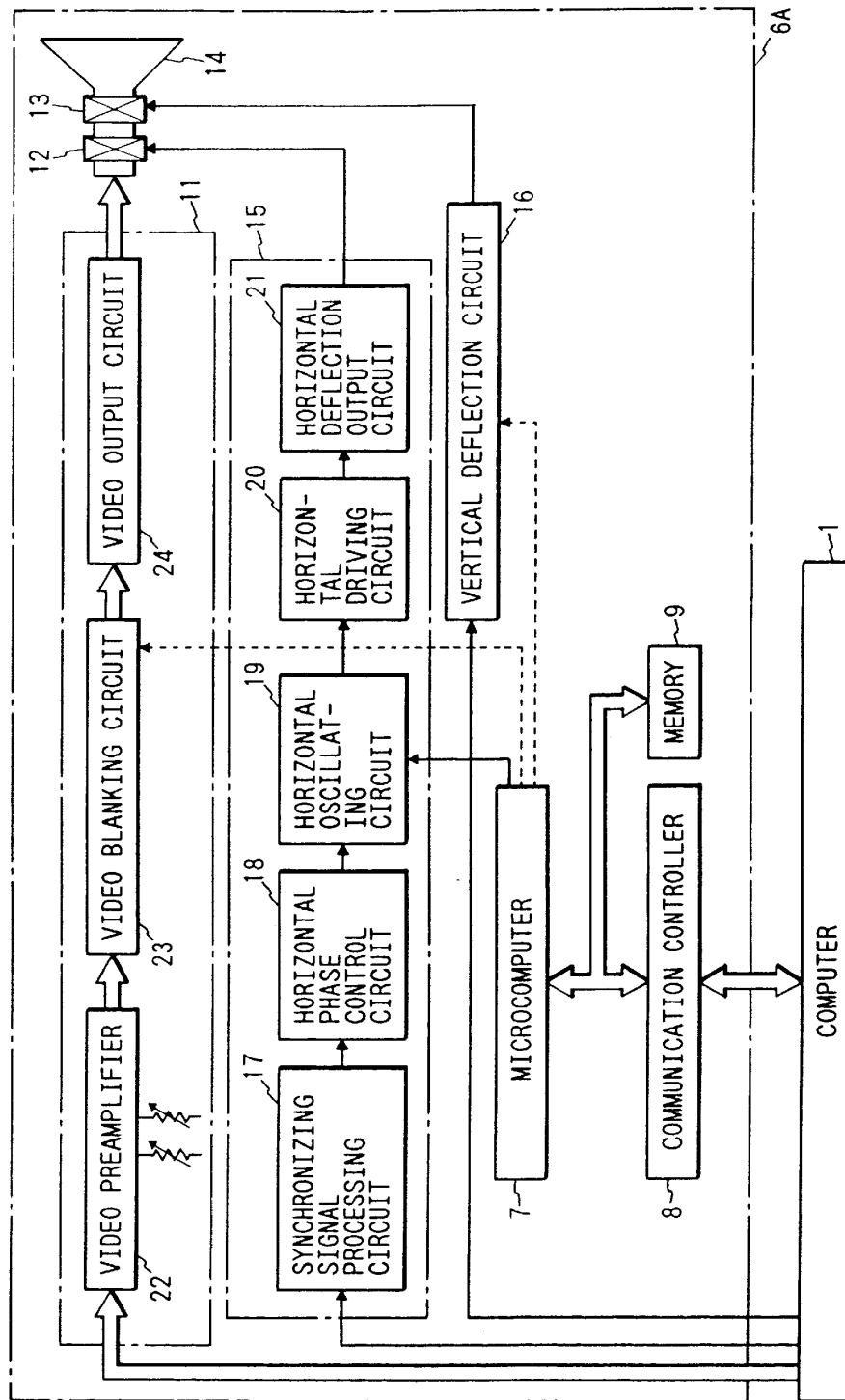


FIG. 5

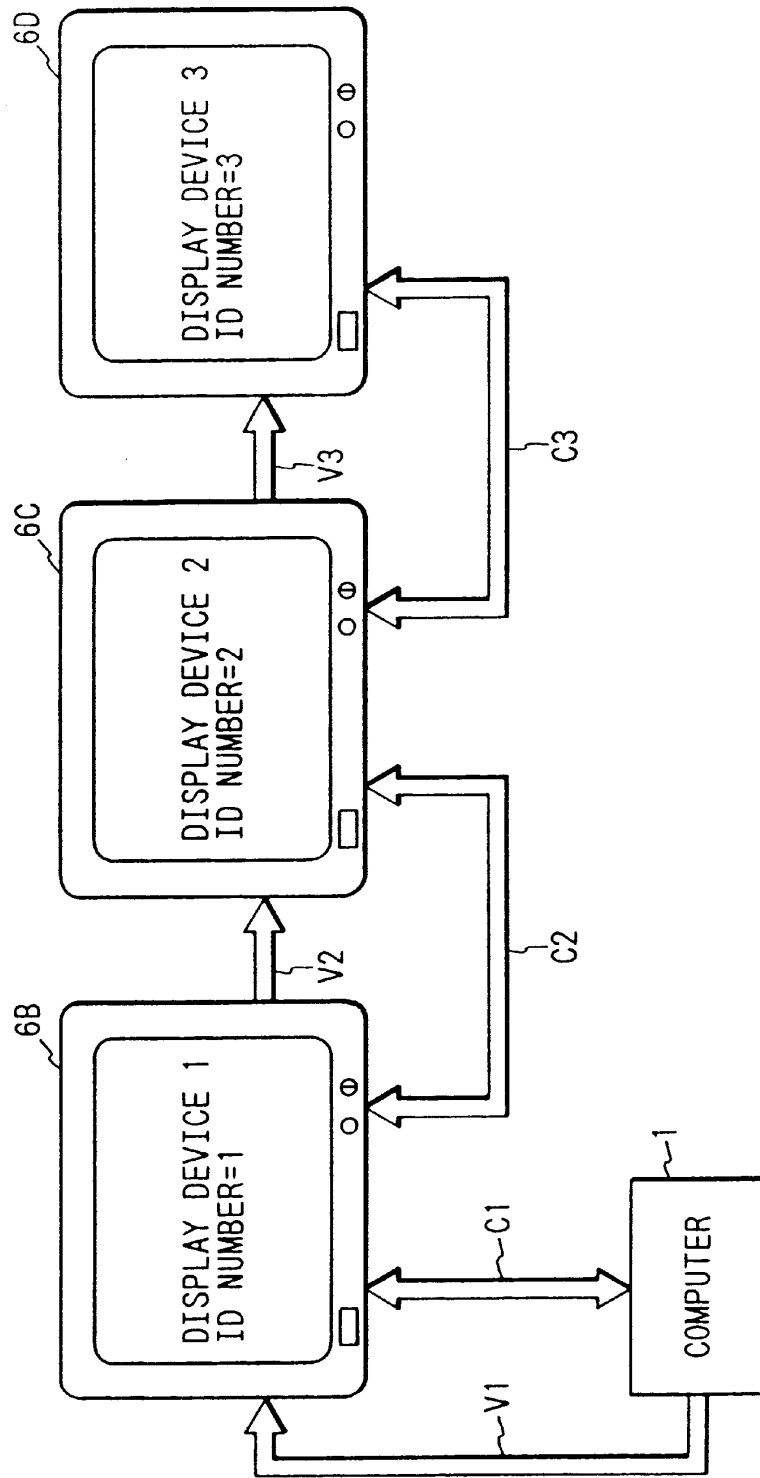


FIG. 6

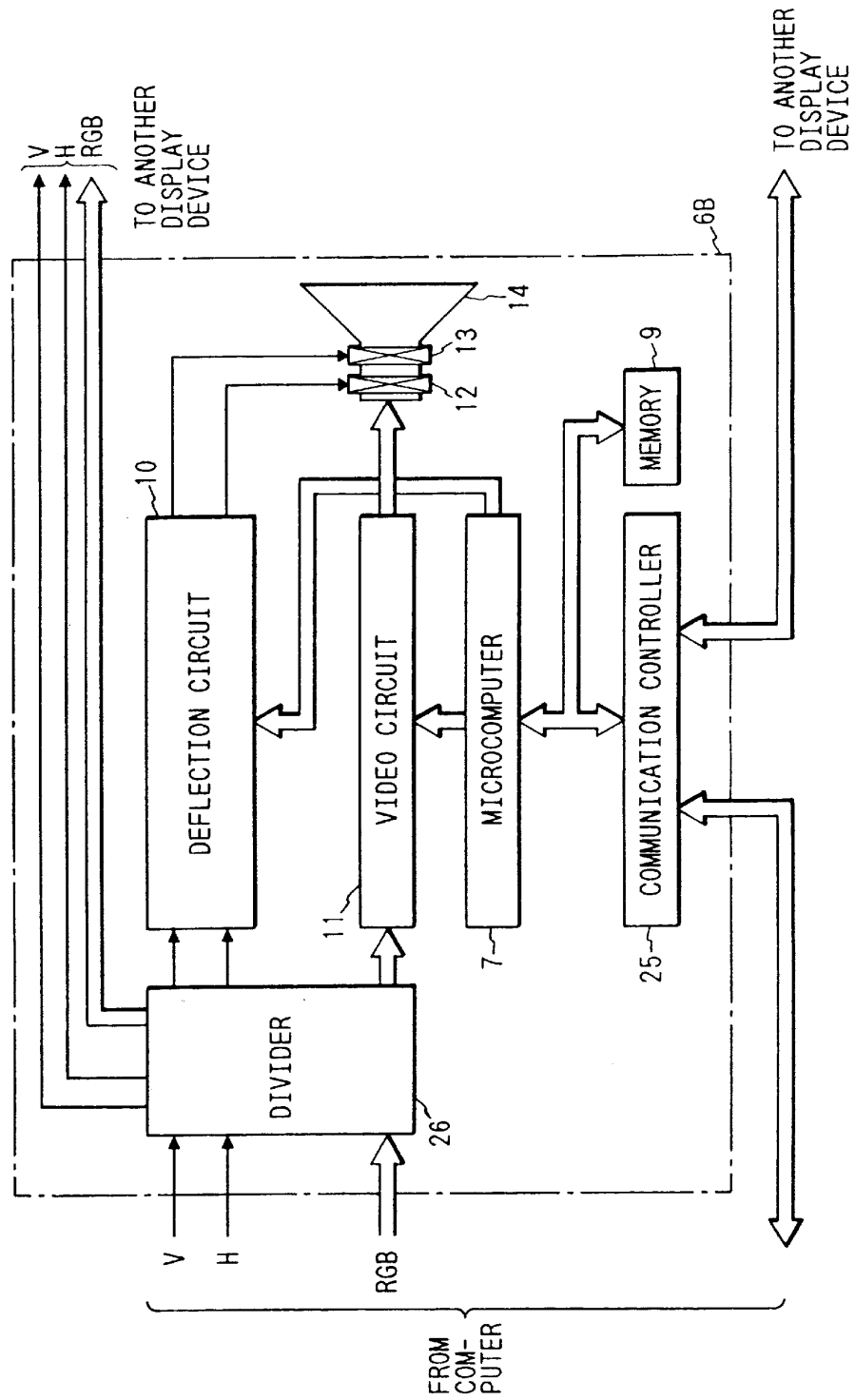


FIG. 7

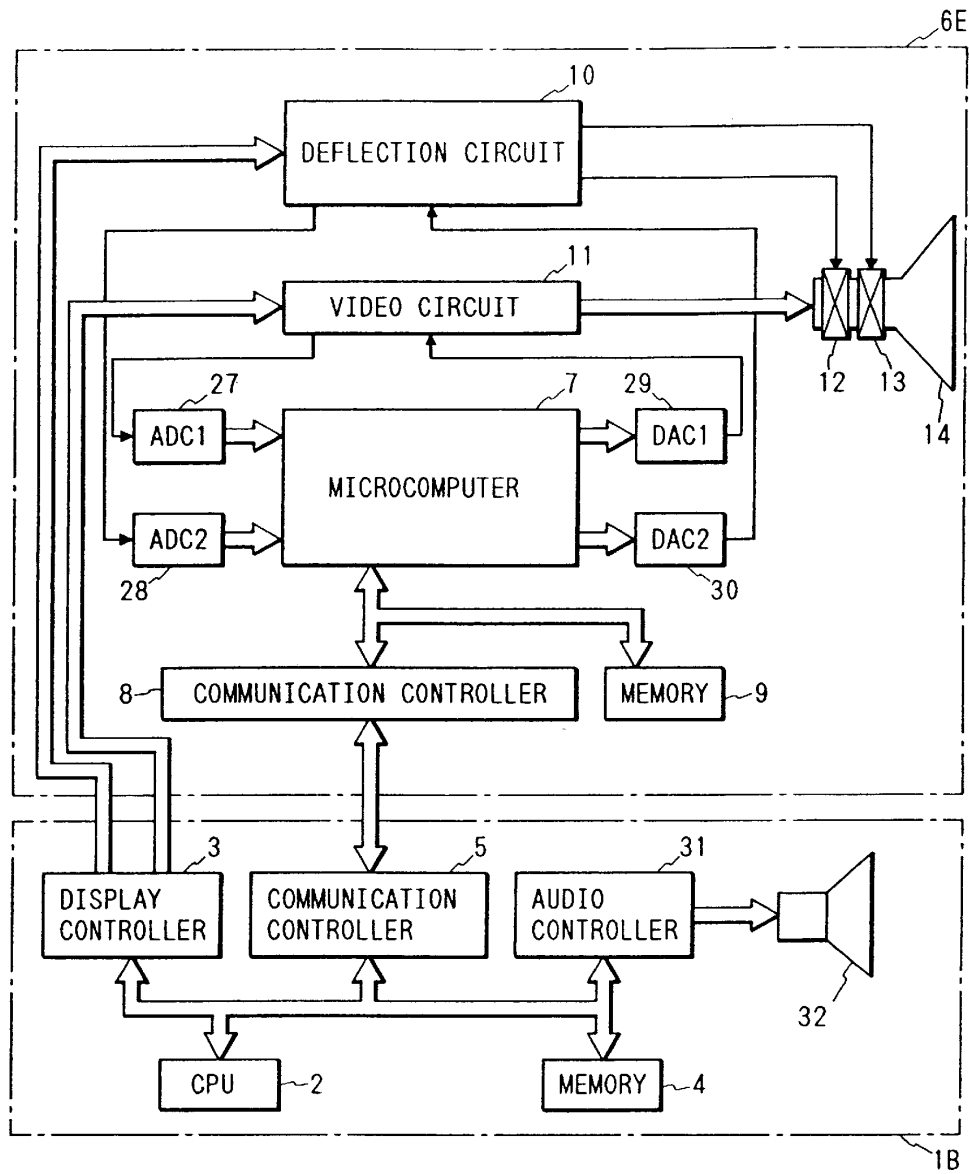


FIG. 8

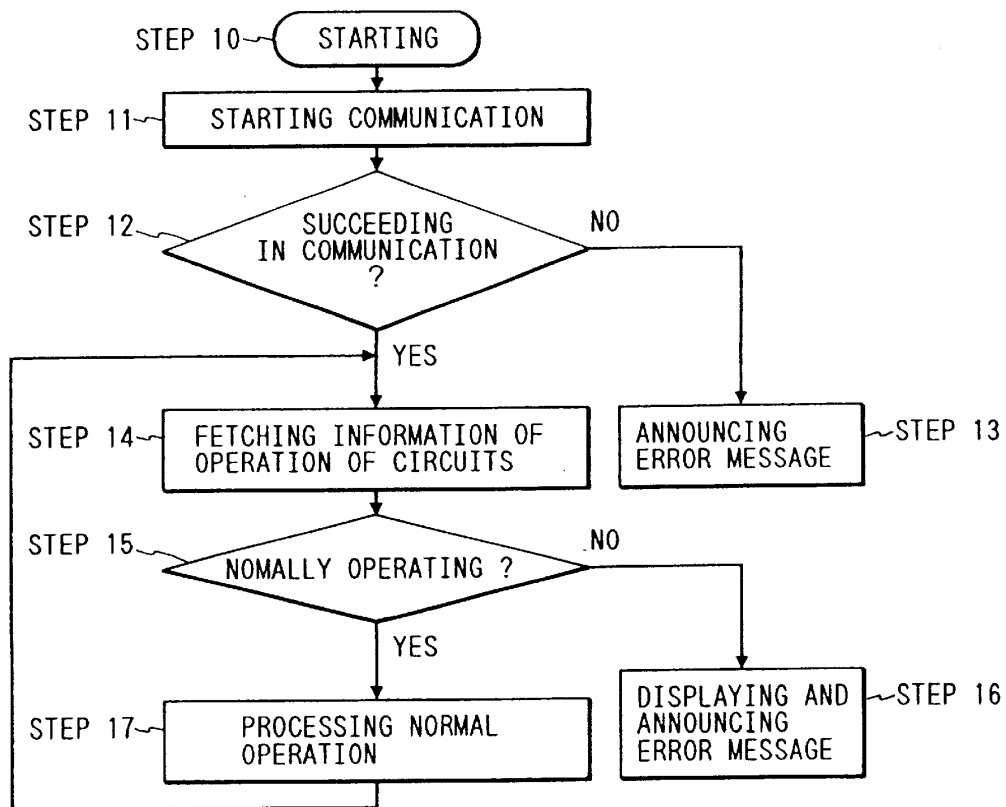


FIG. 9

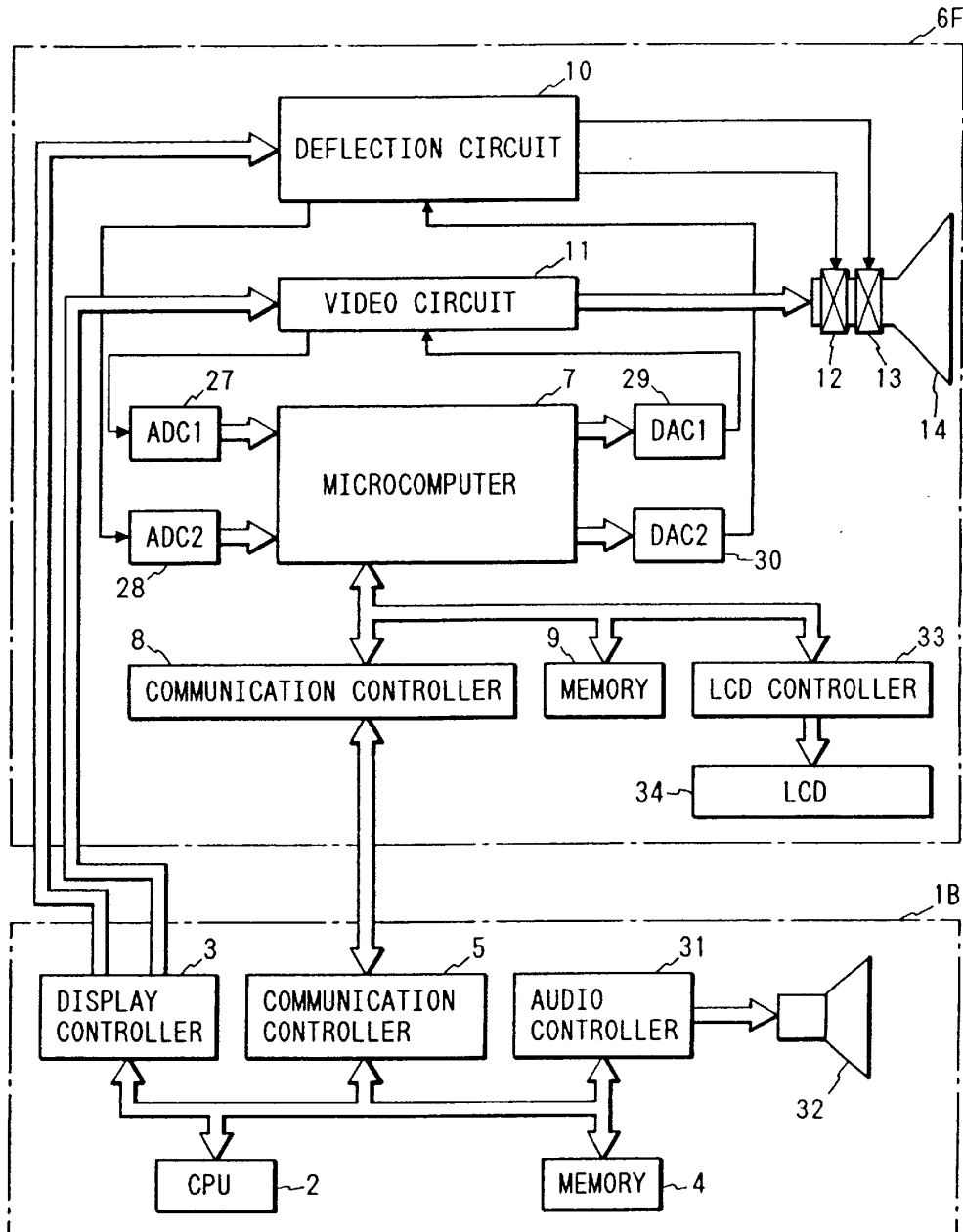


FIG. 10

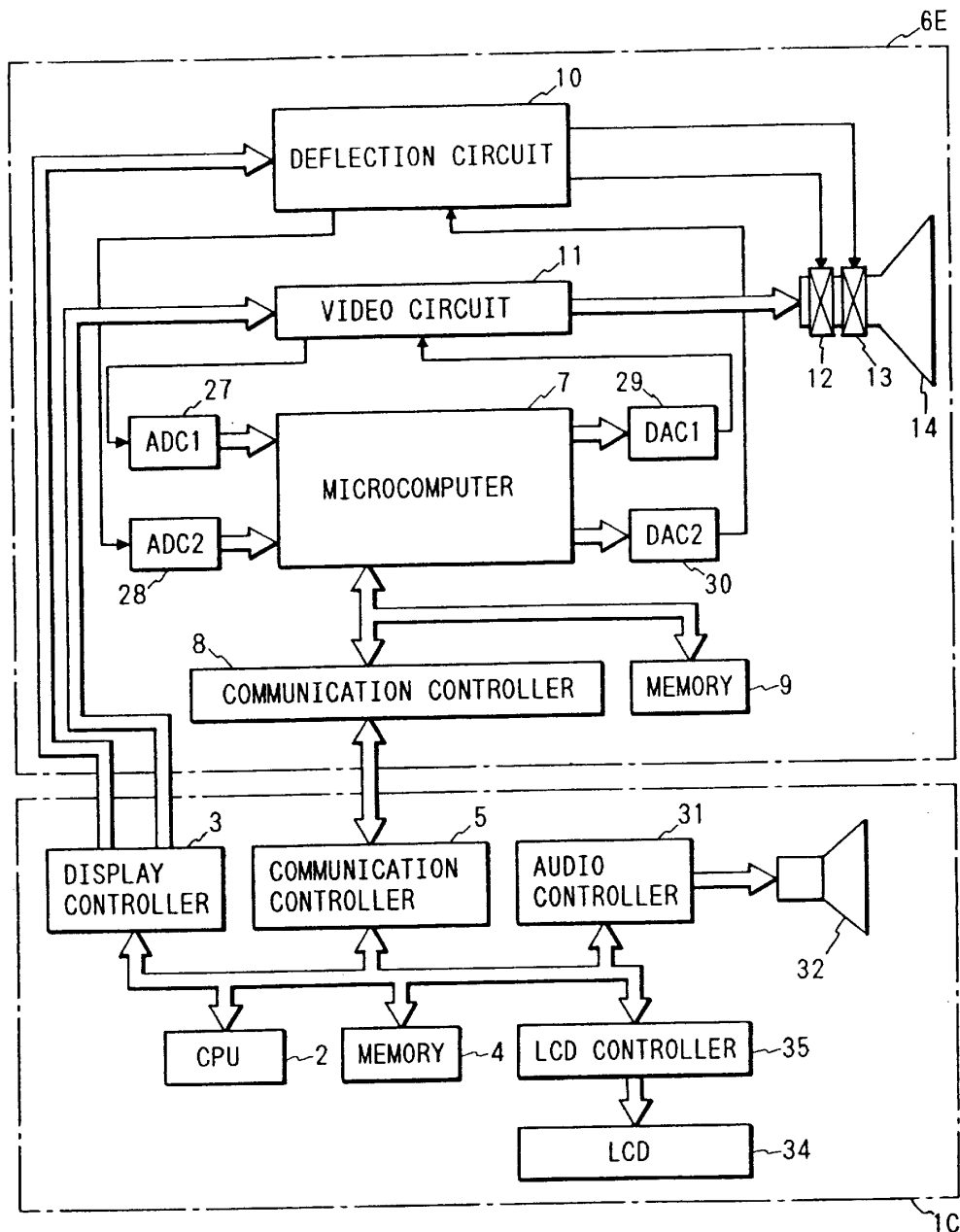


FIG. 11

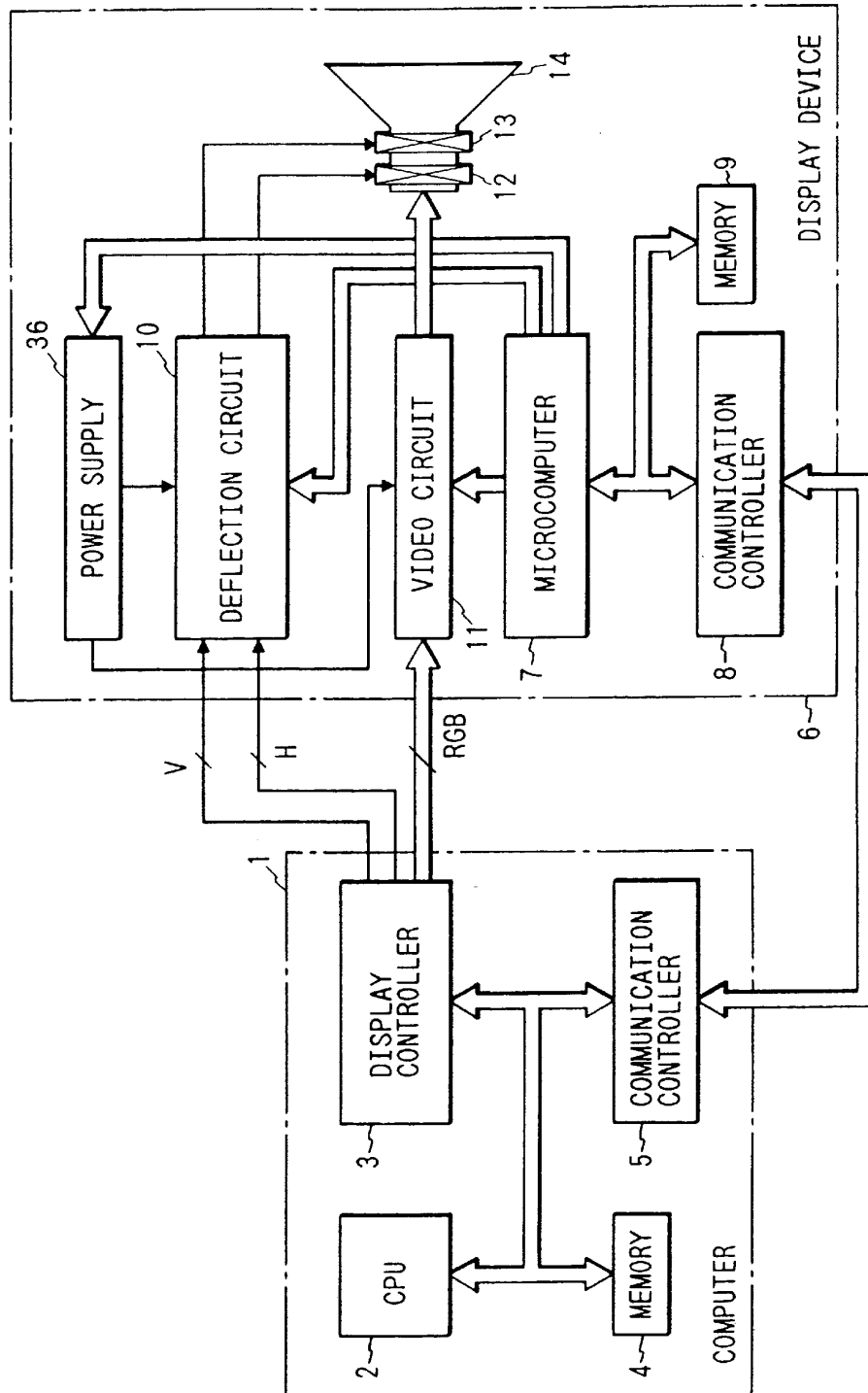
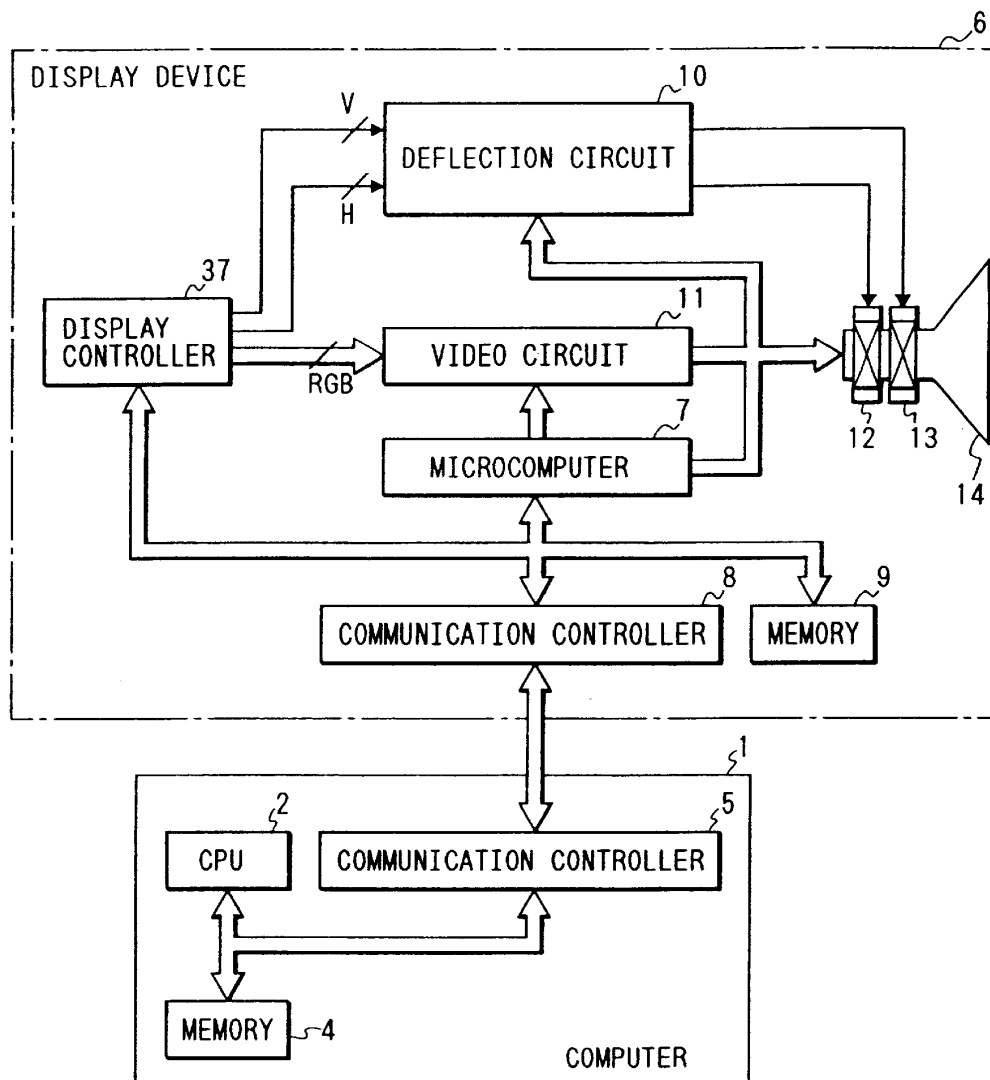


FIG. 12



1

DISPLAY UNIT WITH CONTROLLER ENABLING BI-DIRECTIONAL COMMUNICATION WITH COMPUTER

CROSS REFERENCE TO RELATED APPLICATION

This application is related to U.S. application Ser. No. 09/732,292, filed on the same date, and is a continuation of U.S. application Ser. No. 09/265,363, filed Mar. 10, 1999, now U.S. Pat. No. 6,247,090 which is a continuation of U.S. application Ser. No. 08/833,346, filed Apr. 4, 1997, now U.S. Pat. No. 5,887,147, issued Mar. 23, 1999, which is a continuation of U.S. application Ser. No. 08/598,903, filed Feb. 9, 1996, now U.S. Pat. No. 5,652,845, issued Jul. 29, 1997, which is a continuation of U.S. application Ser. No. 08/190,848, filed Feb. 3, 1994, now abandoned, the subject matter of which is incorporated by reference herein.

BACKGROUND OF THE INVENTION

The present invention relates to an information output system or display apparatus including a computer and an information output device such as a display device or a printer as a computer terminal and more particularly to an information output system or display apparatus for performing various types of control such as the information output method and allowing or not allowing of information output from the computer connected to the above information output device via a communication interface.

In current display devices as computer terminals, a wide variety of display positions and sizes on the screen and video signal frequencies to be displayed are used depending on video signals to be inputted. Therefore, a display or a so-called multi-scan display has been used so that a display device can handle various video signals.

A microcomputer or a memory LSI is used to provide a most suitable display image for each video signal as this type of display device. Such a prior art is indicated in Japanese Patent Application Laid-Open No. 1-321475.

According to this prior art, the microcomputer controls the memory which stores information of the display position and size on the screen for each video signal beforehand and reads the information of the most suitable display position and size on the screen depending on the input video signal from the memory. The microcomputer outputs a control signal on the basis of the read information. This control signal is applied to the deflection circuit as a control voltage or control current through a D-A converter so as to control the voltage or current at a predetermined part of the deflection circuit. By doing this, the display size and position of the display device can be adjusted. When a video signal inputted to the display device is not a known signal, no corresponding information is kept in the above memory. Therefore, the switch mounted on the front of the display device is operated so as to input the adjustment information of the display position and size on the screen. The control circuit of the above microcomputer creates deflection control information on the basis of the above input information and adjusts the display position and size.

According to the aforementioned prior art, the display device obtains a most suitable screen display according to the input video signal. However, according to another prior art, the computer controls and changes the display status. Such a prior art is indicated in Japanese Patent Application Laid-Open No. 61-84688. According to this prior art, a discrimination pulse is superimposed at the blanking interval of a video signal outputted from the computer and the

2

deflection frequency of the display device is changed on the basis of this discrimination pulse.

According to the former prior art among the aforementioned prior arts, the control of the display position and size on the screen is managed by the display device. Therefore, when adjustment is required or requested from the user of display device, it is necessary to perform manual adjustment using the adjustment switch of the display device each time and it is rather troublesome to operate the system.

According to the latter prior art among the aforementioned prior arts, the control can be operated by the computer. However, since the operation is such that the deflection frequency is simply changed on the basis of the discrimination pulse superimposed on the video signal, an image cannot be adjusted to the display image (display position and size) which is required by a user of the computer. Namely, there is a problem imposed that the status which is simply desired by the user cannot be obtained. Furthermore, no consideration is given to prevention of display (indication) of careless images (information) and restraining of unnecessary power consumption. Even if the discrimination pulse is superimposed at the blanking interval of the video signal, the video blanking level is generally shallow in the case of the display device, so that the discrimination pulse is displayed. Furthermore, the control is applied only in one direction from the computer to the display device and no information is sent in the reverse direction, so that there is another problem imposed that a malfunction cannot be avoided.

SUMMARY OF THE INVENTION

An object of the present invention is to provide an information output system wherein a computer can exercise various types of control of an information output device such as a display device. Another object of the present invention is to provide an information output system for maintaining secrecy of information and for restraining power consumption. A further object of the present invention is to provide an information output system for informing the computer of the operation status of the information output device so as to allow easy maintenance.

To accomplish the above objects, according to the present invention, in an information output system consisting of at least a computer and an information output device, the computer is equipped with a first communication means and the information output device is equipped with a second communication means. Furthermore, a control processing means and a memory means for storing the identification number of the computer beforehand are added to the information output device, or a memory means for storing the identification number of the information output device beforehand is mounted in the computer in addition to the first communication means. The above second communication means has a plurality of communication interfaces. Furthermore, a detection means for detecting the internal operation status and a control processing means for judging the detection result are added to the information output device and an audio output means for outputting the operation status in voice is added to the computer. A second display means for displaying the operation status is mounted in the information output device. Or, a display means for displaying the operation status of the information output device is mounted in the computer.

The first communication means in the computer controls communication with the information output device and the second communication means in the information output

3

device controls communication with the computer. The control processing means operates and generates control signals for exercising various types of control for the information output device on the basis of control instructions from the second communication means and compares the identification number of the computer stored in the memory means with the identification number sent from the computer via the first and second communication means. When a comparison result match occurs, the control processing means controls a predetermined part in the information output device.

In the memory means mounted in the computer, the identification number for identifying the information output device is stored beforehand. When the identification number which is sent from the information output device via the second and first communication means matches with the identification number which is stored in the memory means beforehand, the computer communicates with the information output device.

When no comparison result match occurs, the above control processing means controls so that information which is sent from the computer to the information output device is not normally outputted from the information output device. By doing this, information of a computer user will not be indicated carelessly.

When the second communication means has a plurality of communication interfaces, it can communicate with another plurality of information output devices and the computer and in the state that a plurality of similar information output devices are connected to the computer, it can exercise various types of control for the information output devices and can inform the computer of the status of each information output device.

The detection means detects the internal operation status of the information output device and the control processing means judges the detection result. The audio output means indicates the operation status of the information output device in voice on the basis of the judgment result which is sent from the information output device to the computer via the second and first communication means. Furthermore, the display means mounted in the information output device displays the above operation status. The display means mounted in the computer performs the same operation as that of the display means mounted in the information output device. In this case, information which is sent to the computer via the second and first communication means is used as display information.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram showing the first embodiment of the present invention.

FIG. 2 is a memory map showing the contents of the memory in the display device shown in FIG. 1.

FIG. 3 is a flow chart showing the operation of the essential section shown in FIG. 1.

FIG. 4 is a block diagram showing the second embodiment of the present invention.

FIG. 5 is a block diagram showing the third embodiment of the present invention.

FIG. 6 is a block diagram showing the internal structure of the display device 6B shown in FIG. 5.

FIG. 7 is a block diagram showing the fourth embodiment of the present invention.

FIG. 8 is a flow chart showing the operation outline shown in FIG. 7.

4

FIG. 9 is a block diagram showing the fifth embodiment of the present invention.

FIG. 10 is a block diagram showing the sixth embodiment of the present invention.

FIG. 11 is a block diagram showing the seventh embodiment of the present invention.

FIG. 12 is a block diagram showing the eighth embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The embodiments of the present invention will be explained with reference to the accompanying drawings hereunder.

FIG. 1 is a block diagram showing the first embodiment of the present invention. In the drawing, a section 1 enclosed by a chained line indicates a computer. In the section 1, a reference numeral 2 indicates a CPU (central processing unit), 3 a display controller for generating various signals for video display, 4 a memory, and 5 a communication controller for communicating with peripheral devices. In addition, a magnetic recording unit is mounted as a data storage device which is not shown in the drawing.

A section 6 enclosed by another chained line indicates a so-called multi-scan display device which can be applied to various video signal specifications. In the section 6, a reference numeral 7 indicates a microcomputer for controlling display of the display device 6, 8 a second communication controller for communicating with the above communication controller 5, 9 a second memory, 10 a general deflection circuit of the display device, 11 a video circuit of the display device, 12 a horizontal deflection yoke, 13 a vertical deflection yoke, and 14 a color cathode-ray tube (hereinafter called a CDT (color display tube)) for displaying color images.

The operation shown in FIG. 1 is as shown below. The computer 1 has a structure which is the same as the general structure of a conventional personal computer or workstation and the communication controller 5 controls a communication interface such as RS-232C which is installed in the standard type. When a control instruction of the display device 6 is inputted firstly by a user of the computer from a general keyboard which is not shown in the drawing of the computer 1, it is coded digitally by a keyboard controller which is neither shown in the drawing and CPU 2 identifies the instruction and controls the communication controller 5. The communication controller 5 sends the control instruction of the display device to the display device 6. When a control instruction of the display device 6 which is included in the software for allowing the computer 1 to operate is read from the external storage device such as a floppy disk drive or hard disk drive which is not shown in the drawing, CPU 2 identifies the instruction and controls the communication controller 5. The communication controller 5 also sends the control instruction of the display device to the display device 6.

Next, the display device 6 sends the control instruction from the computer 1 which is received by the communication controller 8 to the microcomputer 7. The microcomputer 7 identifies this control instruction and generates control signals to the relevant portions to be adjusted in the deflection circuit 10 or video circuit 11. The aforementioned deflection circuit 10 and video circuit 11 can be adjusted in the same way as with a conventional multiscan display and the adjustment means has a structure which is the same as that of a conventional multiscan display. By doing this, the

5

display size and position, brightness, contrast, and hue of images displayed on the CDT 14 are made most suitable to a user of the computer system.

Furthermore, WYSIWYG (what you see is what you get) control which makes an image displayed on the display device 6 similar to print output of an output device other than the display, for example, a printer can be realized only by sending a control instruction for changing the display position and size to the display device 6 instead of operating and generating display data by the computer 1. The interface 10 part of the above display device 6 such as the communication control terminal is mounted on the back or side of the display device from a viewpoint of easy connection to the computer 1 and appearance.

Furthermore, the aforementioned communication function is used for adjustment at a factory. In this case, necessary information is all written into the memory 9 in the display device 6. FIG. 2 is a memory map showing the contents of the memory 9 in the display device 6. For adjustment at factory, data to be written can be all set. In a case other than factory adjustment, namely, for adjustment in a system as shown in FIG. 1, to prevent data requiring no rewriting, namely, preset values at factory such as, for example, the number of all data or the data within the corresponding frequency range from being erased by mistake or rewritten, the computer 1 sends the ID number and the microcomputer 7 in the display device 6 checks the ID number with the registered ID number stored in the memory 9.

A flow chart of this check is shown in FIG. 3. As shown in the drawing, when the computer 1 and display device 6 are turned on at Step 1, each device is initialized at Step 2. Concretely, CPU 2 and the microcomputer 7 read the starting system software and put the peripheral circuit to be connected to the CPU into the active state so that the next operation can be performed. Then, at Step 3, the microcomputer 7 in the display device 6 waits for sending of the identification number assigned to the computer 1, that is, the so-called ID number from the computer 1. Next, at Step 4, the microcomputer 7 receives the ID number which is sent from the computer 1 and checks whether the received ID number is registered in the registered ID number list which is stored in the memory 9 in the display device 6.

When it is registered, at Step 5, the computer 1 is allowed to control the display device 6 by external control instructions so that the user control of the display size, position, brightness, and contrast can be performed by control instructions sent from the computer 1 thereafter. On the other hand, when the received ID number is not registered in the memory 9, at Step 6, the display device 6 is not allowed to be controlled by external control instructions thereafter. Therefore, even if any control instruction is sent from the computer 1, the display device 6 will not accept it.

Or, at Step 5, the computer 1 may be allowed to perform all the adjustments which can be performed by the display device 6, that is, the same control as that for adjustment at factory and at Step 6, a part of the control of the display device 6 such as display control may be allowed.

By doing this, the display device 6 can be prevented from careless control.

The above is an example that an ID number is sent to the display device 6 from the computer 1. However, needless to say, the reverse case of the above is possible. Namely, an ID number is sent to the computer 1 from the display device 6 so that the computer 1 identifies that the display device 6 having a communication function is connected and the

6

computer 1 compares the ID number with the ID number registered in the computer 1. When the corresponding ID number is registered, the computer 1 controls the display device 6 by a predetermined control instruction. When it is not registered, the computer 1 judges that it cannot control the display device 6 and will not control the display device 6.

By doing this, the computer 1 communicates with a specific display device 6 and can exercise control such as changing the color temperature of an image displayed on the display device 6 or changing the display size depending on the application software.

According to this embodiment, RS-232C is used as a communication interface. However, a general-purpose interface such as RS-422, RS-423, SCSI or GP-IB, or network interface may be used. Furthermore, the embodiment may be applied to an interface using optical signals instead of electric signals. The above interface may be installed in the neighborhood of the rear cabinet or lower pedestal of the display device 6 for convenience of a user.

FIG. 4 is a block diagram showing the second embodiment of the present invention. According to this embodiment, when the ID number sent from the computer to the display device is not registered in the memory 9, another operation which is different from the operation shown in the first embodiment is performed. Namely, according to this embodiment, when the ID numbers do not match with each other, nothing is displayed on the display device so as to enhance the secrecy of information.

Next, the structure of FIG. 4 will be explained. In the drawing, a reference numeral 6A indicates another display device which is different from the display device 6 shown in FIG. 1, 15 a horizontal deflection circuit, 16 a vertical deflection circuit, 17 a synchronizing signal processing circuit, 18 a horizontal phase control circuit, 19 a horizontal oscillating circuit, 20 a horizontal driving circuit, 21 a horizontal deflection output circuit, 22 a video pre-amplifier circuit, 23 a video blanking circuit, and 24 a video output circuit. The other reference numerals which are the same as those shown in FIG. 1 indicate the same functions. The video circuit 11 is a general video circuit consisting of the video pre-amplifier circuit 22, video blanking circuit 23, and video output circuit 24. The horizontal deflection circuit 15 is a general deflection circuit consisting of the synchronizing signal processing circuit 17, horizontal phase control circuit 18, horizontal oscillating circuit 19, horizontal driving circuit 20, and horizontal deflection output circuit 21. The vertical deflection circuit 16 is also a general circuit which has a structure similar to that of the horizontal deflection circuit 15.

Next, the operation shown in FIG. 4 will be explained. In the drawing, an ID number sent from the computer 1 is inputted into the microcomputer 7 via the communication controller 8. The microcomputer 7 checks the above ID number with the ID number stored in the memory 9. When the ID number stored in the memory 9 matches with the ID number sent from the computer 1, the microcomputer 7 receives the control from the computer 1.

On the other hand, when the check results do not match with each other, the microcomputer 7 controls the horizontal oscillating circuit 19, fixes the oscillation frequency to a predetermined value, and allows the display device 6A to perform a horizontal deflection operation at a value different from the horizontal frequencies of the video signal and synchronizing signal which are sent from the computer. Therefore, the image displayed on the CDT 14 is not

7

synchronized horizontally in this case and the screen content cannot be judged. When the vertical deflection circuit 16 is controlled in the same way, the image displayed on the CDT 14 is not synchronized vertically on the screen. By controlling the video blanking circuit 23 of the video circuit 11, the video display period may be blanked so that no image is displayed on the CDT 14.

By using the aforementioned methods independently or combined, only when a user of the computer system enters a predetermined ID number from the keyboard, it is displayed correctly on the display device 6A and information displayed on the CDT 14 can be prevented from careless indication.

FIG. 5 is a block diagram of the third embodiment of the present invention. According to this embodiment, the display device is provided with a plurality of communication functions and a plurality of display devices can be connected with the communication interface. In the drawing, reference numerals 6B, 6C, and 6D indicate display devices having the same structure, V1, V2, and V3 lines for video signals and synchronizing signals, C1, C2, and C3 communication lines for, for example, RS-232C, and 1 the aforementioned computer. Each of the display devices 6B, 6C, and 6D has a plurality of video signal I/O terminals and communication interface I/O terminals and a registered ID number. According to this embodiment, as shown in FIG. 5, 1 is assigned to the display device 6B as an ID number, 2 to the display device 6C as an ID number, and 3 to the display device 6D as an ID number.

Next, the operation shown in FIG. 5 will be explained. In the drawing, for example, when controlling the display device 6B from the computer 1, the ID number 1 is sent to the line C1 and the display device 6B is controlled appropriately from the computer 1. Next, when controlling the display device 6C, the ID number 2 is sent from the computer 1 in the same way. Then, the ID number is received by the display device 6C via the lines C1 and C2 and the display device 6C can be controlled appropriately from the computer 1.

Since a plurality of display devices can be controlled by a computer in this way, a plurality of display devices can be adjusted at a time, for example, at the time of delivery adjustment at a factory. Furthermore, by using a multi-display system for displaying an image by assembling a plurality of display devices and for displaying various images on each screen, the display devices can be hued and adjusted in brightness simply.

FIG. 6 is a block diagram showing the internal structure of the display device 6B shown in FIG. 5. In the drawing, a reference numeral 25 indicates a communication controller having two communication ports and 26 a divider of video signals and synchronizing signals. The communication controller 25 sends or receives data to or from the computer 1 in the same way as the communication controller 8 of the display device 6 shown in FIG. 1 and also divides the communication lines and relays other display devices. On the other hand, the divider 26 divides video signals or synchronizing signals sent from the computer 1 or signal source to other display devices. By using such a structure, a plurality of display devices can be connected to a computer as shown in FIG. 5.

Next, the fourth embodiment of the present invention will be described. FIG. 7 is a block diagram showing the fourth embodiment of the present invention. In the drawing, a reference numeral 1B indicates a computer, 31 an audio control circuit for producing a sound, 32 a speaker, 6E a

8

display device, 27 and 28 analog-digital converters (hereinafter abbreviated to ADC), and 29 and 30 digital-analog converters (hereinafter abbreviated to DAC). The other reference numerals which are the same as those shown in FIG. 1 indicate the same functions. The operation of FIG. 7 will be explained hereunder with reference to the operation flow chart shown in FIG. 8.

When the computer 1B and display device 6E are started at Step 10 as shown in FIG. 8, they start communication with each other via the communication controllers 5 and 8 at Step 11 next. Then, at Step 12, the computer 1B calls the display device 6E. When no response is received, the computer 1B judges that the display device 6E is faulty, starts the audio control circuit 31 at Step 13, and informs the user of the computer 1B that the display device 6E is faulty from the speaker.

When the communication succeeds, at Step 14, the microcomputer 7 fetches information of the operation status of the deflection circuit 10 or video circuit 11 in the display device 6E from the voltage at a predetermined part in the circuit as digital information via the ADCs 27 and 28. Next, at Step 15, the microcomputer 7 judges whether the value which is fetched at Step 14 is a value in the normal operation status. When the microcomputer 7 judges it as an error, it informs the computer 1B of the faulty value via the communication controller 8 and CPU 2 of the computer 1B allows the audio control circuit 31 to operate and generates a message informing an error of the display device 6E from the speaker 32. Furthermore, CPU 2 allows the display controller 3 to operate and displays also a message informing an error on the CDT 14 via the video circuit 11.

In this case, when an indication code informing the faulty part is sent to the computer 1B from the display device 6E simultaneously, the computer 1B judges the indication code and can inform the user or a customer engineer of the display device 6E of the faulty part by sound or display.

When the display device 6E is normal at Step 15, the computer 1B can exercise the communication control such as the display size, hue, and brightness of the display device 6E at Step 17. At this step, when a control instruction is sent to the display device 6E from the computer 1B, the microcomputer 7 decodes the instruction and outputs the control code to the corresponding DAC 29 or 30. The DAC 29 or 30 controls a predetermined control part at the DC control voltage corresponding to the above control code and controls the display size, position, and hue of the image displayed on the CDT 14. When the above series of operations ends, the computer 1B returns to Step 14 and repeats the operations from the monitor mode of a faulty operation of the display device 6E to the normal operation at Step 17.

As mentioned above, the computer 1B can be informed of a faulty operation by using the communication function of the display device 6E. Therefore, the user can judge the faulty part and can maintain the system easily.

FIG. 9 is a block diagram showing the fifth embodiment of the present invention. This embodiment obtains the same effect as that of the embodiment shown in FIG. 7. In FIG. 9, a reference numeral 6F indicates a display device, 33 a liquid crystal display controller in the display device 6F, and 34 a liquid crystal display panel mounted in the display device 6F. The other reference numerals which are the same as those shown in FIGS. 1 and 7 indicate the same functions.

The operation shown in FIG. 9 is basically the same as that shown in FIG. 7. The operation of the deflection circuit 10 or video circuit 11 is monitored by the microcomputer 7 via the ADC 27 or 28. When an error occurs, the micro-

9

computer 7 transmits an indication code informing the occurrence of an error to the computer 1B via the communication line and informs the user of it by voice from the speaker 32.

Furthermore, the microcomputer 7 allows the liquid crystal display controller 33 in the display device 6F to operate and displays information of the occurrence of the fault and faulty part on the liquid crystal display panel 34. By doing this, information when an error occurs in the display device 6F can be obtained more surely.

FIG. 10 is a block diagram showing the sixth embodiment of the present invention. This embodiment obtains the same effect as that of the embodiment shown in FIG. 9. In FIG. 10, a reference numeral 1C indicates a computer and 35 a liquid crystal display controller in the computer 1C. The other reference numerals which are the same as those shown in FIGS. 1 and 9 indicate the same functions. In FIG. 10, the display function for a fault and faulty operation of the display device shown in FIG. 9 is mounted in the computer 1C.

Namely, when an error occurs in the internal circuit of the display device 6E, the voltage detected by the ADC 27 or 28 is digitized and processed by the microcomputer 7 as faulty voltage occurrence information and information informing an error is transmitted to the computer 1C via the communication controller 8. In the computer 1C, CPU 2 decodes the transmitted faulty information. When CPU 2 identifies the faulty part of the display device 6E, it allows the audio control circuit 31 to operate as an audio signal and informs the user of the fault by an audio message from the speaker 32 on one hand. On the other hand, CPU 2 controls the liquid crystal display controller 35 so as to display characters or graphics on the liquid crystal display panel 34. By doing this, the user of the display device 6E can be informed of an error or fault of the display device 6E and can maintain the system easily.

FIG. 11 is a block diagram showing the seventh embodiment of the present invention. In the drawing, a reference numeral 36 indicates a power supply of the deflection circuit 10 and video circuit 11. The other reference numerals which are the same as those shown in FIG. 1 indicate the same functions.

Next, the operation shown in FIG. 11 will be explained. In FIG. 11, when a control instruction to the display device 6 is issued from CPU 2 of the computer 1, the communication controller 5 changes the control instruction to a one in the signal format suited to communication and sends it to the display device 6. The display device 6 returns the signal received by the communication controller 8 to the control instruction which can be identified by the microcomputer 7 and sends it to the microcomputer 7. The microcomputer 7 judges the control instruction and decides the part of a predetermined section in the display device 6 to be controlled.

When the control instruction relates to control of the power supply 36 and is an instruction for stopping power supply from the power supply 36 to the deflection circuit 10, or video circuit 11, or both circuits, the microcomputer 7 controls the power supply 36 so as to stop the above power supply. Therefore, the image display on the CDT 14 is also stopped.

By doing this, for example, when the computer 1 is not in operation for a predetermined period, the operation power supply for the display device 6 can be automatically put into the off state. Therefore, unnecessary power consumption can be restrained and the life span of the display device can be

10

lengthened. The aforementioned is power supply off control. However, needless to say, power supply on control is also possible. Namely, in this case, when the computer 1 is turned on or the computer 1 is changed from the function stop state to the active state, the microcomputer 7, power supply 36, deflection circuit 10, and video circuit 11 perform the reverse operation of the aforementioned so that the display device automatically starts to display.

FIG. 12 is a block diagram showing the eighth embodiment of the present invention. In the drawing, a reference numeral 37 indicates a display controller and the other numerals which are the same as those shown in FIG. 1 indicate units performing the same functions as those shown in FIG. 1.

Next, the operation of FIG. 12 will be explained. In FIG. 12, video information is sent to the display device 6 from the communication controller 5 in addition to a control instruction of the display device 6 which is explained in the embodiment shown in FIG. 1. This video information is a digital signal in the same way as a signal which is inputted to the display controller 3 in the embodiment shown in FIG. 1. The communication controller 8 of the display device 6 sends video information among the received signals to the display controller 37. The display controller 37 performs an operation which is the same as that of the display controller shown in FIG. 1 and generates a video signal to be inputted to a general display. By doing this, also in the embodiment shown in FIG. 12, an effect which is the same as that shown in FIG. 1 can be obtained. Furthermore, in FIG. 12, since video information is transmitted via a communication interface which is connected between the computer 1 and display device 6, a video signal line which is conventionally necessary is not necessary.

According to the present invention, a user of a computer can exercise various types of control for an information output device such as a display device from the keyboard of the computer or by the software incorporated in the computer. Therefore, the operability of the computer system is improved so that the system can be used easily and the user can obtain a desired information output status easily.

When an identification number is set to each device, a value which is set by the above control will not be lost by a careless operation of a user. By setting an identification number for a specific user, the secret of information can be protected inversely. Since the power supply for the information output device can be controlled by the computer when necessary, unnecessary power consumption can be restrained.

Since the status of the information output device can be monitored simply, the system can be protected against a malfunction and maintained easily. Furthermore, the aforementioned control hardware can be realized in a minimum structure.

What is claimed is:

1. A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

comparing means for comparing a first identification information which is previously stored in said display unit and a second identification information which is previously stored in said computer and is sent from said computer; and

a communication prohibition means for prohibiting communication between said computer with respect to display control of said display unit, when said first and second identification information do not match as a result of the comparison by said comparing means;

11

wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

2. A display unit according to claim 1, wherein said first and second identification information include an identification number.

3. A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

comparing means for comparing a first identification information which is previously stored in said display unit, and a second identification information which is previously stored in said computer and is sent from said computer; and

a reception prohibition means for prohibiting reception of a control command from said computer, for controlling at least one of a display size, a display position, a brightness, and a contrast of said display unit, when said first and second identification information do not match as a result of the comparison by said comparing means;

wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

4. A display unit according to claim 3, wherein said first and second identification information include an identification number.

5. A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

memory means for storing at least data of a frequency range to which said display unit is operable;

comparing means for comparing a first identification information which is previously stored in said display unit, and a second identification information which is previously stored in said computer and is sent from said computer; and

a communication permission means for permitting communication between said computer, at least with respect to said data of a frequency range stored in said memory means, when said first and second identification information match as a result of the comparison by said comparing means;

wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

6. A display unit according to claim 5, wherein said first identification information is stored in said memory means.

7. A display unit according to claim 5, wherein said data relating at least to a display specification of said display unit stored in said memory means, includes data of a frequency range to which said display unit is operable.

8. A display unit according to claim 5, wherein said first and second identification information include an identification number.

9. A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

memory means for storing at least data of a frequency range for which said display unit is operable;

comparing means for comparing a first identification information which is previously stored in said display unit in advance, and a second identification information which is previously stored in said computer and is sent from said computer; and

a communication prohibition means for prohibiting communication between said computer, at least with respect to said data of a frequency range stored in said memory means, when said first and second identification infor-

12

mation do not match as a result of the comparison by said comparing means;

wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

10. A display unit according to claim 9, wherein the control of said memory means includes rewriting or writing control of said data in said memory means.

11. A display unit according to claim 9, wherein said first identification information is stored in said memory means.

12. A display unit according to claim 9, wherein said data relating at least to a display specification of said display unit stored in said memory means, includes data of a frequency range to which said display unit is operable.

13. A display unit according to claim 9, wherein said first and second identification information include an identification number.

14. A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

comparing means for comparing a first identification information which is previously stored in said display unit, and a second identification information which is previously stored in said computer and is sent from said computer; and

a communication permission means for enabling display control by said computer and permitting communication between said computer and said display unit with respect to display control of said display unit, when said first and second identification information match as a result of the comparison by said comparing means, wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

15. A display unit having a communication control circuit for communicating with an externally connected computer, wherein said communication control circuit comprises:

comparing means for comparing a first identification information which is previously stored in said display unit, and a second identification information which is previously stored in said computer and is sent from said computer; and

a reception permission means for enabling control of a display size/position of said display unit by said computer and permitting reception of a control command from said computer for controlling at least the display size/position of said display unit, when said first and second identification information match as a result of the comparison by said comparing means,

wherein said communication control circuit enables bi-directional communication with said display unit and said computer.

16. A display unit for displaying an image based upon a digital image information signal, inputting said digital image information signal from an externally connected computer, comprising:

comparing means for comparing a first identification information which is previously stored in said display unit, and a second identification information which is previously stored in said computer and is sent from said computer; and

a communication permission means for enabling display control by said computer and permitting communication between said computer and said display unit with respect to display control of said display unit, when said first and second identification information match as a result of the comparison by said comparing means, further comprising a communication controller which enables bi-directional communication with said display unit and said computer.

13

17. A display unit for displaying an image based upon a digital image information signal, inputting said digital image information signal from an externally connected computer, comprising:

comparing means for comparing a first identification information which is previously stored in said display unit, and a second identification information which is previously stored in said computer and is sent from said computer; and

a communication prohibition means for disabling control of said memory means by said computer and prohibiting communication between said computer and said memory means of said display unit, when said first and second identification information do not match as a result of the comparison by said comparing means, further comprising a communication controller which enables bi-directional communication with said display unit and said computer.

18. A display unit for displaying an image based upon an image signal inputted from an externally connected computer, comprising:

memory means for storing an identification number for making said computer recognize that said display unit is communicatable with said computer; and

a communication control means for sending said identification number stored in said memory means to said computer,

wherein said communication control means enables bi-directional communication with said display unit and said computer.

19. A display unit for displaying an image based upon an image signal inputted from an externally connected computer, comprising:

memory means for storing an identification number for making said computer recognize that said display unit is communicatable with said computer; and

a communication control means for sending said identification number stored in said memory means to said computer in response to power on of at least one said display unit and said computer,

wherein said communication control means enables bi-directional communication with said display unit and said computer.

20. A display unit for displaying an image based upon an image signal inputted from an externally connected computer, comprising:

a memory which stores an identification number for making said computer recognize that said display unit is communicatable with said computer; and

a communication controller connected to said memory which sends said identification number stored in said memory to said computer,

wherein said communication controller enables bi-directional communication with said display unit and said computer.

21. A display unit for displaying an image based upon an image signal inputted from an externally connected computer, comprising:

a memory which stores an identification number for making said computer recognize that said display unit is communicatable with said computer; and

a communication controller which sends said identification number stored in said memory to said computer in response to power on of at least one of said display unit and said computer,

wherein said communication controller enables bi-directional communication with said display unit and said computer.

14

22. A method of communicating between a display unit and a video source from which video signals are sent to the display unit for display, the method comprising the steps of:

communicating display unit information stored in a memory of the display unit from the display unit to the video source, wherein said display unit information includes an identification number for uniquely identifying the display unit; and

sending a signal from the video source to the display unit, wherein said signal is generated based on the display unit information,

wherein information is bi-directionally communicated with the video source and the display unit.

23. A display unit for displaying an image based on an image signal inputted from an externally connected computer, comprising:

a processor adapted to control display of the display unit;

a memory which stores an identification number; and

a communication controller which sends the identification number stored in said memory to said computer;

wherein said communication controller enables bi-directional communication between said display and said computer.

24. A display unit according to claim 23, further comprising a deflection circuit, wherein the processor generates control signals for the deflection circuit.

25. A display unit for displaying an image based on an image signal inputted from an externally connected computer, comprising:

a processor adapted to control display of the display unit;

a memory which stores identification information; and

a communication controller which sends the identification information stored in said memory to said computer in response to power on of at least one of said display unit and said computer;

wherein said communication controller enables bi-directional communication between said display and said computer.

26. A display unit according to claim 25, further comprising a deflection circuit, wherein the processor generates control signals for the deflection circuit.

27. A display unit for displaying an image based on an image signal inputted from an externally connected video source, comprising:

a processor adapted to control display of the display unit;

a memory in which at least display unit information is stored, wherein the display unit information includes an identification number for identifying the display unit; and

a communication controller capable of bi-directionally communicating with the video source;

wherein the communication controller communicates the display unit information from the display unit to the video source and the display unit receives a signal from the video source that is generated based on the display unit information.

28. A display unit according to claim 27, wherein the video source is a computer.

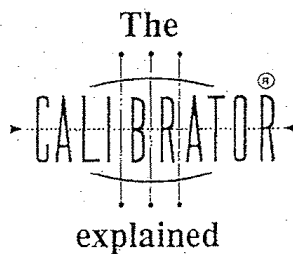
29. A display unit according to claim 28, further comprising a deflection circuit, wherein the processor generates control signals for the deflection circuit.

* * * * *

BARCO

Barco n.v.
Video & Communications

Th. Sevenslaan 106
B-8500 Kortrijk (Belgium)
Tel. 056/23.32.11 - Telex 85.842 barind b
FAX (0)56/21 27 81
HR. Ieper 28.186 - BTW 421.577.737
K.B. Kortrijk 460-0328901-14



part 1

SOFTWARE VERSION 2.01
AND HIGHER

APRIL 1990

ABOUT "THE CALIBRATOR® EXPLAINED, PART 1":

Information in this document is subject to change without notice, and does not represent a commitment on the part of BARCO.

The information described in this document is furnished under a licence agreement or nondisclosure agreement.

This document or its content may be used only in accordance with the terms of the agreement.

If you have comments about this documentation or the functional software of the CALIBRATOR®, send your comments to your BARCO representative (to the attention of the Product Support Manager Computer Displays).

THE CALIBRATOR®
OPTISENSE®
CALIBRATOR TALK®
are registered trademarks of BARCO Belgium.

DISCLAIMER:

BARCO MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED,
REGARDING THE ENCLOSED INFORMATION, ITS MERCHANTABILITY,
OR ITS FITNESS FOR ANY PARTICULAR PURPOSE.



COMPUTER DISPLAYS

CCID 7x51

GETTING CALIBRATED PICTURES

OR HOW TO MAKE MATHEMATICAL USE
OF A CALIBRATOR®

DOC: CALGAM8

17apr90

Prepared by : J.-P. VAN ELSTLANDE : Chief Engineer
J. MAELFEYT: Product & Marketing Support Manager

ABSTRACT

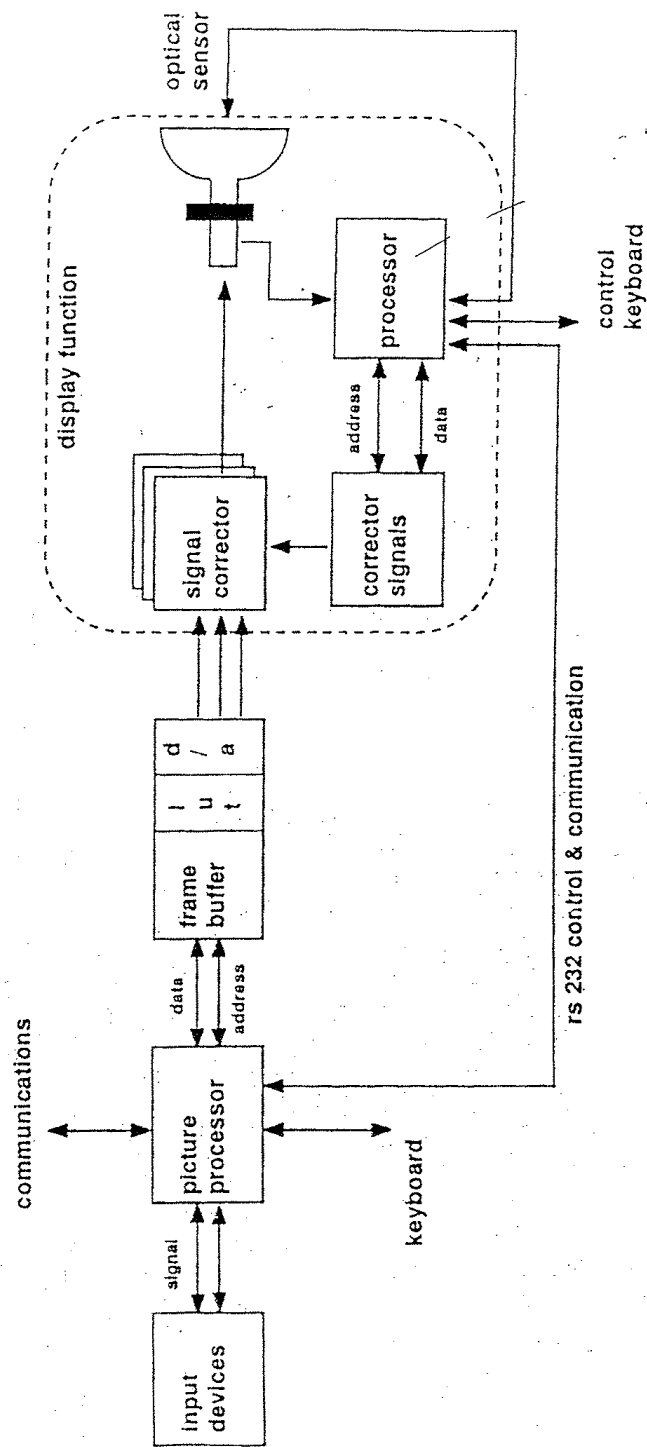
As technology improves, the requirements to display a colorimetric correct picture increases also.
This document describes a method to get full advantage of the use of a CALIBRATOR® in your application.

WHAT IS ... A CALIBRATOR® ?

It is the first product of a new display line, especially conceived and developed for all applications where the picture, as the end product, may be sold.
These end products ask for stringent COLORIMETRIC specifications, as used in the following applications:

Prepress:	Scanners Design Stations Proofing Stations
Textile and Fashion:	Design Stations Presentation Stations Dying Formulae Correcting Systems
Photographic Workstations:	Video Colour Analyzers Film Processors Cine Correction Stations
Animation:	Video Painting Stations
Medical:	Endoscopy

SET UP WITH CALIBRATOR



STANDARD DISPLAYS and CALIBRATORS

What is the difference between ... a STANDARD DISPLAY and ... ?

A CALIBRATOR® ensures - amongst better picture quality - also:

- * BETTER INTEGRATION WITH WORKSTATION FOR COLORIMETRIC ACCURACY
- * CALIBRATED COLORIMETRIC REPRODUCTION
- * MATHEMATICAL DEFINED PICTURE
- * TRANSPORTABLE VALUES
- * FIVE DIFFERENT WHITE REFERENCE POINTS BUILT-IN
- * AUTO-CALIBRATION ROUTINE BUILT-IN VIA LOW COST OPTICAL SENSOR (OPTISENSE®)

WORKING IN A CALIBRATED ENVIRONMENT

First of all, select the correct Reference White Point for your application (see figure "CIE 1931 (x,y)-chromaticity diagram". Use this Reference White Point for all further calculations. By preference, use the display in the CALIBRATED mode.

The Input/Output formula is now using the following information blocks:

- * The Video Input Values
- * The Control settings (via Keypad or serial communication channel)
- * The Calibration Parameters of the display.

Before going deeper into the mathematical model of the Calibrator®, the following definitions are important.

- * CONTRAST: Is the perceived contrast on the screen and is - besides the opto-electric parameters of the driven CRT - also dependent on the ambient light, the intrinsic transparency of the CRT-faceplate and the quality of the Anti-Reflective Coating on the front side of the CRT.
- * BRIGHTNESS: Is the perceived overall brightness of the picture.

For REASONS of MATHEMATICAL CORRECTNESS two NEW parameters are defined now, which are unique controls in a display.

They are digitally controlled and stored in non-volatile memory. There is a direct relationship between these setting values and their use in the "CALIBRATOR® MATHEMATICAL MODEL", referred to as the "CALIBRATOR® CHARACTERISTIC FUNCTIONS" (CCF's), based on the "CALIBRATOR® CHARACTERISTIC PARAMETERS" (CCP's).

BARCO

COMPUTER DISPLAYS

The
CALIBRATOR®
explained

part 1

CONTENTS

GETTING CALIBRATED PICTURES
OR HOW TO MAKE MATHEMATICAL USE
OF A CALIBRATOR®

ACCURATE DEFINITION
OF CIE1931 XYZ-COORDINATES
ON A **BARCO** CALIBRATOR®

COLOUR SOLID
OF A **BARCO** CALIBRATOR®
WITHOUT AMBIENT ILLUMINATION

THE **BARCO** CALIBRATOR®
INTERCONNECTION PROTOCOL
FUNCTIONAL SPECIFICATION

APRIL 1990

CONTENTS

	page
1. HARDWARE SUPPORT	3
1.1 General	3
1.2 RS232 port	3
1.3 RS422 port	7
2. SOFTWARE SUPPORT	8
3. PROTOCOL CONTROL SEQUENCES	10
4. DATABLOCK FORMAT	10
5. PROTOCOL	11
5.1 Establish a Session	11
5.2 Terminate a Session	12
5.3 Data Flow	12
5.4 Protocol Time-outs	15
6. DATA MESSAGE SYNTAX	16
6.1 'Execute-only' or 'No Feedback' Commands	17
6.2 'No Feedback Commands with Factory Password'	20
6.3 'Feedback' Commands	22
6.3.1 Colour Auto Calibration	22
6.3.2 OPTISENSE® Matching	22
6.3.3 OPTISENSE® Value Request	23
6.3.4 Horizontal Frequency Autolock	23
6.3.5 User Password Change	23
6.3.6 Read Actual Calibrator® Parameter Values	24
6.3.7 Store Actual Calibrator® Settings	24
6.3.8 Recall User Colour Temperature Label Definition	25
6.3.9 Store User Colour Temperature Label Definition	25
6.3.10 Store Colour Temperature	26
6.3.11 Terminal Status Request	26
6.3.12 Serial Number Request	27
6.3.13 Version Request	27
APPENDIX A: Return Codes / Diagnostic Errors & Warnings	28
APPENDIX B: Currently not implemented Commands	30
APPENDIX C: Abbreviations	31
APPENDIX D: Interface Cables for the Calibrator®	32
APPENDIX E: How to calculate the BCC	34
APPLICATION: How to read the CCP's (Calibrator® Characteristic Parameters)	35
SUMMARY	36

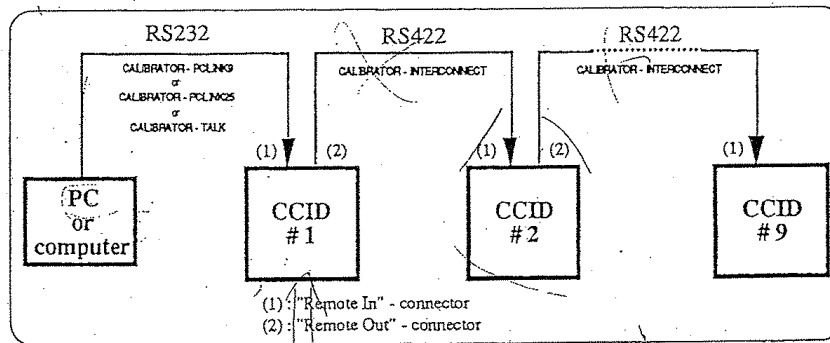
The Calibrator® - (Personal) Computer INTERCONNECTION

1. HARDWARE SUPPORT

1.1 General

The Calibrator® has two *main* communication ports, one RS232 port and one RS422 port. The RS232 port serves as a connection for the PC or computer, while the RS422 port is used as an inter-display connection. One Calibrator® must be assigned Master and the PC or computer always connects to this Calibrator®. If more than one Calibrator® is (are) to be driven by the PC or computer, they must be configured as a Slave and these Calibrators will communicate with the Master via the RS422 port. So the PC or computer really communicates with a Slave through the Master (acting as an RS232 ↔ RS422 convertor), and hence it needs only one (RS232) communication port.

Calibrator® InterDisplay Bus

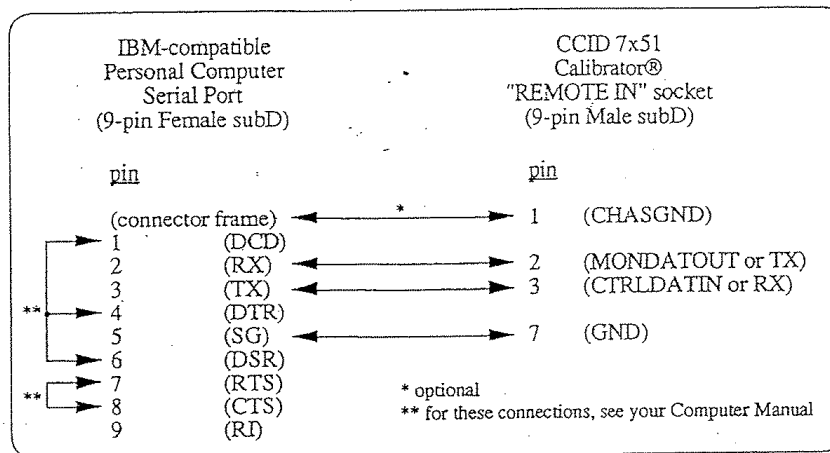


1.2 RS232 port

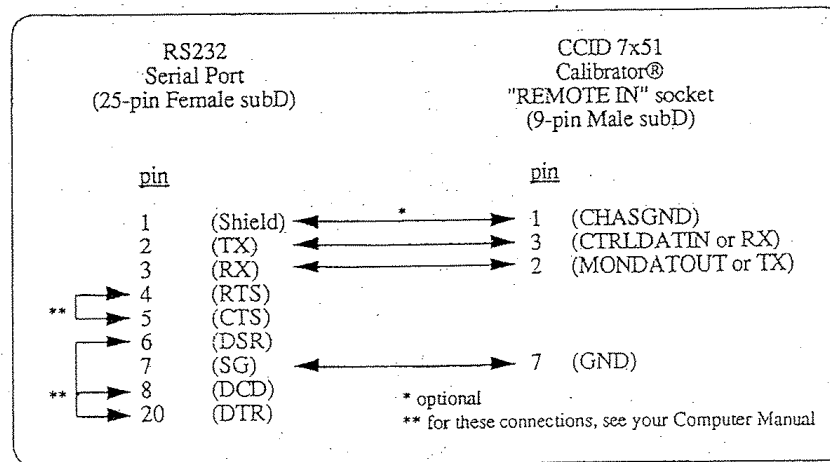
Connector:	The PC or computer may be connected to either the 'CONTROL' or preferably to the 'REMOTE IN' connector.
Physical:	3-wire RS232 connection (RX/TX/GND).
Transmission mode:	Asynchronous, 9600 bps.
Character format:	1 start bit / 8 data bits (no parity) / 1 stop bit.

Interfaces:

The 9-pin RS232-interface connects with the diagram below.
Interconnection cables 'IBM-PC/Calibrator®' (**CALIBRATOR - PCLINK9**)
can be provided (see Appendix D).

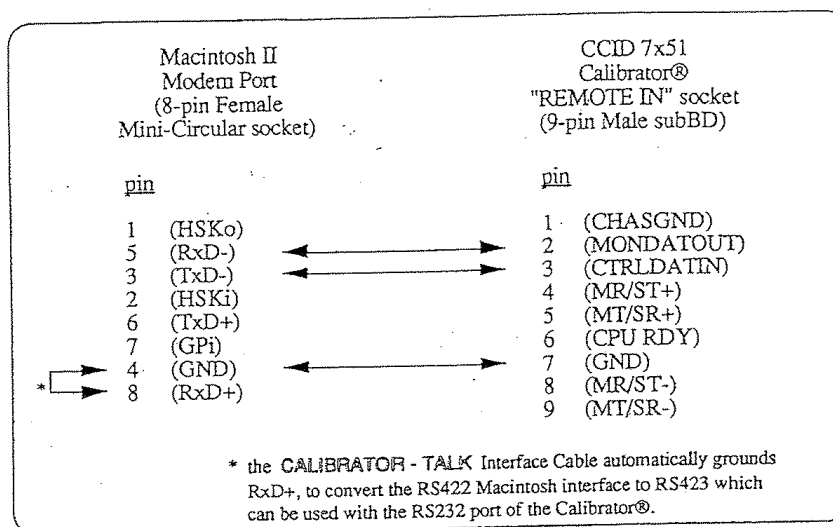


The standard 25-pin RS232-interface connects with the diagram below.
For the interface cable (**CALIBRATOR - PCLINK25**), see Appendix D.



The 8-pin RS232-interface (Macintosh Mini-Circular Connector) connects with the diagram below.

For the interface cable (**CALIBRATOR - TALK**), see Appendix D.



Notes: The Calibrator® has two RS232 ports: a main computer port, and an OPTISENSE® ¹⁾ input port. The Calibrator® redirects its ports, if the optical sensor is to be used together with the PC. This operation is totally transparent to the user.

Any FEMALE 9-pin subD socket of the Calibrator® (i.e. 'REMOTE IN', 'CONTROL' at the rear, the 'CONTROL' socket on the frontal LVL1 Control Panel, and even the female 9-pin subD 'SENSOR' socket on the Keypad, connected to a 'Control' socket on the Calibrator®) can be used as a connector for the RS232-port of the Calibrator®. The use of the 'REMOTE IN' socket is to be preferred.

The OPTISENSE® (or THOMA Colour Analyzer) uses another RS232 port, accessible at any 'CONTROL' socket of the Calibrator®, or the 'SENSOR' socket on the Keypad. The pin connections of the two 'Control' sockets and the 'SENSOR' socket, mentioned above, are completely identical (see listing below).

¹⁾ OPTISENSE® is the optical sensor made by Barco, to be used with the Calibrator®.

EXTERNAL SOCKETS of the CALIBRATOR®

"CONTROL"

(9-pin Female subD-socket on Control Panel (LVL1), and duplicated on the SYNC & CONTROL module)

pin		
1	CHASGND	
2	MONDATOUT	RS232 main port
3	CTRLDATIN	RS232 main port
4	OSDATA	RS232 aux port
5	- 15 V PROTD	
6	+ 15 V PROTD	
7	GND	
8	SDA	I ² C-bus 1)
9	SCL	I ² C-bus

"SENSOR"

(9-pin Female subD-socket on Keypad (LVL 2), identical with "CONTROL"-connector)

pin		
1	CHASGND	
2	MONDATOUT	RS232 main port
3	CTRLDATIN	RS232 main port
4	OSDATA	RS232 aux port
5	- 15 V PROTD	
6	+ 15 V PROTD	
7	GND	
8	SDA	I ² C-bus
9	SCL	I ² C-bus

"REMOTE IN"

(9-pin Female subD-socket on SYNC & CONTROL module)

pin		
1	CHASGND	
2	MONDATOUT	RS232 main port
3	CTRLDATIN	RS232 main port
4	MR/ST+	RS422 port
5	MT/SR+	RS422 port
6	CPU RDY	
7	GND	
8	MR/ST-	RS422 port
9	MT/SR-	RS422 port

"REMOTE OUT"

(9-pin Male subD-socket on SYNC & CONTROL module, NOT identical with "REMOTE IN")

pin		
1	CHASGND	
2	NC	
3	NC	
4	MR/ST+	RS422 port
5	MT/SR+	RS422 port
6	NC	
7	GND	
8	MR/ST-	RS422 port
9	MT/SR-	RS422 port

1) The I²C-bus is used to connect the Keypad to the Calibrator®.

1.3 RS422 port

Connector: Calibrators are linked from 'REMOTE OUT' to 'REMOTE IN' connector.

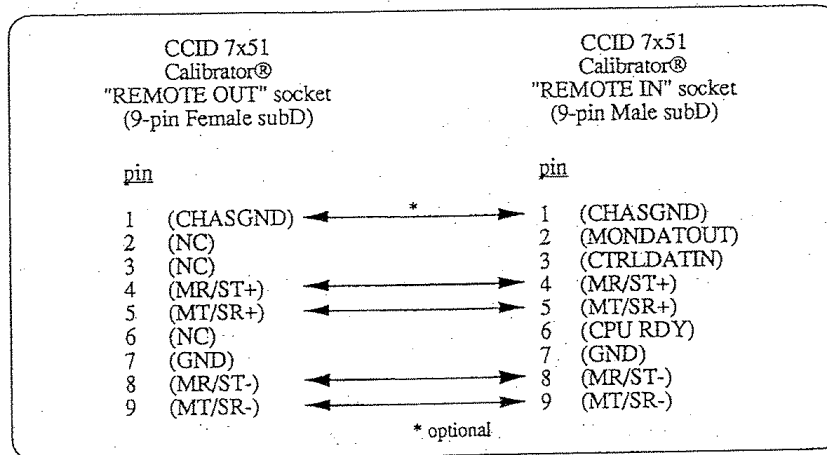
Physical: 4-wire RS422 connection
['MR/ST A' & 'MR/ST B' (or 'MR/ST+' & 'MR/ST-')
and
'MT/SR A' & 'MT/SR B' (or 'MT/SR+' & 'MT/SR-')]

Transmission mode: Asynchronous, 9600 bps.

Character format: 1 start bit / 8 data bits (no parity) / 1 stop bit.

Interface:

The 9-pin RS422-interface connects with the diagram below.
For the interface cable (**CALIBRATOR - INTERCONNECT**), see Appendix D.



Note: For Abbreviations: see Appendix C

2. SOFTWARE SUPPORT

This document describes the Protocol & Command Set for the CCID 7x51 Calibrator®, software version 2.01. Future enhancements may be incorporated in later versions.

Every Calibrator® will be assigned remote number '1' (#1) at first start-up, meaning that it automatically becomes Master. One may now connect a computer to the RS232 port and communicate with the (master) Calibrator®. If the Calibrator® is to be connected on the InterDisplay Bus as a Slave, the user must give it another remote number, ranging from 2 to 9. This may be done, either with the Keypad, or by connecting the PC to the RS232 port, and using the remote command 'RM' (see later). The display hereby loses the 'master' status and gets the 'slave' status. This means that it may be accessed from another (read: master) display on the InterDisplay Bus. The Slave RS232 port does not serve as a PC or computer input any more, but will solely be used for the Optical Sensor. At the Master display, the computer will be able to communicate with the Master itself or, through the Master, with any Slave on the InterDisplay Bus.

CAUTION: One must be very careful in assigning the Slave status to an active Master by means of the command 'RM', since this is a one-way operation. The only way to assign a Slave the Master status is through another Master (address is changed only after the session is closed!), or by using the 'REM' key on the Keypad! Also a check should be made to ensure that each display has a unique remote address.

Messages on the serial line will mostly be transmitted in readable ASCII to facilitate line tracing. Non readable ASCII is used only for the 'Control Sequences' (see 3. and 4.) and for the display identification during an 'Open Session' (see 5.1).

Table 1 at the end of this paragraph gives an overview of the ASCII Character Set.

During a session on a Calibrator®, the Keypad will be disabled to avoid conflicts. This will be indicated by a message on the LCD display.

Barco makes the functional spec available to users considering protocol implementation. Customer specific applications can be written, either by the customer, or a request may be forwarded to Barco for development of a customized software.

Note: In the text, protocol (= syntax & rules) and data (= the commands and responses) are treated separately. Take care not to mix up the protocol with the data in your implementation.

Table 1: ASCII CHARACTER SET (7-BIT CODE)

BINARY

MSD LSD								
	0 000	1 001	2 010	3 011	4 100	5 101	6 110	7 111
0	0000 NUL	0001 DLE	0010 SP	0011 0	0100 @	0101 P	0110 a	0111 p
1	0001 SOH	0010 DC1	0011 !	0100 1	0101 A	0110 Q	0111 b	1000 q
2	0010 STX	0011 DC2	0100 "	0101 2	0110 B	0111 R	1000 c	1001 r
3	0011 ETX	0100 DC3	0101 #	0110 3	0111 C	1000 S	1001 d	1010 s
4	0100 EOT	0101 DC4	0110 \$	0111 4	1000 D	1001 T	1010 e	1011 t
5	0101 ENQ	0110 NAK	0111 %	1000 5	1001 E	1010 U	1011 f	1100 u
6	0110 ACK	0111 SYN	1000 &	1001 6	1010 F	1011 V	1100 g	1101 v
7	0111 BEL	1000 ETB	1001 (	1010 7	1011 G	1100 W	1101 h	1110 w
8	1000 BS	1001 CAN	1010)	1011 8	1100 H	1101 X	1110 i	1111 x
9	1001 HT	1010 EM	1011 *	1100 9	1101 I	1110 Y	1111 j	1111 y
A	1010 LF	1011 SUB	1100 +	1101 :	1110 J	1111 Z	1111 k	1111 z
B	1011 VT	1100 ESC	1101 ,	1110 ;	1111 K	1111 [	1111 l	1111 {
C	1100 FF	1101 FS	1110 .	1111 <	1111 L	1111 \	1111 m	1111 |
D	1101 CR	1110 GS	1111 -	1111 =	1111 M	1111]	1111 n	1111 }
E	1110 SO	1111 RS	1111 .	1111 >	1111 N	1111 ^	1111 o	1111 ~
F	1111 SI	1111 US	1111 /	1111 ?	1111 O	1111 _	1111 o	1111 DEL

DECIMAL

ASCII cod	Char	ASCII cod	Char	ASCII cod	Char	ASCII cod	Char
0	NUL	32	SP	64	@	96	`
1	SOH	33	!	65	A	97	a
2	STX	34	"	66	B	98	b
3	ETX	35	#	67	C	99	c
4	EOT	36	\$	68	D	100	d
5	ENQ	37	%	69	E	101	e
6	ACK	38	&	70	F	102	f
7	BEL	39	'	71	G	103	g
8	BS	40	(	72	H	104	h
9	HT	41	)	73	I	105	i
10	LF	42	*	74	J	106	j
11	VT	43	+	75	K	107	k
12	FF	44	,	76	L	108	l
13	CR	45	-	77	M	109	m
14	SO	46	.	78	N	110	n
15	SI	47	/	79	O	111	o
16	DLE	48	0	80	P	112	p
17	DC1	49	1	81	Q	113	q
18	DC2	50	2	82	R	114	r
19	DC3	51	3	83	S	115	s
20	DC4	52	4	84	T	116	t
21	NAK	53	5	85	U	117	u
22	SYN	54	6	86	V	118	v
23	ETB	55	7	87	W	119	w
24	CAN	56	8	88	X	120	x
25	EM	57	9	89	Y	121	y
26	SUB	58	:	90	Z	122	z
27	ESC	59	;	91	[	123	{
28	FS	60	<	92	\	124	|
29	GS	61	=	93	]	125	}
30	RS	62	>	94	^	126	~
31	US	63	?	95	_	127	DEL

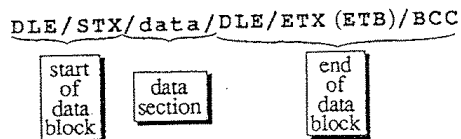
3. PROTOCOL CONTROL SEQUENCES

DLE (16D):	<u>Data Link Escape</u>	All protocol control sequences start with DLE.
DLE/ENQ (05D)+id:	<u>ENQuiry</u>	Open a session with the CCID with address 'id'.
DLE/ACK (06D):	<u>ACKnowledge</u>	Acknowledge a session opening or a correct data block.
DLE/NAK (21D):	<u>Negative AcKnowledge</u>	Abort a session opening, or inform the transmitter that there is an error in a data block.
DLE/STX (02D):	<u>Start of TeXt</u>	Start of a data block.
DLE/ETB (23D):	<u>End of Transmission Block</u>	End of a data block, more blocks following (reserved for future extension).
DLE/ETX (03D):	<u>End of TeXt</u>	End of last datablock.
DLE/EOT (04D):	<u>End Of Transmission</u>	End of session.
DLE/WACK (63D):	<u>Wait for positive ACKnowledge</u>	

" / " means: followed by

"..D" means: decimal

4. DATABLOCK FORMAT



The 'data section' may contain control characters. When a data section contains DLE, the first DLE will be skipped, so it must be sent as DLE/DLE. Both DLE's will be included in the BCC (Block Check Character).

BCC is a Longitudinal Redundancy Check (LRC - even parity). Calculation begins after STX up to, and including, ETX (ETB) ¹⁾.

The maximum length of the data in a data section must not exceed 256 bytes.

¹⁾ Easy to implement: XOR-ing the indicated bytes, see Appendix E.

5. PROTOCOL

Hereafter, the device which is currently transmitting data (regardless if it is the Calibrator® or a computer), will be called the 'Transmitter', the other one the 'Receiver'. The Calibrator® discards all incoming data, until a session is opened by the computer. The Master sends all data from the RS232 to the RS422 port and vice versa (transparent mode), after an 'open session' with another address than the Master's (which has address # 1), but keeps monitoring the data for a 30 seconds inactivity, in which case the Master sends a 'close session' to both sides.

5.1 Establish a session with the Calibrator®

COMPUTER

Calibrator®

DLE/ENQ/id →

Case 1: Session established

← DLE/ACK

Case 2: Session not established, e.g. someone is working with the keypad

← DLE/NAK

id:	0 (ASCII<NULL>) =	'Broadcast' to all Calibrators <i>Note: no DLE/ACK nor DLE/NAK will be returned !</i>
	1 (ASCII<SOH>) =	Master
	2 (ASCII<STX>)...9 (ASCII<HT>) =	Display # of Slaves

Note: An 'open session' always contains in itself a 'terminate session'. This makes it possible to switch from one Calibrator® to another with a simple 'open session', without having to close first (e.g. useful when polling Calibrators for status).

5.2 Terminate a session with the Calibrator®

A session will be terminated by sending DLE/EOT.

DLE/EOT may be sent by computer or Calibrator®, when the line is idle, or in response to a datablock to terminate a session.

A session will also be terminated by the receiver, when it receives no answer or a bad datablock (incorrect BCC, receiver generates DLE/NAK response) four times in a row, or by the Calibrator® when it detects an inactivity time-out (see '5.4 Protocol Time-outs').

5.3 Data flow

Data always flows as the result of a computer action.

The Calibrator® never initiates the transmission of data: the computer sends a command to the Calibrator®, and the display replies:

- * with DLE/ACK when data was correctly received and executed without error,
- * with DLE/NAK when there is a BCC error,
- * or with another Datablock when data must be returned,
e.g. a reply to that command, or an error status such as e.g. invalid command.

Examples

Ex. 1 Data = 'No Feedback' command, no protocol errors:

COMPUTER _____ Calibrator® _____

DLE/STX/data/DLE/ETX/BCC→

Possibilities:

Case 1: Correctly received and executed

←DLE/ACK

Case 2: Correctly received, but error in command

←DLE/STX/data/DLE/ETX/BCC
(data = error status reply, see 6.)

Case 2.1: Computer detects no errors

DLE/ACK→

*Case 2.2: Computer detects errors
see Example 4 or 5 in case of protocol error.*

Ex. 2 *data = 'Feedback' command, no protocol errors:*

COMPUTER _____ Calibrator® _____

DLE/STX/data/DLE/ETX/BCC→

←DLE/STX/data/DLE/ETX/BCC
(correctly received; execution stopped
with data = error status reply)

Possibilities:

Case 1: Computer detects no errors

DLE/ACK→

Case 2: Computer detects errors
see Example 4 or 5 in case of protocol error.

Ex. 3 *Calibrator® is executing a command, taking longer than turnaround time-out.*

When a command has been sent from the computer to the Calibrator®, and the execution time takes more than the turnaround time (e.g.: automatic colour calibration), the Calibrator® will send DLE/WACK (wait for positive acknowledge) during command execution approx. every 2 seconds, until the command has been processed. At this point the Calibrator® sends DLE/ACK or a data message.

COMPUTER _____ Calibrator® _____

DLE/STX/data/DLE/ETX/BCC→

(Wack Time-out, approx. 2 seconds)

←DLE/WACK

(Wack Time-out, approx. 2 seconds)

←DLE/WACK

←final reply:

as in Ex. 1 for 'No Feedback' Command
or as in Ex. 2 for 'Feedback' Command.

Ex. 4 NAK reply from receiver.

TRANSMITTER	RECEIVER
DLE/STX/data/DLE/ETX/BCC→	
	←DLE/NAK (BCC incorrect)
DLE/STX/data/DLE/ETX/BCC→	
	←DLE/NAK (BCC incorrect)
DLE/STX/data/DLE/ETX/BCC→	
	←DLE/NAK (BCC incorrect)
DLE/STX/data/DLE/ETX/BCC→	
	←DLE/EOT (terminate session)

Note: A max. of three re-transmissions is allowed, meaning that, if the receiver does not disconnect, the transmitter will.

Ex. 5 No reply from receiver.

TRANSMITTER (*)	RECEIVER
DLE/STX/data/DLE/ETX/BCC→	
	←turnaround to
DLE/STX/data/DLE/ETX/BCC→	
	←turnaround to
DLE/STX/data/DLE/ETX/BCC→	
	←turnaround to
DLE/STX/data/DLE/ETX/BCC→	
	←turnaround to
DLE/EOT→ (terminate session)	

(*) If the Transmitter is any host computer, it should preferably try to re-open the session three times, for certain if the computer does not detect 'disconnect sequences' from the receiver.

5.4 Protocol Time-outs

5.4.1 Inactivity Time-out

The Calibrator® has a (presetable) Inactivity Time-out, factory set to 30 seconds, which means that when no valid protocol syntax was detected in the past 30 seconds, the display will close the session (DLE/EOT).

It is advisable to increase this parameter (see 6.1: 'IT' command), if software on a host computer is asking for communication with the Calibrator®, during a long period of time, and if this happens frequently.

Another possibility to avoid a 'close session' by the Calibrator®, is to have the software on the host computer issue a 'Terminal Status Request' command regularly (see 6.3.11: 'TS' command).

5.4.2 Turnaround Time-out

A Turnaround Time-out of 3 seconds is provided. When the transmitter sends a data message to the receiver, the receiver must respond within Turnaround Time-out. If it doesn't, the transmitter will try again three times before closing the session.

5.4.3 Wack Time-out

A Wack Time-out of approx. 2 seconds is provided, to indicate that the Calibrator® is processing a command which takes more than turnaround time to complete (e.g automatic calibration).

6. DATA MESSAGE SYNTAX

Most messages will be sent over the line in printable ASCII-Codes.

Commands:

Be aware that all commands work on the *ACTUAL* settings of the Calibrator® ! They may be overwritten anytime by a 'Preset' command (see 6.1.), or permanently saved in the Calibrator® by the 'Store to Preset' command (see 6.3.7.).

Pay special attention, when CCP's (Calibrator® Characteristic Parameters) are read, using the 'RV' command (see 6.3.6). Some of the CCP's (Y_{CR} , Y_{CG} & Y_{CB}) are valid for the *actually* selected Colour Temperature only, and are changed if the Colour Temperature is altered. All the other CCP's (Gamma values, Residual Luminance values and Phosphor Chromaticity Coordinates) are independent of Colour Temperature.

Also the Highlight and Lowlight values which can be read by means of the 'RV' command are *actual* values, dependent on the Colour Temperature selection !

Replies:

As all commands originate from the computer, the Calibrator® must be able to give feedback to certain commands. This will be done with a data section, called 'the Error Status Format'.

Error Status Format:

$DLE/STX/ES, n[, m, m, \dots, m] / DLE/ETX/BCC$

Error
Status
Format

n = General Error Status (see Appendix A)

m = Specific Error Status for Feedback Commands,
present only when $n = 0$, (see Appendix A)

n & m : ASCII, BCD coded, without leading zeroes

6.1 'Execute-only' or 'No Feedback' Commands

Calibrator® responds:

- * with DLE/ACK, to indicate that the command was correctly received and executed,
- * with DLE/NAK, to indicate there is a BCC error,
- * with Error Status Format, when an error was detected in the command (except in 'Broadcast Mode' where no response at all will be generated).

Multicommand line support:

Multiple commands may be included in one data section with a ':' separator.
Command execution will stop at the end of the command string, or at the first error.
e.g: HB, 23:BC, 3:CL, 1:CE, 200

'Broadcast Mode' support:

No data reply is required from the Calibrator®, which means that this set may be 'broadcasted' to all Calibrators at once (open session with id = <NULL>).

Notations used in Tables 2 & 3:

$v \dots [v]$: ASCII (range 48D ... 57D), BCD coded, leading zeroes may be omitted.
Number of v 's: from 1 to 5.

$f.f$: Is a general representation of a floating point value.
All digits are ASCII, BCD coded.
The length of the integer part and the fraction are variable.
 $a1, a2, a3, b1, b2, b3, c1, c2$ & $c3$ is also used instead of f .

Table 2: 'EXECUTE-ONLY' or 'NO FEEDBACK' COMMANDS

Syntax	Meaning	Parameters
AK, v	AKB on/off	(v = 0:off, 1:on)
AL, v (1)	Ambient Light Control on/off	(v = 0:off, 1:on)
AR, vvv	AKB Removal	(vvv = 0...250)
AS, vvv	AKB Shift	(vvv = 0...250)
BA, vvv	Box Level	(vvv = 0...100 (0%))
BC, v	Box Colour	(v = 0:red, 1: 3:yellow 5:magenta, 0:white)
BG, vvv	BACKGROUND	(vvv = 0...200)
Bh, vvv	Box Hor. Position	(vvv = 0...250)
BH, vvv	Box Height	(vvv = 0...250)
Bv, vvv	Box Vert. Position	(vvv = 0...250)
BP, vvv	Box Ref. White Amplitude	(vvv = 670...730 [mVpp])
BW, vvv	Box Width	(vvv = 0...250)
CE, vvv	Corners E/W	(vvv = 0...250)
CL, v	Clamping backporch/sync tip	(v = 0:sync tip, 1:back porch)
CT, v	Colour Temperature select <i>copy HL & LL values of the selected temperature 'v' to the 'actual' HL & LL values</i>	(v = 0:D53, 1:D65, 2:D93, 3:US1, 4:US2)
DG (2)	Degauss (3)	
FP, v	Factory Password Installation	(v = 1)
Hb, vvv	Actual Highlights blue	(vvv = 0...255)
Hg, vvv	Actual Highlights green	(vvv = 0...255)
Hz, vvv	Actual Highlights red	(vvv = 0...255)
HB, vvv	Horizontal Blanking	(vvv = 0...250)
HF, vvv	Horizontal Frequency	(vvv = 0...250)
HP, vvv	Horizontal Phase	(vvv = 0...250)
IT, vvv	Inactivity Time-out	(vvv = 10...655 [s])
L1, v	Level 1 Controls on/off	(v = 0:off, 1:on)
Lb, vvv	Actual Lowlights blue	(vvv = 0...255)
Lg, vvv	Actual Lowlights green	(vvv = 0...255)
Lr, vvv	Actual Lowlights red	(vvv = 0...255)

4

Table 2 (cont'd)

LI, vv	LCD Intensity	(vv = 0...15)
Pr, v	PICTURE red on/off	(v = 0:off, 1:on)
Pg, v	PICTURE green on/off	(v = 0:off, 1:on)
Pb, v	PICTURE blue on/off	(v = 0:off, 1:on)
<i>Note: The 'Pr, v', 'Pg, v' & 'Pb, v' commands are overruled by the PI, vvv command (see below).</i>		
PE, vvv	Parabola E/W	(vvv = 0...250)
PH, vvv	Picture Height	(vvv = 0...250)
PI, vvv	PICTURE	(vvv = 50...130)
PR, v (2)	Preset to 'v' <i>Copy the settings of CAL, PR1, or PR2 to the 'actual' settings.</i>	(v = 0:CAL, 1:PRESET1, 2:PRESET2)
PW, vvv	Picture Width	(vvv = 0...250)
RM, v	Calibrator® Remote #	(v = 1...9) (4)
SC, vvv	S-Correction	(vvv = 0...250)
SK, vvv	Skewing	(vvv = 0...250)
SY, v	Sync fast/slow	(v = 0:slow, 1:fast)
SO, v	Source internal/external	(v = 0:external, 1:internal)
TR, vvv	Trapezium	(vvv = 0...250)
VB, vvv	Vertical Blanking	(vvv = 0...250)
VL, vvv	Vertical Linearity	(vvv = 0...250)
Vs, vvv	Vertical Shift fine	(vvv = 0...250)
VS, vvv	Vertical Shift coarse	(vvv = 0...250)
WY, vvv	White Uniformity Vertical (Y-axis)	(vvv = 0...250)
WZ, vvv	White Uniformity Axial (Z-axis)	(vvv = 0...250)
VC, Ph, Pw	Commands deleted from software version 2.0x onwards.	

- (1) Command currently not implemented. Will be available in a later software version.
- (2) These commands will return a 'Parameter Request Error', when trying to read them back with the 'RV' command (see 6.3.6.).
- (3) DG will initiate a delay in the Calibrator®, depending on the remote number. This results in a different delay per Calibrator®, and was implemented to prevent all displays from degaussing at the same time in 'broadcast mode'.
- (4) Not possible in 'Broadcast Mode'. See also remark (3)

6.2 'No Feedback Commands with Factory Password'

These commands provide the same features as the 'No Feedback Commands', mentioned in 6.1, but the storing action of such a commands needs a factory password. This means that a user can not (and is advised not to attempt to) change these values. Except for 'AW', 'FI' and 'ON', all the parameters listed in Table 3 are known as 'Calibrator® Characteristic Parameters or CCP's', which are carefully measured individually at the factory, and stored inside the Calibrator®.

You can read all the parameters (including the CCP's) which are stored inside the Calibrator® by these 'No Feedback Commands with Factory Password', by means of the 'RV'command (see 6.3.6). No password is required for *reading*.

Table 3: 'NO FEEDBACK COMMANDS with FACTORY PASSWORD'

Syntax	Meaning	Parameters
AW, pppppp, vvv	Average Ref.White Luminance [cd/m ²]	(vvv = 060...080 [cd/m ²])
OB, pppppp, f. f	Residual Luminance blue Y _{OB} [cd/m ²]	(p = factory password, f. f = floating point)
OG, pppppp, f. f	Residual Luminance green Y _{OG} [cd/m ²]	(p = factory password, f. f = floating point)
OR, pppppp, f. f	Residual Luminance red Y _{OR} [cd/m ²]	(p = factory password, f. f = floating point)
Note: OB = 'zero'B ≠ OB, the same for OG and OR.		
CB, pppppp, f. f	Calibrated Luminance blue Y _{CB} [cd/m ²]	(p = factory password, f. f = floating point)
CG, pppppp, f. f	Calibrated Luminance green Y _{CG} [cd/m ²]	(p = factory password, f. f = floating point)
CR, pppppp, f. f	Calibrated Luminance red Y _{CR} [cd/m ²]	(p = factory password, f. f = floating point)
EB, pppppp, f. f	Gamma blue γ _B	(p = factory password, f. f = floating point)
EG, pppppp, f. f	Gamma green γ _G	(p = factory password, f. f = floating point)
ER, pppppp, f. f	Gamma red γ _R	(p = factory password, f. f = floating point)

Table 3 (cont'd)

FI, pppppp,
a1.a1, a2.a2, a3.a3,
b1.b1, b2.b2, b3.b3,
c1.c1, c2.c2, c3.c3

(p = factory password,
all values floating point)

Inverse of phosphor matrix [P], denoted [P]⁻¹

$$[P]^{-1} = \begin{bmatrix} \frac{x_R}{y_R} & \frac{x_G}{y_G} & \frac{x_B}{y_B} \\ 1 & 1 & 1 \\ \frac{z_R}{y_R} & \frac{z_G}{y_G} & \frac{z_B}{y_B} \end{bmatrix}^{-1} = \begin{bmatrix} a1.a1 & a2.a2 & a3.a3 \\ b1.b1 & b2.b2 & b3.b3 \\ c1.c1 & c2.c2 & c3.c3 \end{bmatrix}$$

Note: xR & yR, xG & yG and xB & yB: Chromaticity Coordinates (see below).
zR = (1 - xR - yR), zG = (1 - xG - yG) and zB = (1 - xB - yB)

FB, pppppp, f.f	Conversion Factor from OS-units to cd/m ² , blue	(p = factory password, f.f = floating point)
FG, pppppp, f.f	Conversion Factor from OS-units to cd/m ² , green	(p = factory password, f.f = floating point)
FR, pppppp, f.f	Conversion Factor from OS-units to cd/m ² , red	(p = factory password, f.f = floating point)

Dimensions for FR, FG & FB :

$$\frac{Y}{\text{OS-units}} = \frac{\left[\frac{\text{cd}}{\text{m}^2} \right]}{\left[\right]} = \frac{\text{cd}}{\text{m}^2}$$

xB, pppppp, f.f	Chromaticity coordinate 'x' of the blue phosphor	(p = factory password, f.f = floating point)
xG, pppppp, f.f	Chromaticity coordinate 'x' of the green phosphor	(p = factory password, f.f = floating point)
xR, pppppp, f.f	Chromaticity coordinate 'x' of the red phosphor	(p = factory password, f.f = floating point)
yB, pppppp, f.f	Chromaticity coordinate 'y' of the blue phosphor	(p = factory password, f.f = floating point)
yG, pppppp, f.f	Chromaticity coordinate 'y' of the green phosphor	(p = factory password, f.f = floating point)
yR, pppppp, f.f	Chromaticity coordinate 'y' of the red phosphor	(p = factory password, f.f = floating point)
ON, pppppp, vvvv	OPTISENSE® serial number	(p = factory password, vvvv = 0...1023)

6.3 'Feedback Commands'

The computer always expects an 'Error Status Format' from the Calibrator®, except when a BCC error is detected, in which case the Calibrator® replies with NAK.

The explanation of the 'Error Status Format' for the commands below will not be repeated, except for the extra data bytes when n = 0 in the ES format.

Multicommand line support: There will be no support for multicommands per datablock.

'Broadcast Mode': As all commands require a reply, there will be no 'Broadcast Mode' support for these commands !

6.3.1 Colour Auto Calibration

COMPUTER

Calibrator®

AC,uuuuuu,t,c→
(u = user password,
t = 0:tracking exclusive, 1:inclusive,
c = 0:D53, 1:D65, 2:D93, 3:US1, 4:US2)

←ES,n[,m]
(n = General Error Status,
see Appendix A)
(m = Specific Error Status for Feedback
Commands, see Appendix A)

Note 1: US 1 and US 2 will be calibrated to the label definition they were assigned to with the 'SU' command.(see 6.3.9.)

Note 2: To perform tracking only, send the 'AC' command as follows :

AC,uuuuuu,1,→

6.3.2 OPTISENSE® Matching

COMPUTER

Calibrator®

OC,uuuuuu→
(u = user password)

←ES,n[,m]
(n = General Error Status,
see Appendix A)
(m = Specific Error Status for Feedback
Commands, see Appendix A)

6.3.3 OPTISENSE® Value Request

COMPUTER

Calibrator®

OV, vvvvvv→

(vvvvv = number of measurements
to average
= 1...32767 (= 2¹⁵-1))

←ES, n [, m, f. f]

(n = General Error Status,
see Appendix A)

(m = Specific Error Status for Feedback
Commands, see Appendix A)

(f. f = floating point value
from OPTISENSE®)

Note: use the Conversion Factors (see Table 3) to obtain the values in cd/m².

6.3.4 Horizontal Frequency Autolock

COMPUTER

Calibrator®

HA→

←ES, n [, m]

(n = General Error Status,
see Appendix A)

(m = 0:OK, 1:No Sync,
2:Frequency too low,
3:Frequency too high)

6.3.5 User Password Change

COMPUTER

Calibrator®

PA, oooooo, nnnnnn→

(o = old user password,
n = new user password)

←ES, n [, m]

(n = General Error Status,
see Appendix A)

(m = Specific Error Status for Feedback
Commands, see Appendix A)

*Note: 'old' & 'new' are limited to ASCII '0...9', 'A...Z', '.' or 'SP'
(space).*

6.3.6 Read Actual Calibrator® Parameter Values

The 'Read Values' Command applies to most of the 'No Feedback Commands', with or without factory password.

Commands marked with '(2)' in Table 2 can not be read back.

Format:

COMPUTER	Calibrator®
$RV, cc [, cc, ..., cc] \rightarrow$ (cc = Command Identifier, e.g.: HB, VS, ... see tables)	$\leftarrow ES, n [, v : v : ... : v]$ (n = General Error Status, see Appendix A) (v = Actual Values, ordered as in the command; can be either v...[v] or f.f)

6.3.7 Store Actual Calibrator® Settings

COMPUTER	Calibrator®
$SP, uuuuuu, v \rightarrow$ (Store Actual Settings to Preset v, u = user password, v = 0:CAL, 1:PRESET1, 2:PRESET2)	$\leftarrow ES, n [, m]$ (n = General Error Status, see Appendix A) (m = Specific Error Status for Feedback Commands, see Appendix A)

6.3.8 Recall User Colour Temperature Label Definition

COMPUTER

Calibrator®

RU, v →
(Recall Definition for User Colour
Temperature v)
(v = 3:USER1, 4:USER2)

← ES, n, v
(n = General Error Status,
see Appendix A)
(v = D50...D99 for Colour
Temperatures on the Daylight Locus
or
v = 0.xxx, 0.yyy if the Colour
Temperature was specified by
chromaticity coordinates)

6.3.9 Store User Colour Temperature Label Definition

COMPUTER

Calibrator®

SU, v, x →
(Store Definition for User Colour
Temperature 'v')
(v = 3:USER1, 4:USER2,
(x = D50...D99 for Colour Temperatures
on the Daylight Locus
or
x = 0.xxx, 0.yyy if the colour
temperature is to be specified by
chromaticity coordinates)

← ES, n [, m]
(n = General Error Status,
see Appendix A)
(m = Specific Error Status for Feedback
Commands, see Appendix A)

6.3.10 Store Colour Temperature

COMPUTER

Calibrator®

ST, uuuuuu, v→
[Store Actual Colour Temperature (store the
actual settings of the High- & Lowlights)
to the selected Colour Temperature Label]
u = user password,
v = 0:D53, 1:D65, 2:D93,
3:US1, 4:US2)

←ES, n[, m]
(n = General Error Status,
see Appendix A)
(m = Specific Error Status for Feedback
Commands, see Appendix A)

*Note: be aware, that this command does not store the Colour Temperature
Label Definition. Use 'SU, v, x' to store this definition (see
6.3.9).*

6.3.11 Terminal Status Request

COMPUTER

Calibrator®

TS→

←ES, n[, m, ..., m]
(n = General Error Status,
see Appendix A)
(m = 0: No Errors,
m > 0: see Appendix A for
Diagnostic Codes)

6.3.12 Serial Number Request

COMPUTER _____ Calibrator®

SN→

←ES, n [, sss...s]
(n = General Error Status,
see Appendix A)
(s = ASCII string)

6.3.13 Version Request

COMPUTER _____ Calibrator®

VE→

←ES, n [, sss...s]
(n = General Error Status,
see Appendix A)
(s = ASCII string)

APPENDIX A

CCID7xxx RETURN CODES DIAGNOSTIC ERRORS & WARNINGS.

The Return Codes are always in the Error Status Format (see also 6.):

ES, n [, m , m , ... , m]

n & m : ASCII, BCD coded, without leading zeroes.

1. REPLY TO ALL COMMANDS ('Feedback' as well as 'No Feedback')

n = General Error Status:

Indicates if errors occurred in the transmission, and if the message has been understood (i.e.: the command and the number of parameters was correct).

- n = 0 : No error, possibly data following (e.g.: m, command dependent !)
- n = 1 : Invalid command.
- n = 2 : Command syntax error.
- n = 3 : Parameter range error (overflow, underflow).
- n = 4 : Too many or too few parameters.
- n = 5 : Bad parameter (e.g. alpha-numeric instead of numeric).
- n = 6 : Parameter request error.
- n = 7 : TX buffer overflow.
- n = 8 : Out of memory.
- n = 9 : Function locked, try again later.

2. REPLY TO SPECIFIC FEEDBACK COMMANDS

m = Specific Error Status for Feedback Commands:

Indicates if an error occurred during the execution of the command.

2.1 'Horizontal Frequency Autolock' Command.

- m = 1 : No lock possible.
- m = 2 : Incoming frequency too low.
- m = 3 : Incoming frequency too high.

2.2 Other Feedback Commands.

- m = 0 : Command successful.
- m = 1 : Optical Sensor time-out, no data coming in.
- m = 2 : No Optical Sensor connected, unknown format or wrong mode.
- m = 3 : Reserved.
- m = 4 : Thoma Sensor overflow.
- m = 5 : Unstable readings from optical sensor.
- m = 6 : Calibration loop overflow, possibly unstable Lowlight or Highlight readings.
- m = 7 : Bad OPTISENSE® serial #. OPTISENSE does not match Calibrator®.
- m = 8 : Lowlight red underflow, check RGBin or RGBout board.
- m = 9 : Lowlight green underflow, check RGBin or RGBout board.
- m = 10 : Lowlight blue underflow, check RGBin or RGBout board.
- m = 11 : Lowlight red overflow, check RGBin or RGBout board.
- m = 12 : Lowlight green overflow, check RGBin or RGBout board.
- m = 13 : Lowlight blue overflow, check RGBin or RGBout board.
- m = 14 : Highlight red underflow, check RGBin or RGBout board.
- m = 15 : Highlight green underflow, check RGBin or RGBout board.
- m = 16 : Highlight blue underflow, check RGBin or RGBout board.
- m = 17 : Highlight red overflow, check RGBin or RGBout board.
- m = 18 : Highlight green overflow, check RGBin or RGBout board.
- m = 19 : Highlight blue overflow, check RGBin or RGBout board.
- m = 20 : Tracking: loop overflow, unstable light output readings.
- m = 21 : Tracking: PICTURE red overflow.
- m = 22 : Tracking: PICTURE green overflow.
- m = 23 : Tracking: PICTURE blue overflow.
- m = 24 : Tracking (BACKGROUND range adjust): BACKGROUND overflow.
- m = 25 : Tracking: PICTURE red underflow.
- m = 26 : Tracking: PICTURE green underflow.
- m = 27 : Tracking: PICTURE blue underflow.
- m = 28 : Tracking (BACKGROUND range adjust): BACKGROUND underflow.
- m = 29 : All serial channels in use.
- m = 96 : Factory password not installed.
- m = 99 : Password error.
- m = 199 : Function aborted by system (if the diagnostic error code occurs during command execution).
Use 'TS' to identify error.

2.3 'Terminal Status' Command

ERRORS (100...198):

- m = 100 : Vertical deflection down, check H&V DEFLECTION board.
- m = 101 : Horizontal deflection down, check H&V DEFLECTION board.
- m = 102 : EHT down, check EHT module.
- m = 103 : Horizontal deflection not locked, possibly lost sync, or fault in S&C, or H&V DEFLECTION board.
- m = 104 : Remote I/O on Deflection board down, check H&V DEFLECTION board.
- m = 105 : Deflection Processor down, check H&V DEFLECTION board.

WARNINGS (200...255)

- m = 200 : Scan voltage too high, check Voltage Selector tap on SMPS board.
- m = 201 : EEPROM read after write fault, change EEPROM on S&C board.(*).
- m = 202 : EEPROM wear-out, change EEPROM on S&C board.(*).
- m = 203 : Unexpected power fail interrupt, check S&C board.
- m = 204 : Horizontal frequency too low.
- m = 205 : Horizontal frequency too high.
- m = 206 : Software error detected.(*).

(*) These warnings discontinue the updating of the EEPROM.
One can continue to work, but the subsequent settings will not be stored in non-volatile memory.

APPENDIX B

CURRENTLY NOT IMPLEMENTED COMMANDS.

Currently NOT implemented commands per Software version 2.01:

6.1 'Execute-only' or 'No Feedback' Commands

Table 2: 'EXECUTE-ONLY' or 'NO FEEDBACK' COMMANDS

Syntax	Meaning	Parameters
AL, v (1)	Ambient light control on/off	(v = 0:off, 1:on)

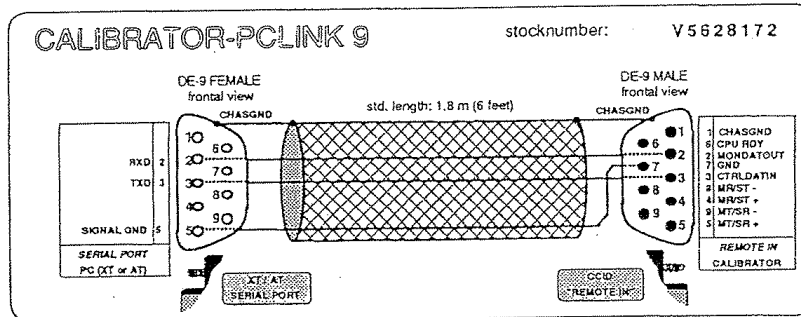
APPENDIX C

ABBREVIATIONS

ACK	Positive Acknowledge
AKB	Automatic Kinescope Biasing
BCC	Block Check Character
bps	bits per second
CAL	Calibrated setting
CCID	Computer Controlled Imaging Display
CCP	Calibrator® Characteristic Parameter
CHASGND	Chassis Ground
CTRLDATIN	Control Data Input
CTS	Clear To Send
DCD	Data Carrier Detect
DLE	Data Link Escape
DSR	Data Set Ready
DTR	Data Terminal Ready
EEPROM	Electrically Erasable Programmable Memory
ENQ	Enquiry
EOT	End of Transmission
ES	Error Status
ETB	End of Transmission Block
ETX	End of Text
GND	Ground
H&V	Horizontal and Vertical (deflection board)
HT	Horizontal Tab
LCD	Liquid Crystal Display
LRC	Longitudinal Redundancy Check
MONDATOUT	Monitor Data Output
MR/ST	Master Receive/Slave Transmit
MT/SR	Master Transmit/Slave Receive
NAK	Negative Acknowledge
NC	Not connected
OS	OPTISENSE®
PC	Personal Computer
PR1	PRESET1 setting
PR2	PRESET2 setting
RI	Ring Indicator
RTS	Request To Send
RX	Receive
S&C	Sync and Control (board)
SG	Signal Ground
SOH	Start of Header
STX	Start of Text
TX	Transmit
US1	USER1 Colour Temperature
US2	USER2 Colour Temperature
WACK	Wait for Positive Acknowledge

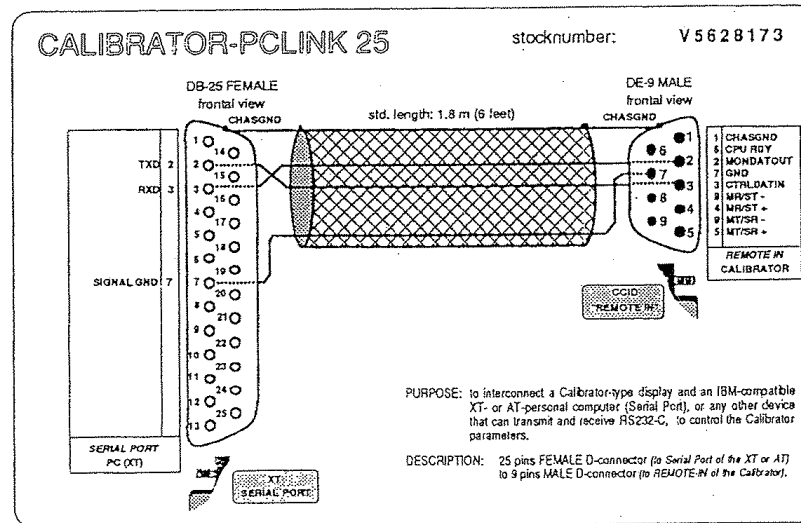
APPENDIX D

INTERFACE CABLES for the CALIBRATOR®



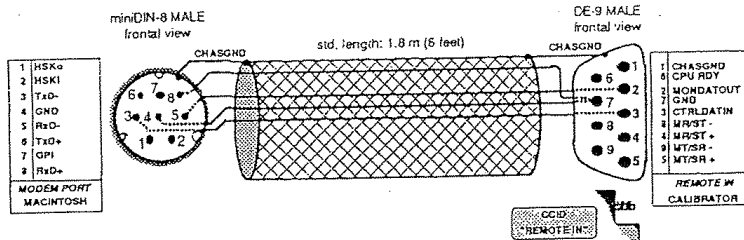
PURPOSE: to interconnect a Calibrator-type display and an IBM-compatible XT- or AT-personal computer (Serial Port), or any other device that can transmit and receive RS232-C, to control the Calibrator parameters.

DESCRIPTION: 9 pins FEMALE D-connector (to Serial Port of the XT or AT) to 9 pins MALE D-connector (to REMOTE-IN of the Calibrator).



CALIBRATOR-TALK

stocknumber: V 5628171

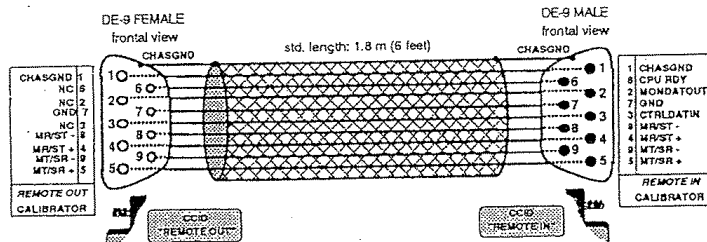


PURPOSE: to interconnect a Calibrator-type display and a Macintosh II computer (Modern Port) to control the Calibrator parameters.

DESCRIPTION: 8 pins MALE D-connector (to REMOTE-IN of the Calibrator) to 8 pins MALE mini-DIN connector (to Modern Port of the Macintosh).

CALIBRATOR-INTERCONNECT

stocknumber: V 3261172

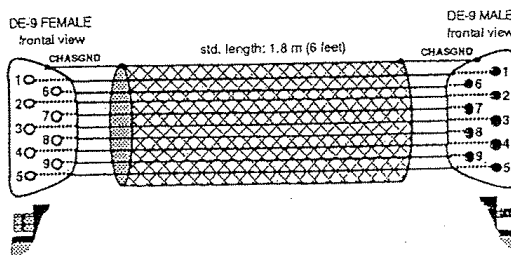


PURPOSE: to interconnect up to nine Calibrator-type displays for remote control of up to eight slave displays through the master display, controlled by a single keypad or a Personal Computer (see CALIBRATOR-PCLINK cable).

DESCRIPTION: 9 pins FEMALE D-connector (to REMOTE-OUT of Calibrator n° "R") to 9 pins MALE D-connector (to REMOTE-IN of Calibrator n° "R+1").

GENERAL EXTENSION

stocknumber: V 5628174



PURPOSE: to extend one of the CALIBRATOR INTERFACE CABLES at the 9 pins MALE D-connector side.

DESCRIPTION: 9 pins MALE D-connector to 9 pins FEMALE D-connector.

APPENDIX E : HOW TO CALCULATE THE BCC

Example: the computer wants to put the BACKGROUND on value 120.

Message :

DLE/STX/data/DLE/ETX/BCC

where data is: BG, 120

Let's write down the message in binary format :

DLE	0001	0000
STX	0000	0010
B	0100	0010
G	0100	0111
,	0010	1100
1	0011	0001
2	0011	0010
0	0011	0000
DLE	0010	0000
ETX	0000	0011
BCC	????	????

The BCC is calculated, starting with the data field, up to and including the ETX character. The LRC method will make the sum of bits in each bit column of the indicated bytes. If this sum is odd, then the corresponding bit in the BCC will be made 1 (LRC - even parity). A calculation for the least significant bit column results in:

0	}	Sum = 3 (decimal)
1		
0		
1		
0		
0		
0		
0		
1		
1		

The least significant bit of the BCC must be 1. Doing the same for the other bit columns, gives you the total result:

BCC = 00111001.

This algorithm can easily be implemented by XOR-ing the indicated bytes and storing the result in BCC.

APPLICATION

How to read the CCP's (Calibrator® Characteristic Parameters) ?

To make a mathematical use of the Calibrator®, you need to know the characteristics of the display. These parameters are measured individually for each Calibrator® and stored inside the EEPROM on the Sync & Control Module at the end of the manufacturing process.

CCP's can be subdivided in two categories: Colour Temperature Dependent and Colour Temperature Independent. If you work with different Colour Temperatures in your application, you read the Colour Temperature Independent CCP's (for any selected Colour Temperature), and then you can select the Colour Temperatures used in your application one by one, each time followed by a reading of the Colour Temperature Dependent CCP's.

The following tables list the two categories of CCP's:

Colour Temperature Independent
CCP's

X _R	Y _R	Y _{0R}	Y _R
X _G	Y _G	Y _{0G}	Y _G
X _B	Y _B	Y _{0B}	Y _B

Colour Temperature Dependent
CCP's

Y _{CR}
Y _{CG}
Y _{CB}

To read the CCP's for T_c = D65, the following 'conversation' between Calibrator® and computer is necessary:

<p><u>COMPUTER</u></p> <p><i>Establish a session with the Calibrator®</i></p> <p>DLE/ENQ/<SOH>→</p> <p><i>Read the Colour Temperature Independent CCP's</i></p> <p>DLE/STX/RV, xR, xG, xB, yR, yG, yB, 0R, 0G, 0B, ER, EG, EB/DLE/ETX/BCC→</p> <p><i>Select D65 as the new Colour Temperature</i></p> <p>DLE/STX/CT, 1/DLE/ETX/BCC→</p> <p><i>Read the three Colour Temperature Dependent CCP's (for T_c = D65)</i></p> <p>DLE/STX/RV, CR, CG, CB/ DLE/ETX/BCC→</p> <p><i>Terminate the session with the Calibrator®</i></p> <p>DLE/EOT</p>	<p style="text-align: right;"><u>Calibrator®</u></p> <p style="text-align: right;">←DLE/ACK</p> <p style="text-align: right;">←DLE/STX/ES, 0, V:V:V: V:V:V:V:V:V:V:V:V/ DLE/ETX/BCC</p> <p style="text-align: right;">←DLE/STX/ES, 0/DLE/ ETX/BCC</p> <p style="text-align: right;">←DLE/STX/ES, 0, V:V:V/ DLE/ETX/BCC</p>
---	--

SUMMARY

Command (sorted)	Type	Meaning	Page
AK, v	No Feedback	AKB on/off	18
AL, v	No Feedback	Ambient Light Control on/off	18
AR, vvv	No Feedback	AKB Removal	18
AS, vvv	No Feedback	AKB Shift	18
BA, vvv	No Feedback	Box Level [%]	18
BC, v	No Feedback	Box Colour	18
BG, vvv	No Feedback	BACKGROUND	18
BH, vvv	No Feedback	Box Height	18
Bh, vvv	No Feedback	Box Horizontal Position	18
BP, vvv	No Feedback	Box Ref. White Amplitude [mVpp]	18
Bv, vvv	No Feedback	Box Vertical Position	18
BW, vvv	No Feedback	Box Width	18
CE, vvv	No Feedback	Corners E/W	18
CL, v	No Feedback	Clamping back porch/sync tip	18
CT, v	No Feedback	Colour Temperature Select	18
DG	No Feedback	Degauss	18
FP, v	No Feedback	Factory Password Installation	18
HB, vvv	No Feedback	Horizontal Blanking	18
Hb, vvv	No Feedback	Actual Highlights blue	18
HF, vvv	No Feedback	Horizontal Frequency	18
Hg, vvv	No Feedback	Actual Highlights green	18
HP, vvv	No Feedback	Horizontal Phase	18
Hr, vvv	No Feedback	Actual Highlights red	18
IT, vvv	No Feedback	Inactivity Time-out [s]	18
L1, v	No Feedback	Level 1 Controls on/off	18
Lb, vvv	No Feedback	Actual Lowlights blue	18
Lg, vvv	No Feedback	Actual Lowlights green	18
LI, vv	No Feedback	LCD Intensity	19
Lr, vvv	No Feedback	Actual Lowlights red	18
Pb, v	No Feedback	PICTURE blue on/off	19
PE, vvv	No Feedback	Parabola E/W	19
Pg, v	No Feedback	PICTURE green on/off	19
PH, vvv	No Feedback	Picture Height	19

Command (sorted)	Type	Meaning	Page
PI, vvv	No Feedback	PICTURE	19
PR, v	No Feedback	Preset to v	19
Pr, v	No Feedback	PICTURE red on/off	19
PW, vvv	No Feedback	Picture Width	19
RM, v	No Feedback	Calibrator® Remote #	19
SC, vvv	No Feedback	S-Correction	19
SK, vvv	No Feedback	Skewing	19
SO, v	No Feedback	Source internal/external	19
SY, v	No Feedback	Sync fast/slow	19
TR, vvv	No Feedback	Trapezium	19
VB, vvv	No Feedback	Vertical Blanking	19
VL, vvv	No Feedback	Vertical Linearity	19
VS, vvv	No Feedback	Vertical Shift coarse	19
Vs, vvv	No Feedback	Vertical Shift fine	19
WY, vvv	No Feedback	White Uniformity Vertical (Y-axis)	19
WZ, vvv	No Feedback	White Uniformity Axial (Z-axis)	19

Command (sorted)	Type	Meaning	Page
AW, ppppppp, vvv	No Feedb w/PW	Average Ref. White Luminance [cd/m ²]	20
OB, ppppppp, f. f	No Feedb w/PW	Residual Luminance blue Y _{OB} [cd/m ²]	20
OG, ppppppp, f. f	No Feedb w/PW	Residual Luminance green Y _{OG} [cd/m ²]	20
OR, ppppppp, f. f	No Feedb w/PW	Residual Luminance red Y _{OR} [cd/m ²]	20
CB, ppppppp, f. f	No Feedb w/PW	Calibrated Luminance blue Y _{CB} [cd/m ²]	20
CG, ppppppp, f. f	No Feedb w/PW	Calibrated Luminance green Y _{CG} [cd/m ²]	20
CR, ppppppp, f. f	No Feedb w/PW	Calibrated Luminance red Y _{CR} [cd/m ²]	20
EB, ppppppp, f. f	No Feedb w/PW	Gamma blue γ_B	20
EG, ppppppp, f. f	No Feedb w/PW	Gamma green γ_G	20
ER, ppppppp, f. f	No Feedb w/PW	Gamma red γ_R	20
FB, ppppppp, f. f	No Feedb w/PW	Conversion Factor OSunits-cd/m ² , blue	21
FG, ppppppp, f. f	No Feedb w/PW	Conversion Factor OSunits-cd/m ² , green	21
FI, ppppppp, ...	No Feedb w/PW	Inverse of Phosphor Matrix	21
FR, ppppppp, f. f	No Feedb w/PW	Conversion Factor OSunits-cd/m ² , red	21
ON, ppppppp, vvvv	No Feedb w/PW	OPTISENSE® Serial Number Request	21
xB, ppppppp, f. f	No Feedb w/PW	'x'-coordinate, blue phosphor	21
xG, ppppppp, f. f	No Feedb w/PW	'x'-coordinate, green phosphor	21
xR, ppppppp, f. f	No Feedb w/PW	'x'-coordinate, red phosphor	21
yB, ppppppp, f. f	No Feedb w/PW	'y'-coordinate, blue phosphor	21
yG, ppppppp, f. f	No Feedb w/PW	'y'-coordinate, green phosphor	21
yR, ppppppp, f. f	No Feedb w/PW	'y'-coordinate, red phosphor	21

Command (sorted)	Type	Meaning	Page
AC, uuuuuu, t, c	Feedback	Colour Auto Calibration	22
HA	Feedback	Horizontal Frequency Autolock	23
OC, uuuuuu	Feedback	OPTISENSE® Matching	22
OV, vvvvvv	Feedback	OPTISENSE® Value Request	23
PA, oooooo, nnnnnn	Feedback	User Password Change	23
RU, v	Feedback	Recall User Col.Temp.Label Definition	25
RV, cc[, cc, ..., cc]	Feedback	Read Actual Calibrator® Parameter Values	24
SN	Feedback	Serial Number Request	27
SP, uuuuuu, v	Feedback	Store Actual Calibrator® Settings	24
ST, uuuuuu, v	Feedback	Store Colour Temperature	26
SU, v, x	Feedback	Store User Col.Temp.Label Definition	25
TS	Feedback	Terminal Status Request	26
VE	Feedback	Version Request	27

Alphabetical Command Index

Command	Type	Meaning	Page
OB, pppppp, f. f	No Feedb w/PW	Residual Luminance blue Y_{OB} [cd/m ²]	20
OG, pppppp, f. f	No Feedb w/PW	Residual Luminance green Y_{OG} [cd/m ²]	20
OR, pppppp, f. f	No Feedb w/PW	Residual Luminance red Y_{OR} [cd/m ²]	20
AC, uuuuuu, t, c	Feedback	Colour Auto Calibration	22
AK, v	No Feedback	AKB on/off	18
AL, v	No Feedback	Ambient Light Control on/off	18
AR, vvv	No Feedback	AKB Removal	18
AS, vvv	No Feedback	AKB Shift	18
AW, pppppp, vvv	No Feedb w/PW	Average Ref. White Luminance [cd/m ²]	20
BA, vvv	No Feedback	Box Level [%]	18
BC, v	No Feedback	Box Colour	18
BG, vvv	No Feedback	BACKGROUND	18
BH, vvv	No Feedback	Box Height	18
Bh, vvv	No Feedback	Box Horizontal Position	18
BP, vvv	No Feedback	Box Ref. White Amplitude [mVpp]	18
Bv, vvv	No Feedback	Box Vertical Position	18
BW, vvv	No Feedback	Box Width	18
CB, pppppp, f. f	No Feedb w/PW	Calibrated Luminance blue Y_{CB} [cd/m ²]	20
CE, vvv	No Feedback	Corners E/W	18
CG, pppppp, f. f	No Feedb w/PW	Calibrated Luminance green Y_{CG} [cd/m ²]	20
CL, v	No Feedback	Clamping back porch/sync tip	18
CR, pppppp, f. f	No Feedb w/PW	Calibrated Luminance red Y_{CR} [cd/m ²]	20
CT, v	No Feedback	Colour Temperature Select	18
DG	No Feedback	Degauss	18
EB, pppppp, f. f	No Feedb w/PW	Gamma blue γ_B	20
EG, pppppp, f. f	No Feedb w/PW	Gamma green γ_G	20
ER, pppppp, f. f	No Feedb w/PW	Gamma red γ_R	20
FB, pppppp, f. f	No Feedb w/PW	Conversion Factor OSunits-cd/m ² , blue	21
FG, pppppp, f. f	No Feedb w/PW	Conversion Factor OSunits-cd/m ² , green	21
FI, pppppp, ...	No Feedb w/PW	Inverse of Phosphor Matrix	21
FP, v	No Feedback	Factory Password Installation	18
FR, pppppp, f. f	No Feedb w/PW	Conversion Factor OSunits-cd/m ² , red	21
HA	Feedback	Horizontal Frequency Autolock	23
HB, vvv	No Feedback	Horizontal Blanking	18
Hb, vvv	No Feedback	Actual Highlights blue	18
HF, vvv	No Feedback	Horizontal Frequency	18
Hg, vvv	No Feedback	Actual Highlights green	18
HP, vvv	No Feedback	Horizontal Phase	18
Hr, vvv	No Feedback	Actual Highlights red	18
IT, vvv	No Feedback	Inactivity Time-out [s]	18
L1, v	No Feedback	Level 1 Controls on/off	18
Lb, vvv	No Feedback	Actual Lowlights blue	18
Lg, vvv	No Feedback	Actual Lowlights green	18
LI, vv	No Feedback	LCD Intensity	19
Lr, vvv	No Feedback	Actual Lowlights red	18

Alphabetical Command Index (cont'd)

OC,uuuuuu	Feedback	OPTISENSE® Matching	22
ON,pppppp,vvvv	No Feedb w/PW	OPTISENSE® Serial Number Request	21
OV,vvvvvv	Feedback	OPTISENSE® Value Request	23
PA,oooooooo,nnnnnn	Feedback	User Password Change	23
Pb,v	No Feedback	PICTURE blue on/off	19
PE,vvv	No Feedback	Parabola E/W	19
Pg,v	No Feedback	PICTURE green on/off	19
PH,vvv	No Feedback	Picture Height	19
PI,vvv	No Feedback	PICTURE	19
PR,v	No Feedback	Preset to v	19
Pr,v	No Feedback	PICTURE red on/off	19
PW,vvv	No Feedback	Picture Width	19
RM,v	No Feedback	Calibrator® Remote #	19
RU,v	Feedback	Recall User Col.Temp.Label Definition	25
RV,cc[,cc,...,cc]	Feedback	Read Actual Calibrator® Parameter Values	24
SC,vvv	No Feedback	S-Correction	19
SK,vvv	No Feedback	Skewing	19
SN	Feedback	Serial Number Request	27
SO,v	No Feedback	Source internal/external	19
SP,uuuuuu,v	Feedback	Store Actual Calibrator® Settings	24
ST,uuuuuu,v	Feedback	Store Colour Temperature	26
SU,v,x	Feedback	Store User Col.Temp.Label Definition	25
SY,v	No Feedback	Sync fast/slow	19
TR,vvv	No Feedback	Trapezium	19
TS	Feedback	Terminal Status Request	26
VB,vvv	No Feedback	Vertical Blanking	19
VE	Feedback	Version Request	27
VL,vvv	No Feedback	Vertical Linearity	19
VS,vvv	No Feedback	Vertical Shift coarse	19
Vs,vvv	No Feedback	Vertical Shift fine	19
WY,vvv	No Feedback	White Uniformity Vertical (Y-axis)	19
WZ,vvv	No Feedback	White Uniformity Axial (Z-axis)	19
xB,pppppp,f.f	No Feedb w/PW	'x'-coordinate, blue phosphor	21
xG,pppppp,f.f	No Feedb w/PW	'x'-coordinate, green phosphor	21
xR,pppppp,f.f	No Feedb w/PW	'x'-coordinate, red phosphor	21
yB,pppppp,f.f	No Feedb w/PW	'y'-coordinate, blue phosphor	21
yG,pppppp,f.f	No Feedb w/PW	'y'-coordinate, green phosphor	21
yR,pppppp,f.f	No Feedb w/PW	'y'-coordinate, red phosphor	21

CCPs 4 TABLE

DEFAULT CALIBRATOR CHARACTERISTIC PARAMETERS					1-9-90
ASSUME PHOSPHORS	x coord	y coord	z coord		
RED	0,623	0,350	0,027		
GREEN	0,281	0,611	0,108		
BLUE	0,157	0,069	0,774		
ALSO PARAMETERS	Y0	GAMMA			
RED	0	2,20			
GREEN	0	2,20			
BLUE	0	2,20			
THEN IS					
FOR 80 nit CAL	5000°K	5300°K	6500°K	9300°K	9900°K
YCR80	23,80	22,93	20,38	17,35	16,96
YCG80	51,29	51,75	52,83	53,54	53,57
YCB80	4,91	5,32	6,78	9,11	9,47
TOTAL	80	80	80	80	80
FOR 70 NIT CAL	5000°K	5300°K	6500°K	9300°K	9900°K
YCR70	20,83	20,06	17,83	15,18	14,84
YCG70	44,88	45,28	46,23	46,85	46,87
YCB70	4,29	4,66	5,94	7,97	8,29
TOTAL	70	70	70	70	70
FOR 60 NIT CAL	5000°K	5300°K	6500°K	9300°K	9900°K
YCR60	17,85	17,20	15,29	13,01	12,72
YCG60	38,47	38,81	39,62	40,16	40,18
YCB60	3,68	3,99	5,09	6,83	7,10
TOTAAL	60	60	60	60	60
ALSO IN %					
STARTING FROM	5000°K	5300°K	6500°K	9300°K	9900°K
MAX RED	29,75	28,66	25,48	21,69	21,20
MAX GREEN	64,11	64,69	66,04	66,93	66,96
MAX BLUE	6,13	6,65	8,48	11,39	11,84
sum is	100	100	100	100	100

NASA Tech Brief

National Aeronautics and
Space Administration

Goddard Space Flight Center, Greenbelt, Maryland

p. 246, 1-2

Interface for Color-Video Monitor

A wide range of video signals can be accommodated.

A commercially produced color-video monitor is modified by the addition of an interface circuit to accommodate a wider-than-usual range of scanning rates and resolutions. The monitor displays a properly adjusted picture as long as the input video signal conforms to one of several industry standards and has a horizontal-synchronization frequency of 15.0 to 37.5 kHz, a vertical-synchronization frequency of 43 to 65 Hz, a horizontal resolution up to 1,280 elements, and a vertical resolution up to 1,024 elements. With little or no intervention by the operator and without having to be turned off for adjustments, the interface adapts the monitor within 1 second to changes in rates or resolutions, as long as those parameters remain within the specified ranges.

The interface design relies on the fact that standard video signals having the same vertical- and horizontal-synchronization frequencies usually require similar aspect ratios and other monitor settings. The interface adjusts the monitor identically for video signals for which those frequencies are sufficiently close.

The vertical- and horizontal-synchronization pulses are taken from a sampling point in the monitor after these pulses have been separated from the incoming video signal. The interface measures the two pulse frequencies and processes them, according to a transfer function, into eight outputs that adjust the width, height, centering, geometric distortion, and other characteristics of the picture (see Figure 1).

The transfer function is contained in electronic memory in the form of two "lookup" tables that specify the outputs for input frequencies in various combinations of nonoverlapping ranges. Table 1 contains the adjustment records, which are defined by the operator during the initial calibration. Table 2 contains fixed calibration values that are used when Table 1 does not contain an entry for a particular video signal. An important feature is that

the contents of Table 1 are maintained in nonvolatile memory.

The interface repeatedly measures the two pulse frequencies. A match is found when each frequency lies within the range specified in a particular adjustment record, and the two most recent consecutive readings of the frequencies differ by no more

than one count. When a match is found, the values in the adjustment record are used to control the monitor. When a match is not found, the interface uses arbitrary values from Table 2 that keep the monitor in a safe operating condition and that might accidentally provide a correctly adjusted picture with some input video signals.

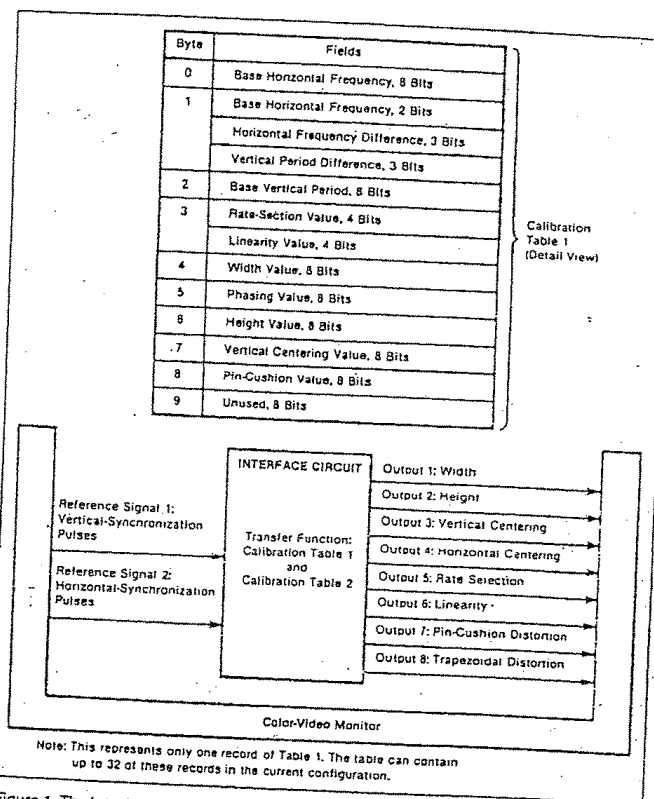


Figure 1. The Interface Circuit measures the frequencies of the horizontal- and vertical-synchronizing pulses. When these frequencies fall within a combination of preset ranges, the interface generates an associated preset combination of eight picture-adjusting signals.

The adjustment records are made during an initial calibration, which is conducted with the help of a computer connected to the monitor (see Figure 2). A video generator is set to one of the anticipated combinations of signal parameters. For each combination, the interface is allowed to adjust the monitor from Table 2. The operator then makes fine adjustments manually for the best picture. The optimized adjustment values, along with the horizontal and vertical frequency range for that combination, is then stored in Table 1. The procedure is repeated for each different combination.

*This work was done by Eric Rodriguez of Goddard Space Flight Center.
GSC-13076 /TN*

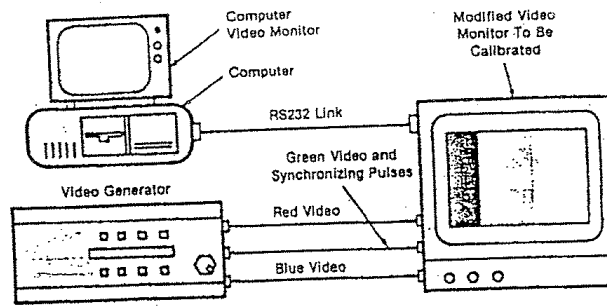
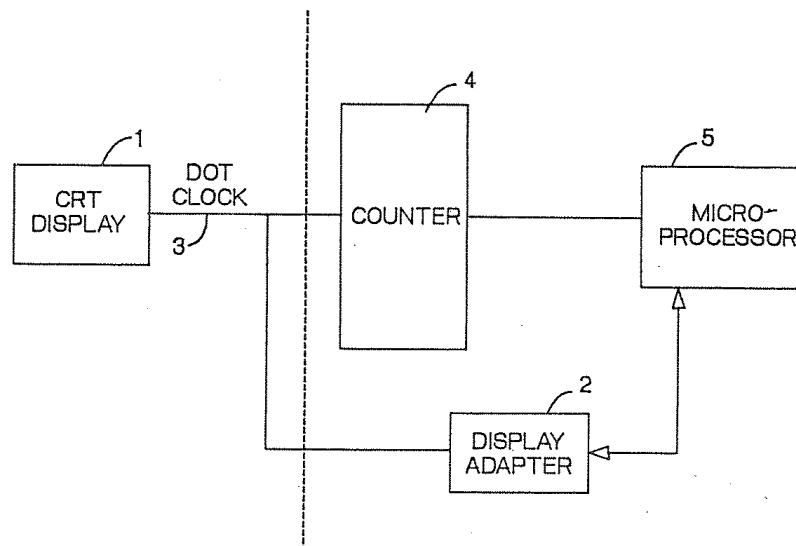


Figure 2. The Video Monitor is "Trained" by a computer that helps to control the calibration procedure and inserts the values in the calibration tables.

FOR ADDITIONAL INFORMATION: Contact: Director, Technology Transfer Division, P.O. Box 8757,
BWI Airport, MD 21240; (301) 621-0100 Ext. 241
REFER TO THE NUMBER LISTED AT THE END OF THIS ARTICLE

MONITOR IDENTIFICATION TECHNIQUE



A method of identifying which of several types of CRT displays are attached to a common workstation logic unit without using dedicated identification wires in the interconnecting signal cable is described. The logic unit must sense the display type in order to transmit appropriate display timing and color or monochrome signals.

The logic unit usually includes a separate oscillator for each display which limits the use of displays developed and marketed subsequent to release of the logic unit.

It is proposed that each oscillator be included within its respective display 1 and that the oscillator be adapted to generate and supply the dot clock signals to the display adapter 2 of the logic unit over the dot clock line 3, as shown in the drawing. The logic unit uses the dot clock signals essentially in the same manner as in the earlier systems. This, however, permits newly introduced displays with their own dot clock signals to be used with the earlier existing logic unit.

MONITOR IDENTIFICATION TECHNIQUE - Continued

Identification of each display is achieved by using the dot clock signals of that display to drive a counter 4 in the logic unit. The microprocessor 5, during power-on, gates dot clock pulses from each display into counter 4 for a predetermined time interval. The count in counter 4 at the end of each interval is used to determine which types of displays are connected, and this information is stored for subsequent use by the logic unit during normal system operation.

DISPLAY CONTROLLER SET UP AS A FUNCTION OF DISPLAY MONITOR TYPE,
DISPLAY JUMPER SETTINGS AND AMOUNT OF VRAM

Disclosed is a method which combines the display monitor type information, prioritized display jumper settings, and the amount of VRAM to search for a match in the Display Type Table to determine the appropriate parameters to be used to set up the display controller.

The IBM X-Station is designed to handle a wide variety of display monitors and formats. Each time the IBM X-Station is powered on, the software must automatically determine the appropriate parameters to be used to set up the display controller. The IBM X-Station software combines the display monitor type information, prioritized display jumper settings, and the amount of VRAM to search for a match in the Display Type Table. The Display Type Table contains pointers to the appropriate parameters to be used to set up the display controller.

The display monitor type information is determined by the monitor itself. The display monitor connector contains pins which identify to the attaching machine the monitor type. This information is present on all PS/2*-type display monitors. The classical approach for display controller set up would use only this information to determine the appropriate display controller parameters.

The amount of VRAM is determined by the POST (Power On Self-Test) RAM test. For IBM X-Station, the VRAM size is one of the following: 512K, 1M, or 2M bytes. The IBM X-Station POST does not allow setting of intermediate values. The amount of VRAM generally affects the depth of the screen format (the maximum number of bits per pixels).

The display jumper settings are used to augment the set up. They add flexibility to design since, for a given display monitor type and VRAM size, different display screen formats or set up parameters can be selected. The display jumper settings are prioritized to allow inexact match of the display jumper information. This allows more efficient coding of the Display Type Table (there need not be an entry for all possible combinations) and allows the software to ignore some combinations of the display jumpers (since they are "don't cares" for some display monitors). Prioritizing the display jumper setting also minimizes the impact invalid display jumper settings. On the IBM X-Station, there are two display jumpers.

On the IBM X-Station, the display monitor type, display jumper settings, and the amount of VRAM is combined into a single byte to be used to find a match in the Display Type Table. If a suitable match is not found in the Display Type Table, IBM X-Station software will default to the 8514 monitor type for the VRAM size present and inform the user with one long and two short beeps.

DISPLAY CONTROLLER SET UP AS A FUNCTION OF DISPLAY MONITOR TYPE,
DISPLAY JUMPER SETTINGS AND AMOUNT OF VRAM - Continued

It should be noted that the software on the IBM X-Station looks for the Display Type Table in three locations: NVRAM, Optional ROS, and Base ROS.

The software algorithm used to determine the display parameters is described as follows:

1. Concatenate the Display Switch Settings, and Monitor Type to form the initial Display_Type_Value.
1. Search the Display Type Table for the initial Display_Type_Value
1. If not Found
1. Then
2. . Alter the Display_Type_Value such that the Least Significant bit of the Switch Settings is a "don't care"
2. . Search the Display Type Table for the modified Display_Type_Value
2. . If not Found
2. . Then
3. . . Alter the Display_Type_Value such that the Switch Settings are "don't cares"
3. . . Search the Display Type Table for the modified Display_Type_Value
3. . . If not Found
3. . . Then
4. . . . Alter user (1 long and 2 short beeps)
4. . . . Default to 8514 Monitor Type
3. . . Endif
2. . Endif
1. Endif
1. Get pointer to Display_Parameters

* Trademark of IBM Corp.

IMPROVED METHOD OF MONITOR IDENTIFICATION AND MODE CONTROL

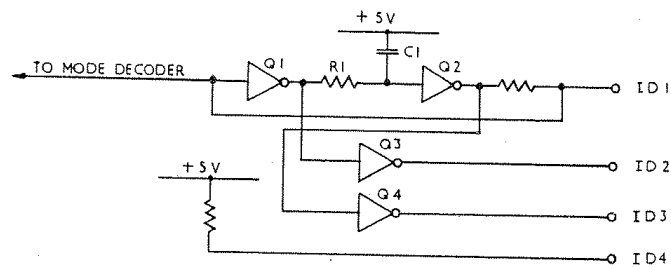


FIG. 1 MONITOR ID INTERFACE

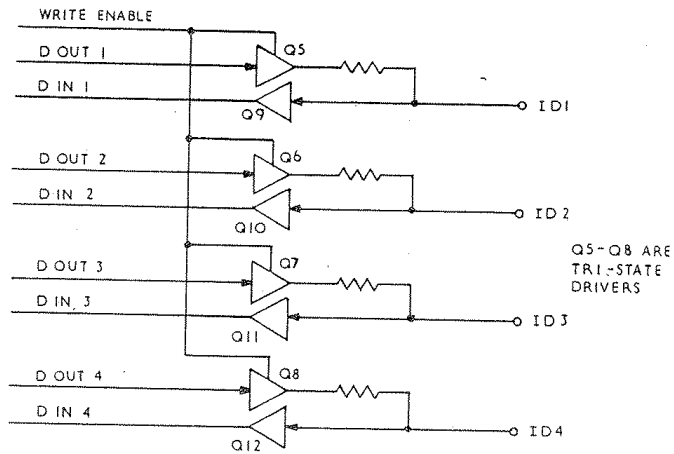


FIG. 2 UNIT ID INTERFACE

The method disclosed in this article allows expansion of the existing PS/2* system unit/monitor interface without expanding the number of data lines. It remains compatible with contemporary software yet offers considerable expansion potential within the scope of future requirements. Additional hardware costs are low.

The PS/2 display interface has the ability to:

IMPROVED METHOD OF MONITOR IDENTIFICATION AND MODE CONTROL - Continued

- a) Select appropriate display formats in the monitor by sensing the polarity of the two sync pulse signals giving four independent modes of operation.
- b) Enable the system unit to identify the type of monitor by reading the status of four ID bits which are connected to logic high or low levels internal to the monitor allowing identification of 16 types of monitors. Both sets of lines are becoming oversubscribed with applications requiring additional modes of operation, and to distinguish between monitors of similar types. Any extension of this system must be compatible with existing hardware and software.

Extended ID System

In the proposed extension, the system unit is enhanced to have the ability to write to one or more of the ID bits in addition to reading. To prevent damage in the event of connection to 0c there is a current limiting resistor in series with the write line(s). In the monitor the passive ID bit connections are replaced with a small logic block that can reply to an interrogation from the system unit via the ID bit lines. This logic block is designed so that it is set to write the nominal monitor ID to the ID lines by a power-on reset in order to be compatible with today's system units. A typical simple example of the system is shown in Fig. 1, the monitor interface, and Fig. 2, that of the system unit. Greater flexibility can be gained by more complex circuits based on the same principle.

Monitor ID Interface

In Fig. 1, a low-cost CMOS input TTL output inverter gate package is used. This is chosen because of its high input impedance, 50% switching thresholds, and low cost. It is TTL compatible; similar gates are at present used in the mode decoders in existing PS/2 monitors. The RC network R1 and C1 hold Q2 input high during power-up sufficiently long to set the latch system of Q1 and Q2, in this case, at a low level output. Levels are taken from this latch to drive some or all of the other ID bits which, at power-up, or when ID1 is held low for a significant length of time, are:

ID1	0	:	latch output
ID2	0	:	Q1 output buffered by Q3
ID3	1	:	Q2 output buffered by Q4
ID4	1	:	tied high by resistor

If ID2, 3 or 4 are written to, there is no change in the ID bit pattern; however, if a logic high level is written to ID1 for longer than the time constant $R1 \times C1$, then the Q1-Q2 latch is toggled high. Consequently, the bit pattern at the ID interface changes to:

IMPROVED METHOD OF MONITOR IDENTIFICATION AND MODE CONTROL - Continued

ID1	0 - > 1
ID2	0 - > 1
ID3	1 - > 0
ID4	1 - > 1

Note that the ID1 line is also sent to the mode decode logic in the monitor allowing additional display formats to be sensed via the sync line decoders.

System Unit ID Interface

Now consider the operation of the logic and software in the system unit. First, to overcome any power-on transient that may have been written to the interface, the system unit writes all zeros to the interface lines and then reads the ID bits. From this, it classifies the type of monitor attached in broad categories, i.e. mono or color, dual line rate or single line rate, etc. The system unit then writes a high level in turn to each of the ID bits and reads the result. If there is no change to any of the bits then the attached monitor is basic type such as is marketed today. If the interface changes after a write operation, as in the example above, then that information can be used to obtain further identification. Subsequent to the identification of monitor type, further display formats for specialized application can be used by driving the ID lines with further mode-decoding information.

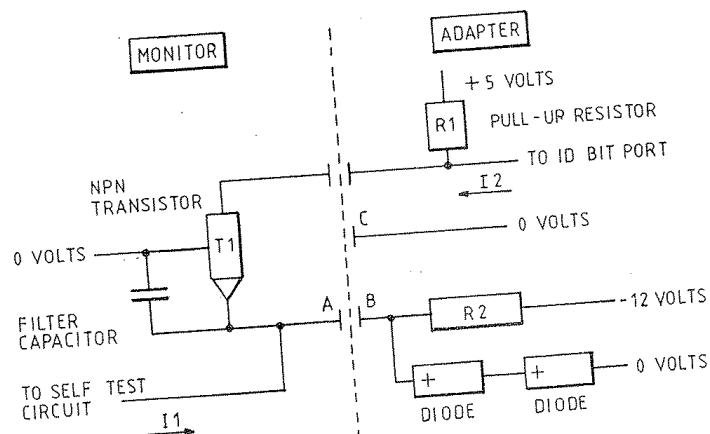
Extending The System

The basic system described above only permits one ID line to be written to in the monitor; this system could be expanded considerably, almost without limit to allow minor exchanges of ID bits by further logic in the monitor to give more data, for example, by toggling the ID bits in succession and using simple sequential logic in the monitor to reply with appropriate ID code sequences.

* Trademark of IBM Corp.

5

IMPROVEMENTS TO DISPLAY IDENTIFICATION



This article relates to microcomputer display systems and in particular to improvements in the interface between a visual display unit and a microcomputer display adapter.

A first improvement, which provides the interface with an open identification architecture, will now be described. Specifically, the open architecture is operable for multiplexing fifteen bits onto the conventional three identification (ID) lines.

An example of a microcomputer display system of the prior art can be produced by coupling one of the range of IBM PS/2* displays (such as the 8514 color display) to an IBM PS/2 system unit (such as the IBM PS/2 model 80). The interface between the PS/2 display and the PS/2 system unit provides three ID bits from which the display adapter in the system unit determines which PS/2 display is attached. The number of different displays that can be identified by the adapter is therefore limited. Furthermore this interface provides no facility for passing image size data between the display and the adapter to enable pixel pitch to be calculated in accordance with image scaling.

IMPROVEMENTS TO DISPLAY IDENTIFICATION - Continued

The open architecture overcomes these limitations by providing an interface with the potential for extending the available ID bits and for transferring image size data between the display adapter and the display. This interface requires no logic changes to the display adapter and is fully compatible with the current range of PS/2 displays.

Description

The adapter is provided with logic for transmitting mode information to the display over the lines carrying synchronization (sync) signals to the display. The mode information is transmitted by setting the horizontal and vertical sync polarities to one of five available configurations (four polarity combinations and no syncs). The display comprises a multiplexer for selecting the three ID bits returned to the adapter. The multiplexer is controlled by the "mode" information decoded from the syncs. The display can therefore transmit five sets of three bits of data (fifteen bits in all) back to the adapter. The input to the multiplexer is hard-wired to represent the following data:

VERTICAL IMAGE SIZE (in default mode). A range from (typically) 100 mm to 500 mm is available. Increments are chosen so that the ratio of increment to image size is constant. Five bits are allocated.

HORIZONTAL IMAGE SIZE (in default mode). A range from (typically) 150 mm to 500 mm is available. Increments are chosen so that the ratio of increment to image size is constant. Five bits are allocated.

PIXEL AND TIMING FORMAT (in default mode). A range compatible with the Video Graphics Adapter (VGA) standard is provided. Four bits are allocated.

PARITY. One bit is allocated.

By sequencing the display through five modes (with no video signals supplied), the adapter can obtain sufficient information to calculate the optimum pixel pitch and drive signals for operating the display. A dedicated ID line is not required to enable the adapter to determine whether the display of the video signal carrying lines. If the adapter reads the ID bits in each of the five first three modes and finds all sets of three bits to be identical, then the adapter deduces that the display does not comprise the aforementioned multiplexer and, therefore, uses the ID decoding technique of the prior art. If, however, the sets of ID bits are different in different modes, then the adapter operates the present decoding technique. The parity bit ensures that no combination of size and format will result in all five sets of ID bits being the same.

IMPROVEMENTS TO DISPLAY IDENTIFICATION - Continued

A second improvement, which provides the interface with a dual identification architecture, will now be described. Specifically, there is now provided a display comprising circuitry for sensing attachment to different levels of display adapter and for transmitting a different identification (ID) code in each case.

As mentioned in the above description of the first improvement, the ability for the display adapter to identify an attached display is limited. For example, in the IBM PS/2 display system of the prior art described earlier, a SELF TEST line is provided between the display and the display adapter. In an IBM 8514 display adapter, the SELF TEST line is coupled to ground. It will be appreciated, however, that in other display adapters, the SELF TEST line may be coupled to other voltage levels, such as -12 V for example.

The circuitry now disclosed enables the display to maintain a unique ID code when attached to adapters that are fully compatible with the display and to give a different ID code when attached to adapters that are only partially compatible with the display. Application software of the prior art can now drive adapters of the prior art for providing appropriate signals to the display comprising this circuitry without requiring software changes for accommodating the unfamiliar ID code.

An example of the circuitry will now be described with reference to the figure. The circuitry comprises a single transistor operating in combination with R2 as a constant current sink when the SELF TEST line is connected to point B in the adapter. The current sink forces current to flow through pull up resistor R1. R2 is chosen to ensure the ID bit is held at logic 0 under worst-case conditions. If the SELF TEST line is connected to ground in another adapter (point C), then no current flows through R1 and the ID bit rises to logic 1.

* Trademark of IBM Corp.

6

SELF-IDENTIFICATION PROTOCOL INITIALIZATION

A method whereby a monitor and display adapter can determine whether the other supports a self-identification protocol is described.


When a self-identifying monitor is powered on, it must set itself up to behave like an existing conventional monitor (sending Monitor ID and responding to relevant syncs) in order to support conventional display adapters. The software for a self-identifying display adapter must also be able to find out if a self-identification monitor is attached in order to know how to set up the adapter. The self-identifying communication is made down the same pins as the Monitor ID (to save pins) and so there must be a way for the monitor and adapter to find out if each can support self-identifying communication.

This disclosure covers the mechanism by which a monitor and display adapter recognize one another as capable of self-identifying communication and release the Monitor ID wires to be used as the physical communication channel. When initially powered-on, a self-identifying monitor must emulate an existing conventional monitor type so as to be compatible with conventional adapters. If a self-identifying adapter is in use, then the software driving that adapter needs to find out if a self-identifying monitor is attached. If a self-identifying monitor is attached, then the software will find out the monitor characteristics, and program the adapter accordingly. If the attached monitor does not support self-identifying communication, then the adapter software will program the adapter appropriately according to the Monitor ID.

To determine whether self-identifying communication is possible, the adapter and monitor perform the following steps. The adapter is the master of this operation, and the monitor is simply a slave; i.e., the adapter and its software are in control.

1. Adapter reads Monitor ID.
2. At HSync time, adapter drives Monitor ID to 0 (a reserved code).
3. Next HSync, self-identifying monitor sees ID of 0 and itself drives to 0.
4. Next HSync, adapter stops driving to 0.
5. Adapter reads ID again.
6. At next HSync, self-identifying monitor stops driving to 0.

SELF-IDENTIFICATION PROTOCOL INITIALIZATION - Continued

HSync 

Monitor ID

Self-Identifying	ID	0000	0000	0000	Hi-Z
Conventional	ID	0000	0000	ID	ID

SIM Adapter

| Drive Hi-Z | Drive 0000 | Drive 0000 | Drive Hi-Z | Drive Hi-Z |

Monitor

Self-Identifying	Drive ID	Drive ID	Drive 0000	Drive 0000	Drive Hi-Z
Conventional	Drive ID	Drive ID	Drive ID	Drive ID	Drive ID

The Monitor ID lines are open-collector (until used for self-identifying communication), so either the adapter or monitor can force the ID to 0. Existing monitors conform to this.

If the adapter reads 0 the second time (at step 5), then it knows that a self-identifying monitor is attached and can commence self-identifying communication. If the adapter reads the same ID as before, then it knows that a conventional monitor is attached and can proceed accordingly. A self-identifying monitor will see the 0 ID and know that a self-identifying adapter is attached. It will then become ready to accept self-identification commands. A conventional monitor will not be affected in any way by this technique. A self-identifying monitor attached to a conventional adapter will never see the 0 ID and so will simply continue to emulate a conventional monitor. The whole sequence is synchronized by clocking with HSync pulses. These could either be run at normal monitor frequencies of under direct control of the driving software or at some other frequency. An alternative means of synchronization is to specify minimum and maximum times appropriately for each step, and use the processors in monitor and system unit to work within these times (see figure).

Peter A. Sicbel

ACCESS.bus, an Open Desktop Bus

With the recent introduction of the ACCESS.bus product, Digital has affirmed its commitment to open systems and thus to facilitating better solutions for interactive computing. This open desktop bus provides a simple, uniform way to link a desktop computer to as many as 14 low-speed I/O devices such as a keyboard, mouse, tablet, or three-dimensional tracker. ACCESS.bus features a 100-kilobit-per-second maximum data rate, hardware arbitration, dynamic reconfiguration, a mature capabilities grammar to support generic device drivers, and off-the-shelf, low-cost I²C microcontroller technology.

As the cost of personal interactive computing decreases, the range of applications and the need for specialized I/O devices is growing dramatically. Traditional personal computers were designed to accept only a small number of standard devices; adding devices beyond those originally envisioned usually requires specialized hardware or software. Custom interfacing is expensive for vendors and users and thus limits the availability of new devices.

ACCESS.bus provides a simple, uniform way to link a desktop computer to a number of low-speed I/O devices such as a keyboard, a mouse, a tablet, or a three-dimensional (3-D) tracker. Designed from the beginning as an open desktop bus, ACCESS.bus facilitates cooperative solutions using equipment from different vendors. This paper describes the ACCESS.bus design and gives some insight into how the idea was adopted at Digital.

Design Goal, Process, and Advantages

The design goal for the desktop bus follows from our experience within the Video, Image and Print Systems (VIPS) Input Device Group with trying to support new devices on Digital terminals and workstations. While various new devices have been successfully prototyped over the years, the need for nonstandard hardware and custom software drivers was always an expensive, time-consuming obstacle. Even after successful prototyping, these devices could not be readily adapted to our standard systems, limiting their use to custom applications. In designing the desktop bus, our goal was to make it as easy as possible to interface previously unavailable I/O devices to our systems in a way that was both practical and marketable. This section explains the benefits of using a desktop bus,

describes the process we went through to convert to a new bus architecture, and summarizes the key advantages of the chosen design.

The basic desktop bus concept is illustrated in Figure 1. The bus allows multiple, low-speed I/O devices to be interconnected and thus interfaced through a single host port. Desktop bus devices such as a keyboard or a tablet, which are not hand-held, provide two connectors and allow another device to be daisy-chained. A hand-held device such as a mouse can be placed at the end of the daisychain, or a connector expansion box can be attached to accommodate additional devices that do not provide two connectors.

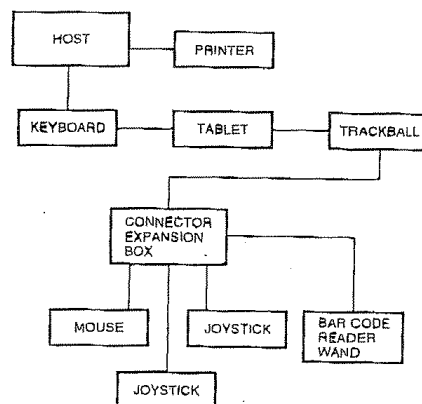


Figure 1 Basic Desktop Bus

ACCESS.bus, an Open Desktop Bus

The desktop bus has the following benefits:

- Enables greater flexibility and variety of use
- Reduces the cost of connecting multiple devices
- Expedites bringing new technology to market
- Helps leverage third-party devices

The first benefit, greater flexibility, can be simply achieved by allowing additional devices and more modular solutions. We further extended this benefit by designing a way for devices to be added at run time without disrupting system operation. Configuration should be automatic; connecting standard devices should not require powering down or rebooting the system before a new device can be used. The desktop bus supports multiple, like devices without switches or jumpers.

The second benefit, reduced cost, was crucial to having the bus accepted as a solution across a wide range of products from low-end video terminals to high-end workstations. We recognized that contemporary electrical techniques could eliminate the need for level translation circuits, -12 volt (V) power supplies, and perhaps some of the protective components used with RS-232 interfacing. Although many devices would now require two connectors, system cost would decrease because we would need to supply only as many connectors as the number of devices to be attached, or possibly one more.

The third benefit, expediting the time to market for new technology, allows us to better satisfy changing requirements. Key to this benefit is having the means to connect new devices without changing the system hardware or software. Based on our experience with input devices, we developed the concept of device capability reporting and generic device protocols. Standard devices like keyboards and locators, e.g., mice, tablets, and trackballs, all work in similar ways. For this class of device, we define a simple device protocol and a way to parameterize and report device unique characteristics. A single generic driver can adapt itself to work with a class of similar devices so that no custom software is required for basic operation of standard devices.

Leveraging third-party devices, the fourth benefit, is aimed at satisfying diverse customer requirements. Because the use of computers continues to proliferate, the range of applications far exceeds that which any one vendor can master.

By making the bus truly open, we encourage third parties to add value to our systems.

The benefits of a desktop bus are significant. But converting to a new architecture, especially one that is not backward compatible, is expensive in terms of the time and effort required. How does a large corporation build agreement to make such an investment decision? The desktop bus project started as a grass roots engineering effort and gradually built momentum. The process was one of dialogue to attract partners. Initially, three groups with slightly different objectives worked together to develop the bus. The visibility of separate groups jointly supporting the bus concept was essential to transform the idea into action. People are more willing to accept an idea that others around them have already adopted.

The three groups that initiated the desktop bus project were our VIPS Input Device Group in Westford, MA, mentioned previously; the Workstation Systems Engineering (WSE) Group, located in Palo Alto, CA; and the Video Advanced Development (A/D) Group in Albuquerque, NM. Our Input Device Group was looking for ways to simplify the process of prototyping specialized input devices and of getting related software support for our video terminals and workstations. WSE was developing a low-cost, personal workstation and needed a flexible way to support multiple input devices without greatly increasing the cost of the base workstation. The Albuquerque A/D Group had been experimenting with next generation I/O devices, i.e., force-feedback joystick, 3-D tracker, and real-time audio and video, and was interested in having these technologies adopted by other Digital groups. This A/D Group had used I²C technology successfully in one of its previous video projects.

In January of 1990, engineers from each group realized they were working on similar problems and began to collaborate. The WSE Group was to build the desktop bus host interface and software drivers into their workstation; the VIPS Group was to help define the device protocols and supply desktop bus keyboards and mice; and the Albuquerque A/D Group was to support bus development and prototype additional devices. Within four months, VIPS had defined the basic protocols and could demonstrate a working I²C keyboard and mouse. These early prototypes helped persuade WSE to support the project and, in turn, helped reinforce the importance of the project to the VIPS Group.

Image Processing, Video Terminals, and Printer Technologies

We began presenting the desktop bus idea to interested groups within Digital and received many useful suggestions including

- Use the same keycodes as on the LK201 keyboard to eliminate the need to rewrite keyboard lookup tables.
- Store the country keyboard variation inside the keyboard so users will not need to enter it manually.
- Keep the devices simple, without modes.

In addition, third-party input device vendors made the following suggestions.

- Use a modular connector that is easy to plug and unplug correctly.
- Provide enough power for several additional devices.
- Allow vendors to supply their own device drivers; tuning their own device drivers is part of the value added by the vendor.

The bus idea was elegant and generally well received. Most of the reservations centered around the likely impact on existing system components, the current problems, and whether conversion to the bus was feasible. Because we recognized that other groups were facing tight development schedules, we did not pressure these groups to support our desktop bus work. We presented the desktop bus as a possible solution to interface problems, made our design information available, and worked to incorporate suggestions. But as the development work progressed, more partners supported our effort.

Once we decided to use a desktop bus, we looked at available designs, including the Apple Desktop Bus, the Musical Instrument Digital Interface (MIDI), and serial buses offered by other semiconductor vendors, and evaluated these alternatives with respect to our design goal. Key advantages of the design chosen, i.e., the ACCESS.bus, are

- Off-the-shelf interintegrated circuit (I²C) microcontroller technology with maximum data rate of 100 kilobits per second (kb/s). This technology is low-cost, yet fast enough for sophisticated input devices like a 3-D tracker.
- Built-in hardware arbitration, which simplifies the software and allows reliable communication without inventing a new protocol.

- Dynamic reconfiguration. The hardware and software allow bus devices to be "hot-plugged" and used immediately, without restarting the system. The devices are recognized automatically and assigned unique addresses. This advantage results in a plug-and-play user interface.

- A mature capabilities grammar to support generic device drivers. An extensible free-form grammar allows devices to describe their characteristics to a generic driver. Most common devices can work with standard drivers.

Bus or network interconnection has become widely accepted as a means of providing flexible open solutions. To appreciate ACCESS.bus, it is helpful to position its performance capabilities with respect to those of other network interconnect technologies, as shown in Table 1.

Table 1 Network Interconnects

Bus Type	Order of Magnitude Performance (kilobits per second)
Apple Desktop Bus, ACCESS.bus	10-100
LocalTalk	100-1,000
Ethernet	1,000-10,000
FDDI	10,000-100,000

At first glance, the 100-kb/s speed of the ACCESS.bus may seem adequate for large desktop devices like printers and modems. But these devices can transmit long data streams independent of any user activity and, if not restricted, could compromise the interactive performance of the bus. Thus, ACCESS.bus is intended for low-speed activities that people perform with their hands and is fast enough to handle multiple interactive devices like a keyboard, mouse, or 3-D tracker.

Hardware Description

Before discussing the ACCESS.bus design, we present a description of the Philips I²C technology upon which the design is based. Details of the specific ACCESS.bus implementation follow.

Interintegrated Circuit Fundamentals

ACCESS.bus extends the Philips I²C bus to operate off-board and, thus, connect desktop devices. The I²C is a two-wire serial clock and serial data

ACCESS.bus, an Open Desktop Bus

open-collector bus. An open-collector design means that the clock and data lines are normally in a high-impedance floating state and are pulled up to a logical high state.

A device that wants to send a message waits for any message frame in progress to complete, then asserts a START signal to become bus master and begins to generate data and clock signals. The bus clock is synchronized among all devices by its wired AND connection. Each device, whether transmitting or receiving, stretches the low period of the clock until ready for the next bit to be transferred. When the last device is ready, the bus clock is allowed to go high, generating a rising edge on the serial clock. At this time, all active devices sense the state of the bus data line. For a receiving device, the state represents the received data bit. For a transmitting device, the state determines whether the device has successfully asserted its data on the bus. A transmitter that is sending a logical high state and detects that the data line is being held low by another sender, recognizes that it has lost arbitration and must try again later. When a "collision" or arbitration occurs, no data is lost, one message is transmitted and received, and the remaining messages must be sent again.

I²C data messages are transmitted as 8-bit bytes, with each byte being acknowledged by a ninth ACKNOWLEDGE bit from the receiver. I²C technology also defines unique START and STOP signals to delimit message frames. The first byte of any message frame is always the destination address.

ACCESS.bus Physical Implementation

Details of the physical implementation of ACCESS.bus are as follows:

- Basic electrical configuration. ACCESS.bus uses four-pin, shielded, modular-type connectors that feature positive orientation and locking tabs. Data and power for the bus are transmitted over low-capacitance, four-wire, shielded cable. The four conductors are used for ground, serial data, serial clock, and +12 V.
- Available power. The maximum available power for all devices is 12 V at 500 milliamperes (mA). ACCESS.bus devices may supply their own power from a separate source, if needed. A power-up reset circuit must still be provided to reset the device when bus power is applied.
- Cable length. The maximum cable length for the entire bus is 8 meters. The limiting factor is a

maximum capacitance not to exceed 700 picofarads (pF).

- Number of devices. The maximum number of ACCESS.bus devices allowed on the bus is 14. Limiting factors are the device addressing range and the power distribution (a total of 500 mA for all devices).
- Hardware interfaces. ACCESS.bus hardware interfaces are implemented using standard I²C microcontrollers developed by the Signetics Company or under license from Philips Corporation. (Signetics Company is a division of North American Philips Corporation.)

ACCESS.bus Protocol

Every device on the bus is a microcontroller with an I²C interface and behaves as either a master transmitter or a slave receiver, exclusively, as defined by the I²C Bus Specification.

Message Format

A message transmits information between a device and the computer or between the computer and one or more devices. There is one exception: a device may attempt to reset other devices assigned to the same address by sending a Reset message to itself.

ACCESS.bus messages have the following format:

Byte Number	Bit Number	
	[1 2 3 4 5 6 7 8]	
1	[destaddr | 0]	Destination address
2	[srcaddr | 0]	Source address
3	[P | length]	Protocol flag, length (the number of data bytes from 0 to 127)
4 through (length + 3)	[body]	Consists of 0 to 127 data bytes
length + 4	[checksum]	

Initially, devices respond to a default power-up address. During the configuration process, the computer assigns a unique address to every device on the bus. Messages are either device data stream (P=0) or control/status (P=1), as indicated by the

Image Processing, Video Terminals, and Printer Technologies

protocol flag. The minimum length of a message is 4 bytes; the maximum length is 131 bytes (127 data bytes and 4 bytes for overhead). The message checksum is computed as the logical XOR of all previous bytes, including the message address.

Standard Messages

The ACCESS.bus protocol defines the seven standard interface messages summarized in Table 2. Parameters defined within the body of the message are listed in parentheses.

Identification

Since the ACCESS.bus is a bus-topology network, unique identification strings are used to distinguish devices. These strings are structured as follows:

protocol revision: 1 byte (e.g., "A")
 module revision: 7 bytes (e.g., "X1.3 ")
 vendor name: 8 bytes (e.g., "DEC ")
 module name: 8 bytes (e.g., "LK501 ")
 device number: 32-bit signed integer

The module revision, vendor name, and module name strings are left-justified ASCII character strings padded with spaces. The device number string is a 32-bit two's complement signed integer and may be either a random number (if negative) or a unique serial number (if positive).

Configuration Process

The configuration process is used to detect what devices are present on the bus, assign each device a

unique address, and connect devices to the appropriate software driver. Configuration normally occurs at system start-up, or at any time when the computer detects the addition or removal of a device.

Power-up/Reset Phase

When reset or powered up, a device always reverts to the default address and sends an Attention message to alert the computer to its presence. At system start-up or reinitialization, the computer sends a Reset message to all I²C addresses in the ACCESS.bus device address range (14 messages) to ensure that all devices on the bus respond at the power-up default address.

Identification Phase

To begin address assignment, the computer sends an Identification message at the device default address. Every device at this address must then respond with an Identification Reply message. As each device sends its message, the I²C arbitration mechanism automatically separates the messages based on the identification strings. The computer can then assign an address to each device by including the matching identification string in the Assign Address message. When a device receives this message and finds a complete match with the identification string, it moves its device address to the new assigned value. As soon as a device has a unique address, it is allowed to send data to the computer.

The I²C physical bus protocol allows multiple devices on the bus at the same time if those devices

Table 2 Standard ACCESS.bus Protocol Messages

Computer-to-device Messages	Purpose
Reset ()	Force device to power-up state and default I ² C address.
Identification Request ()	Ask device for its "identification string."
Assign Address (identification string, new address)	Tell device with matching "identification string" to change its address to "new address."
Capabilities Request (offset)	Ask device to send the fragment of its capabilities information that starts at "offset."
Device-to-computer Messages	
Attention (status)	Inform computer that a device has finished its power-up/reset test and needs to be configured; "status" is the test result.
Identification Reply (identification string)	Reply to Identification Request with device's unique "identification string."
Capabilities Reply (offset, data fragment)	Reply to Capabilities Request with "data fragment," a fragment of the device's capabilities string; the computer uses "offset" to reassemble fragments.

ACCESS.bus, an Open Desktop Bus

are transmitting exactly the same message. In the rare event that two like devices report the same random number or are mistakenly assigned to the same address, each interactive device transmits a Reset message to its assigned address prior to sending its first data message after being assigned a new address. The self-addressed Reset message forces other devices at the same address back to the power-up default address, as if they had just been hot-plugged. The message guarantees that each device has a unique address, but not until the device is actually used. The pseudo-random number (or serial number, if available) distinguishes devices at identification time before they are used, allowing the host to inventory which devices are present.

Capabilities Phase

Device capabilities is the set of information that describes the functional characteristics of an ACCESS.bus peripheral. The purpose of capabilities information is to allow software to recognize and use the features of bus devices without prior knowledge of their particular implementation. By having locator devices report their resolution, for example, generic software can be written to support a range of device resolutions. Capabilities information provides a level of device independence and modularity.

The structure of capabilities information is designed to be simple and compact for efficiency, but also extensible to support new devices without requiring changes to existing software or peripherals. These objectives are supported by making the structure hierarchical and representing capabilities information in a form that applications (and humans) can use directly. The capabilities information is an ASCII string constructed from a simple, readable grammar. The grammar allows text strings to be formed into lists, nested lists, and lists with tagged elements. The capabilities string for a locator might read as follows:

```
(prot(locator)
 type(mouse)
 buttons( 1(L) 2(R) 3(M) )
 dim[2] rel res(200 inch) range(-127 127)
 d0(dname(X))
 d1(dname(Y))
)
```

After assigning a unique address to a device, the computer retrieves the device's capabilities string as a series of fragments using the Capabilities Request and Capabilities Reply messages. The com-

puter then parses the capabilities string to choose the appropriate application driver for the device. The parsed string is also made available to application programs using the device.

Normal Operation

During normal operation, the computer periodically requests inactive devices to identify themselves. If a device is found to be missing, or a new device appears by sending an Attention message at the default address, the computer sends an Identification Request message to each device address previously recorded as in use (up to 14 messages) to confirm which devices are still present. The computer also sends a Reset message to each device address previously recorded as not in use. The computer then begins the address assignment process by sending an Identification message to the default address and assigning each device that responds to an unused device address.

Generic Device Concepts

ACCESS.bus uses the concept of generic device drivers to support familiar I/O devices using only a few drivers. Generic specifications for keyboards, locators, and text devices have been developed.

Keyboards

The keyboard device protocol attempts to define the simplest set of functions from which a Digital LK201 or a common personal computer keyboard user interface can be built. A generic keyboard consists of an array of key stations assigned numbers between 8 and 255. When any key station transitions between open and closed, the entire list of key stations currently closed or depressed is transmitted to the host. This reporting scheme is functionally complete; the host can detect every key transition, and the scheme provides information about the full state of the keyboard on each report. No special resynchronization reports are required.

In addition to reporting key stations, the generic keyboard device can support simple feedback mechanisms such as keyclicks, bells, and light-emitting diodes. These mechanisms are controlled explicitly from the host so that minimal keyboard state modeling is required. The capabilities information is used to identify the keyboard mapping table and the feedback mechanisms available. The keyboard mapping table can also be stored in the keyboard itself as part of the capabilities string.

Image Processing, Video Terminals, and Printer Technologies

Locators

The locator device protocol is designed to accommodate a range of basic locator devices such as a mouse or tablet. More complex devices can be modeled as a combination of basic devices or can provide their own device driver, thus minimizing the burden on the protocol.

A generic locator consists of one or more dimensions described by numeric values and, optionally, a small number of key switches. The standard driver requires the locator device to identify the type of data it will report from a small list of options and adjusts to handle this data type. These options are

- Number of dimensions, e.g., two, for a mouse or a tablet
- Dimension type: absolute, i.e., referenced to some fixed origin, like a tablet; or relative, i.e., changed since last report, like a mouse
- Resolution in divisions per unit, e.g., counts per inch or counts per revolution
- Dynamic range of values that can be reported, i.e., the minimum and maximum values
- Number of key switches, from 0 to 15

The assignment of scalar-value dimensions returned from one or more devices to the user interface functions is left to the application. However, to accommodate most conventions, the scalar dimensions and the key switches can be labeled in the capabilities string.

Text Devices

The text device protocol is intended to provide a simple way to transmit character data to and from character devices such as a bar code reader or a small character display. A generic text device transmits a stream of 8-bit bytes from a character set. Simple control messages are defined to support flow control and to select communication parameters that might be used to interface with a modem. The capabilities string contains information that identifies the specific character set and communication parameters used.

Summary

The ACCESS.bus network interconnect offers the possibility of a standardized, low-speed, plug-and-play serial communications channel that can untangle peripheral interfacing and open the way to new

applications. As the advantages of this open desktop bus design become well known, we expect wider adoption of this product. The ACCESS.bus is currently implemented on Digital's Personal DECstation 5000 workstation, with implementations underway for the next generation of RISC workstations and video terminals.

Acknowledgments

Many people contributed to the design and development of ACCESS.bus. I would especially like to acknowledge Tom Stockebrand and Tom Furlong for their vision and early support; Chris Cued, Mark Shepard, and Ernie Souliere for their contributions to the ACCESS.bus electrical design and protocols; and Robert Clemens for the excellent demonstration hardware and firmware development support.

General References

D. Licherman, "Desktop Bus Is Born Free," *Electronic Engineering Times* (September 2, 1991): 16.

ACCESS.bus Developer's Kit (Palo Alto, CA: Digital Equipment Corporation, Workstation Systems Engineering TRI/ADD Program, 1991).

Signetics I²C Bus Specification (Sunnyvale, CA: Signetics Company, a Division of North American Philips Corporation, February 1987).

Reprinted with permission from the *Digital Technical Journal*. Copyright © 1991 Digital Press/Digital Equipment Corporation, One Burlington Woods Drive, Burlington, MA 01830

Specialized Patent Services

2001 Jefferson Davis Highway
Suite 1007
Arlington, VA

Telephone: 703-415-1555

Facsimile: 703-415-1557

E-mail:

Specialpat@aol.com

Internet:

www.specializedpatent.com

This file wrapper was thoroughly reviewed by our staff. Some of the publications were not found in the file wrapper. A search in the Examiner's Art or through other means can be conducted at a research charge of \$45 per hour. If you would like us to make a search for these references, please give us a call at (703) 415-1555.