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(54) **Facsimile transmission system including bulk sorting**

(57) A facsimile transmission system including bulk sorting is provided in which documents are transmitted at random from one or more sending stations to one or more receiving stations. Each receiving station includes a plurality of associated addresses, wherein the documents are sorted and stored according to the particular address for which the document is designated in address information associated with the document. Also disclosed is a document transmission system that includes at least one document sending station for accepting, routing and transmitting the documents to a plurality of receiving stations. Each receiving station includes one or more unique addresses, the address being operator identifiable and operator controlled. The documents include address information identifying the unique addresses whereby the documents are transmitted only to preselected recipients. There is further disclosed an address sheet including sender information, predetermined receiver information and other pertinent information that is produced from an address information field which includes, in addition to the sender and pertinent information, information relating to a plurality of receivers and extraneous information which is not to be reproduced.

GB 2 089 618 A

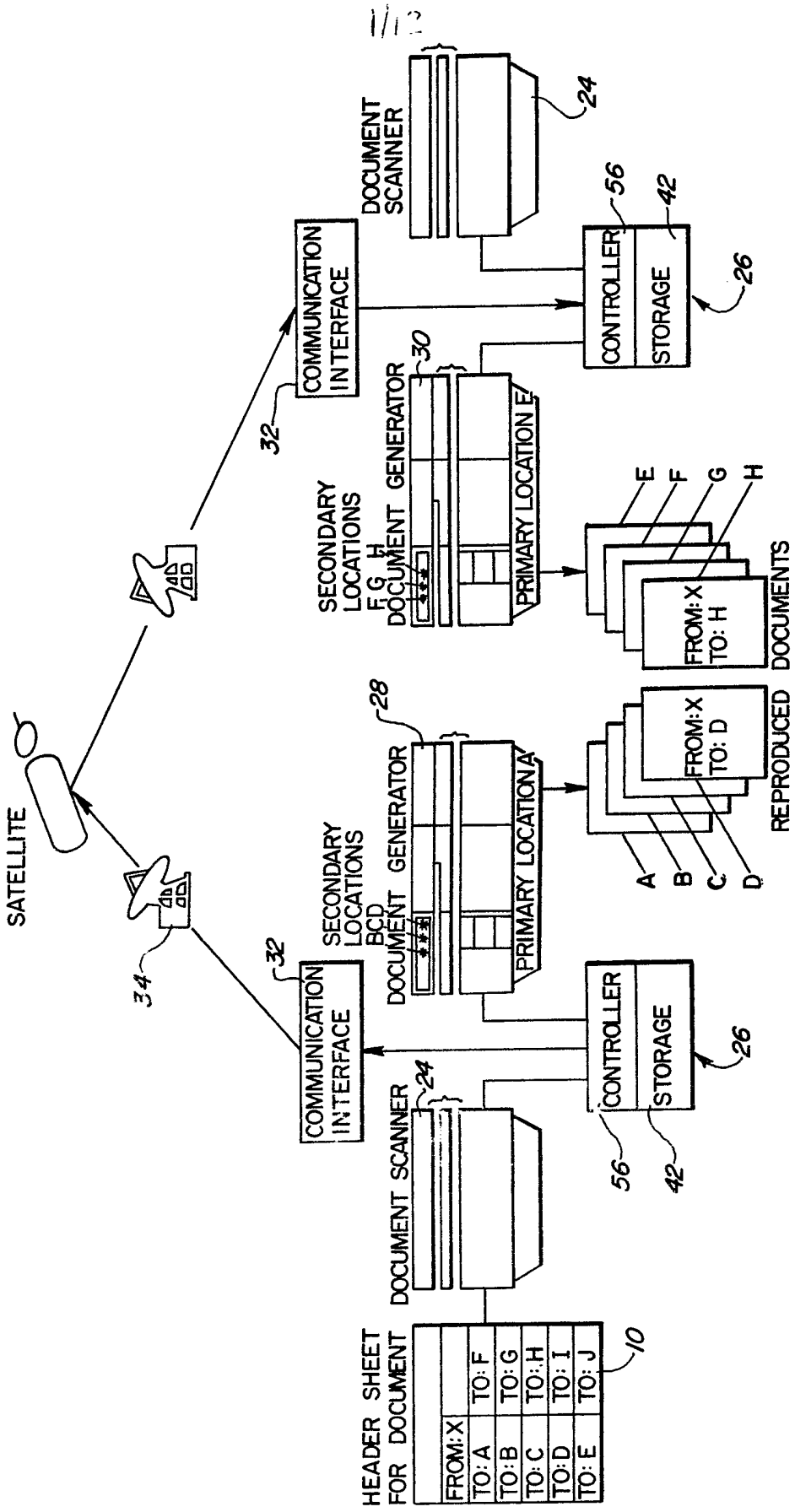

SATELLITE
34
32
COMMUNICATION INTERFACE
DOCUMENT SCANNER
24
CONTROLLER
56
STORAGE
42
26
SECONDARY LOCATIONS B C D
DOCUMENT GENERATOR
28
PRIMARY LOCATION A
A
B
C
D
FROM: X
TO: D
REPRODUCED DOCUMENTS
SECONDARY LOCATIONS E F G H
30
PRIMARY LOCATION E
E
F
G
H
FROM: X
TO: H
HEADER SHEET FOR DOCUMENT
10
FROM: X
TO: A
TO: B
TO: C
TO: D
TO: E
TO: F
TO: G
TO: H
TO: I
TO: J

FIG. 1

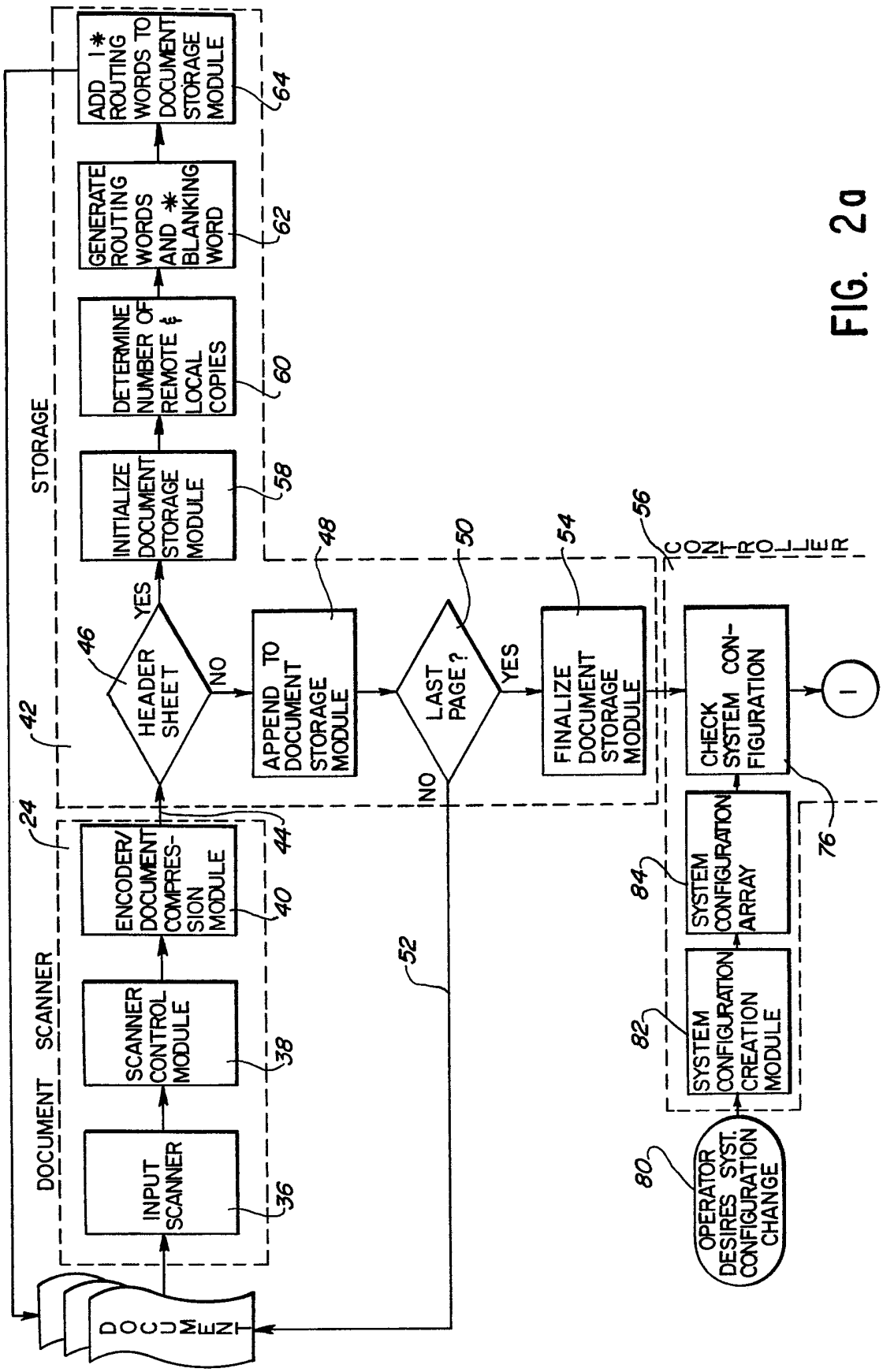

DOCUMENT
DOCUMENT SCANNER
INPUT SCANNER
36
SCANNER CONTROL MODULE
38
ENCODER/ DOCUMENT COMPRES-SION MODULE
40
44
24
STORAGE
42
HEADER SHEET
46
YES
NO
INITIALIZE DOCUMENT STORAGE MODULE
58
DETERMINE NUMBER OF REMOTE & LOCAL COPIES
60
GENERATE ROUTING WORDS AND * BLANKING WORD
62
ADD 1* ROUTING WORDS TO DOCUMENT STORAGE MODULE
64
APPEND TO DOCUMENT STORAGE MODULE
48
LAST PAGE ?
50
YES
NO
52
FINALIZE DOCUMENT STORAGE MODULE
54
CONTROLLER
56
CHECK SYSTEM CON-FIGURATION
1
76
SYSTEM CONFIGURATION ARRAY
84
SYSTEM CONFIGURATION CREATION MODULE
82
OPERATOR DESIRES SYST. CONFIGURATION CHANGE
80

FIG. 2a

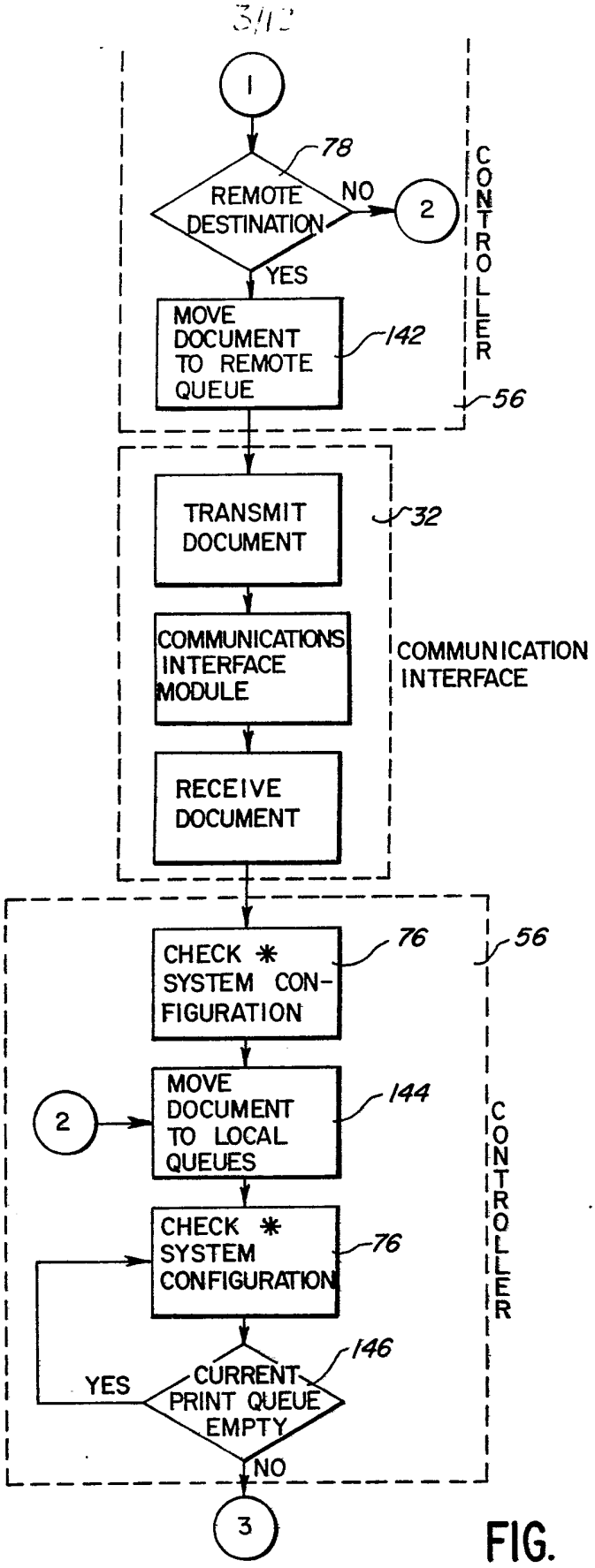

3/12
1
78
REMOTE DESTINATION
NO
2
YES
MOVE DOCUMENT TO REMOTE QUEUE
142
CONTROLLER
56
TRANSMIT DOCUMENT
32
COMMUNICATIONS INTERFACE MODULE
COMMUNICATION INTERFACE
RECEIVE DOCUMENT
CHECK * SYSTEM CONFIGURATION
76
56
2
MOVE DOCUMENT TO LOCAL QUEUES
144
CHECK * SYSTEM CONFIGURATION
76
CONTROLLER
146
YES
CURRENT PRINT QUEUE EMPTY
NO
3

FIG. 2b

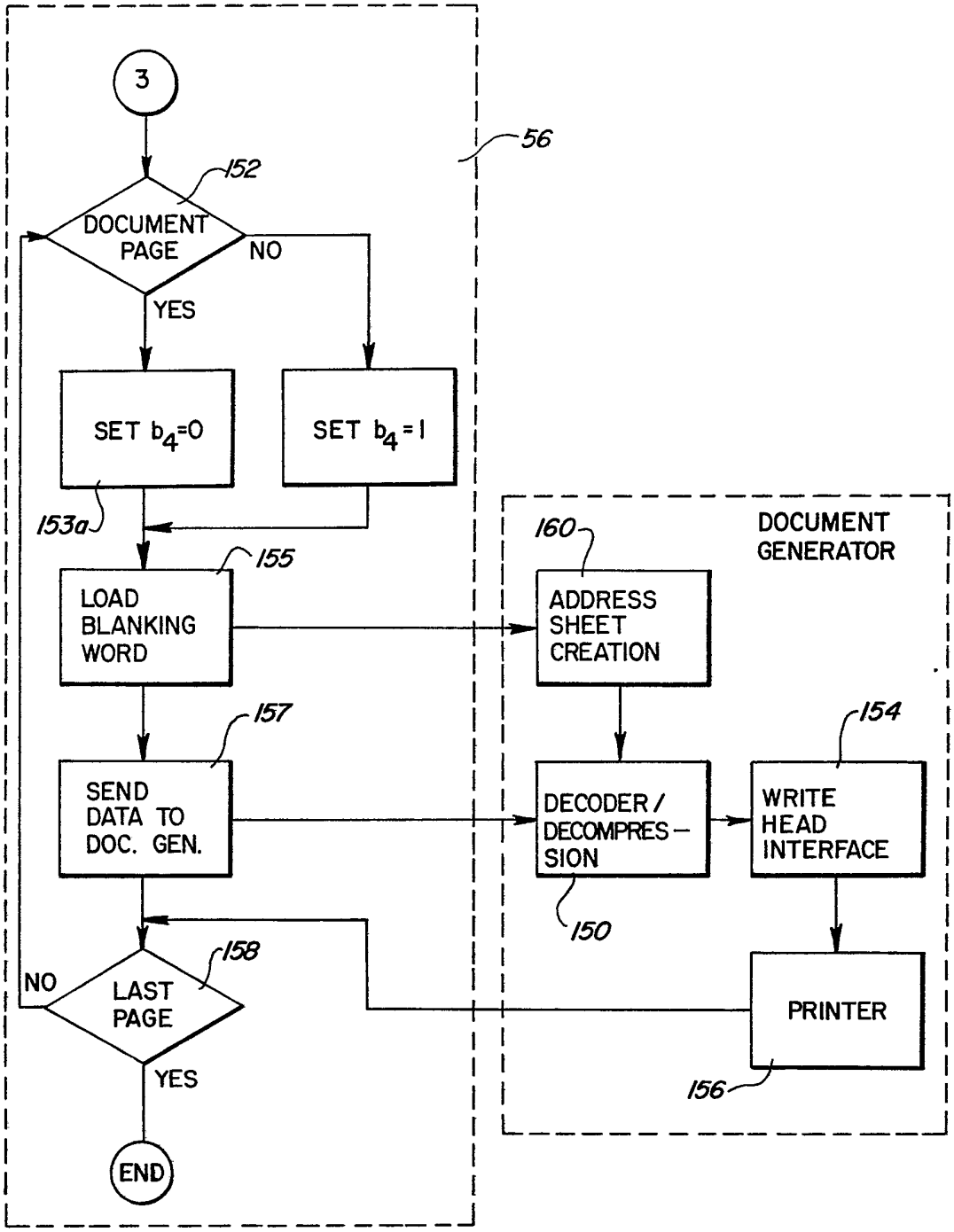

3
56
152
DOCUMENT PAGE
NO
YES
SET b_4=0
SET b_4=1
153a
155
LOAD BLANKING WORD
157
SEND DATA TO DOC. GEN.
158
NO
LAST PAGE
YES
END
DOCUMENT GENERATOR
160
ADDRESS SHEET CREATION
154
DECODER / DECOMPRES-SION
150
WRITE HEAD INTERFACE
PRINTER
156

FIG. 2c

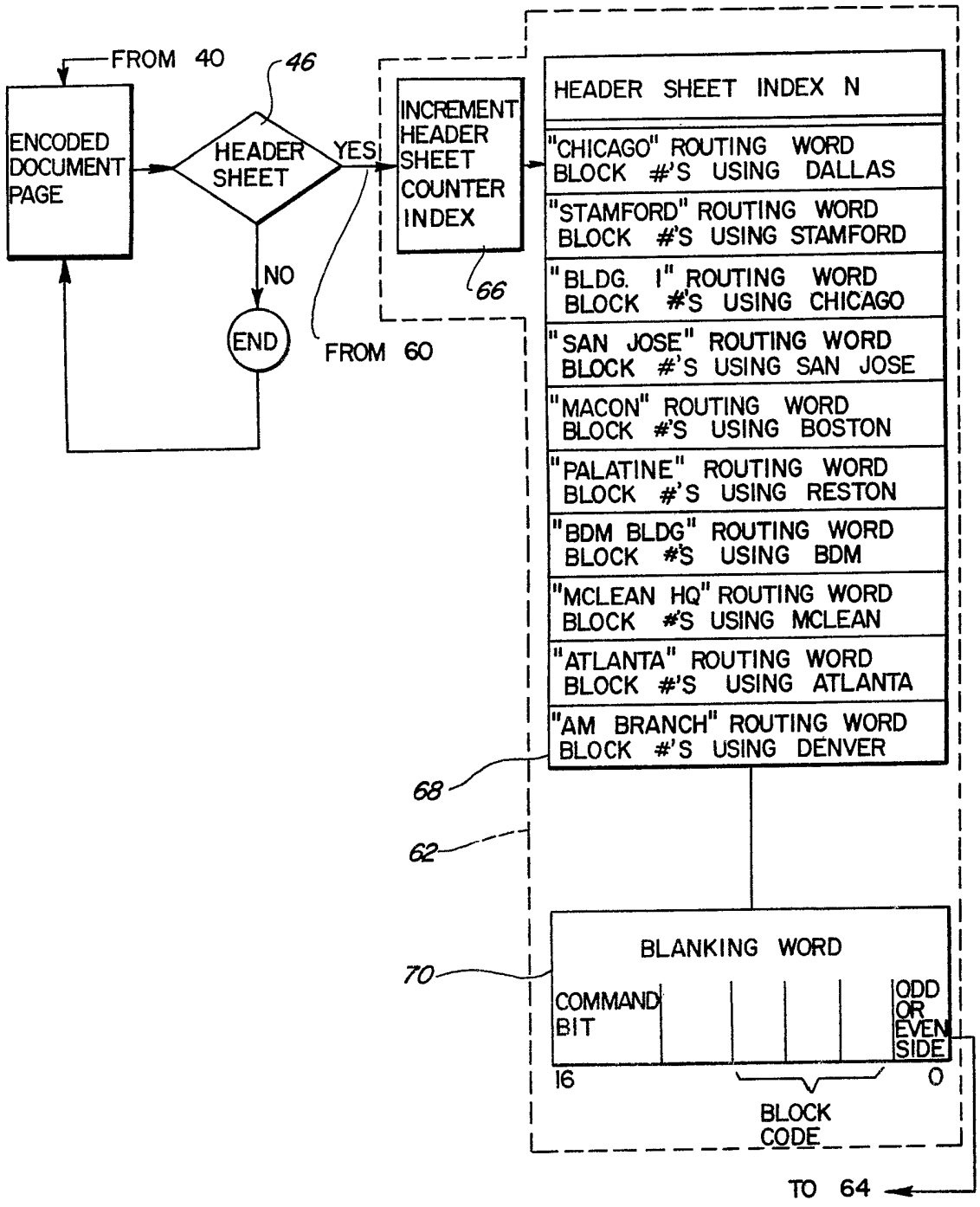

FROM 40
46
ENCODED DOCUMENT PAGE
HEADER SHEET
YES
NO
END
FROM 60
INCREMENT HEADER SHEET COUNTER INDEX
66
HEADER SHEET INDEX N
"CHICAGO" ROUTING WORD BLOCK #'S USING DALLAS
"STAMFORD" ROUTING WORD BLOCK #'S USING STAMFORD
"BLDG. 1" ROUTING WORD BLOCK #'S USING CHICAGO
"SAN JOSE" ROUTING WORD BLOCK #'S USING SAN JOSE
"MACON" ROUTING WORD BLOCK #'S USING BOSTON
"PALATINE" ROUTING WORD BLOCK #'S USING RESTON
"BDM BLDG" ROUTING WORD BLOCK #'S USING BDM
"MCLEAN HQ" ROUTING WORD BLOCK #'S USING MCLEAN
"ATLANTA" ROUTING WORD BLOCK #'S USING ATLANTA
"AM BRANCH" ROUTING WORD BLOCK #'S USING DENVER
68
62
70
BLANKING WORD
COMMAND BIT
ODD OR EVEN SIDE
16
0
BLOCK CODE
TO 64

FIG. 3

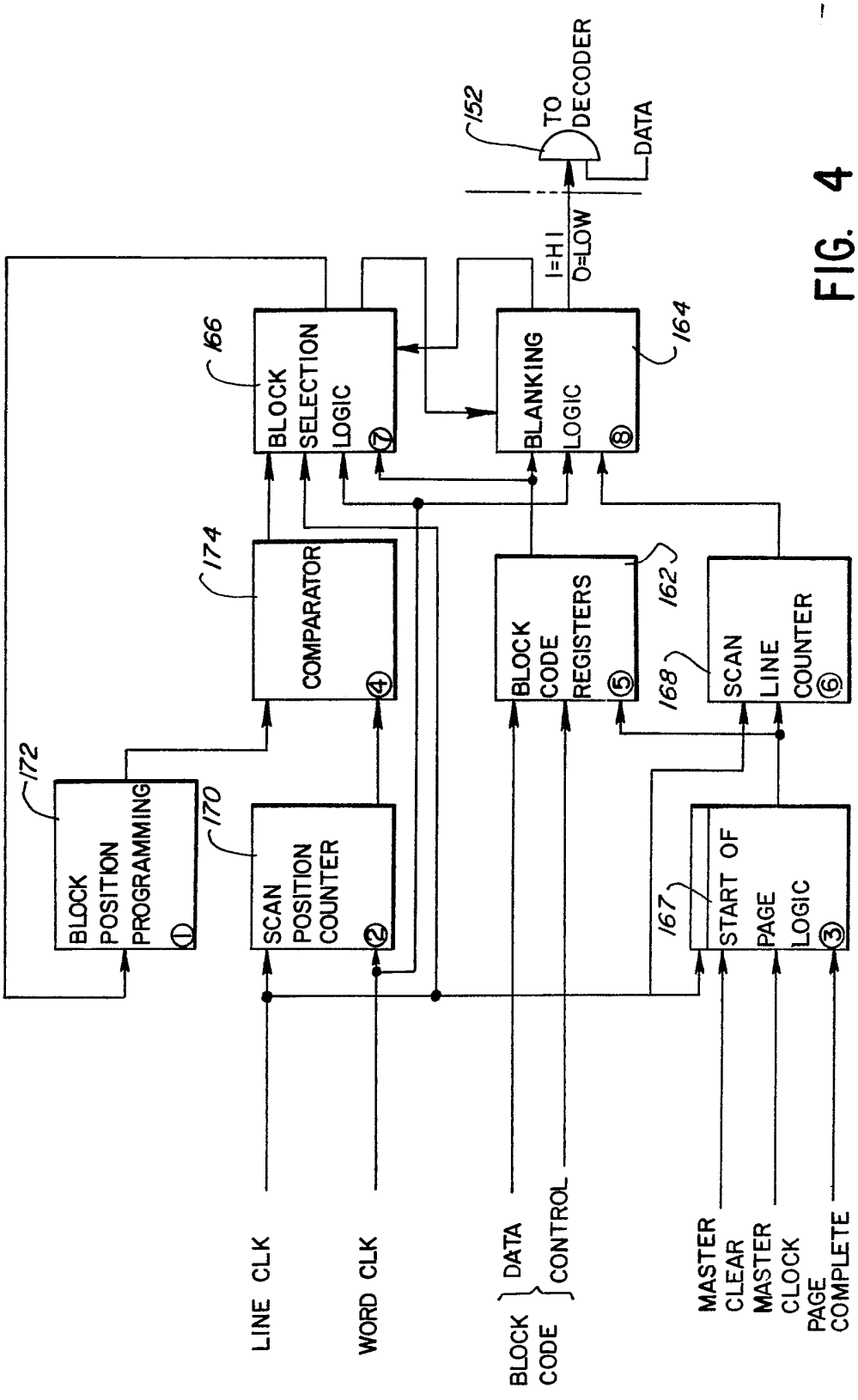

BLOCK POSITION PROGRAMMING ①
SCAN POSITION COUNTER ②
START OF PAGE LOGIC ③
COMPARATOR ④
BLOCK CODE REGISTERS ⑤
SCAN LINE COUNTER ⑥
BLOCK SELECTION LOGIC ⑦
BLANKING LOGIC ⑧
172
170
167
174
162
168
166
164
152
TO DECODER
DATA
I=HI
O=LOW
LINE CLK
WORD CLK
BLOCK CODE
DATA
CONTROL
MASTER CLEAR
MASTER CLOCK
PAGE COMPLETE

FIG. 4

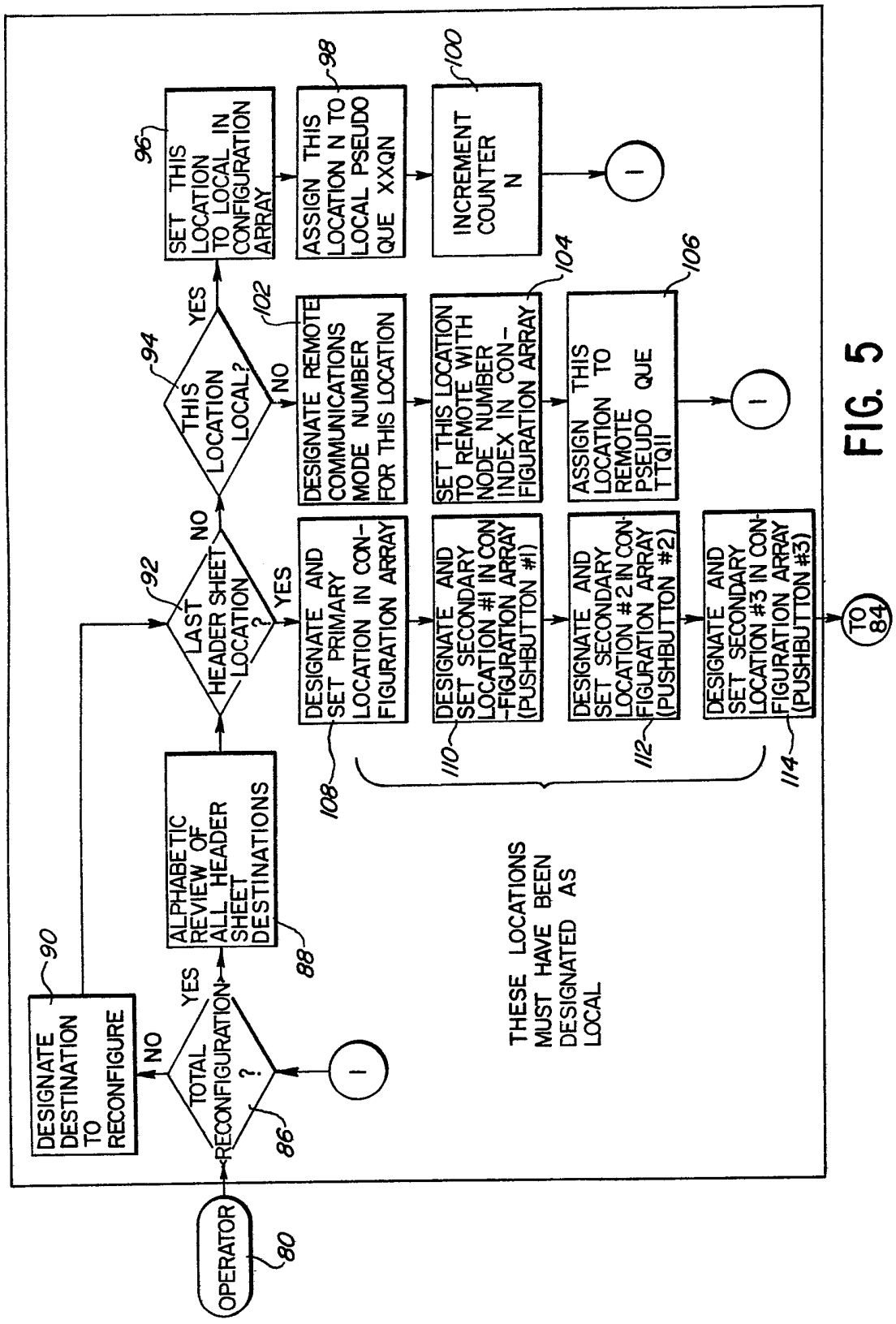

OPERATOR
80
TOTAL RECONFIGURATION ?
86
YES
NO
DESIGNATE DESTINATION TO RECONFIGURE
90
ALPHABETIC REVIEW OF ALL HEADER SHEET DESTINATIONS
88
LAST HEADER SHEET LOCATION ?
92
YES
NO
THIS LOCATION LOCAL?
94
YES
NO
SET THIS LOCATION TO LOCAL IN CONFIGURATION ARRAY
96
ASSIGN THIS LOCATION N TO LOCAL PSEUDO QUE XXQN
98
INCREMENT COUNTER N
100
DESIGNATE REMOTE COMMUNICATIONS MODE NUMBER FOR THIS LOCATION
102
SET THIS LOCATION TO REMOTE WITH NODE NUMBER INDEX IN CONFIGURATION ARRAY
104
ASSIGN THIS LOCATION TO REMOTE PSEUDO QUE TTQII
106
DESIGNATE AND SET PRIMARY LOCATION IN CONFIGURATION ARRAY
108
DESIGNATE AND SET SECONDARY LOCATION #1 IN CONFIGURATION ARRAY (PUSHBUTTON #1)
110
DESIGNATE AND SET SECONDARY LOCATION #2 IN CONFIGURATION ARRAY (PUSHBUTTON #2)
112
DESIGNATE AND SET SECONDARY LOCATION #3 IN CONFIGURATION ARRAY (PUSHBUTTON #3)
114
TO 84
THESE LOCATIONS MUST HAVE BEEN DESIGNATED AS LOCAL

FIG. 5

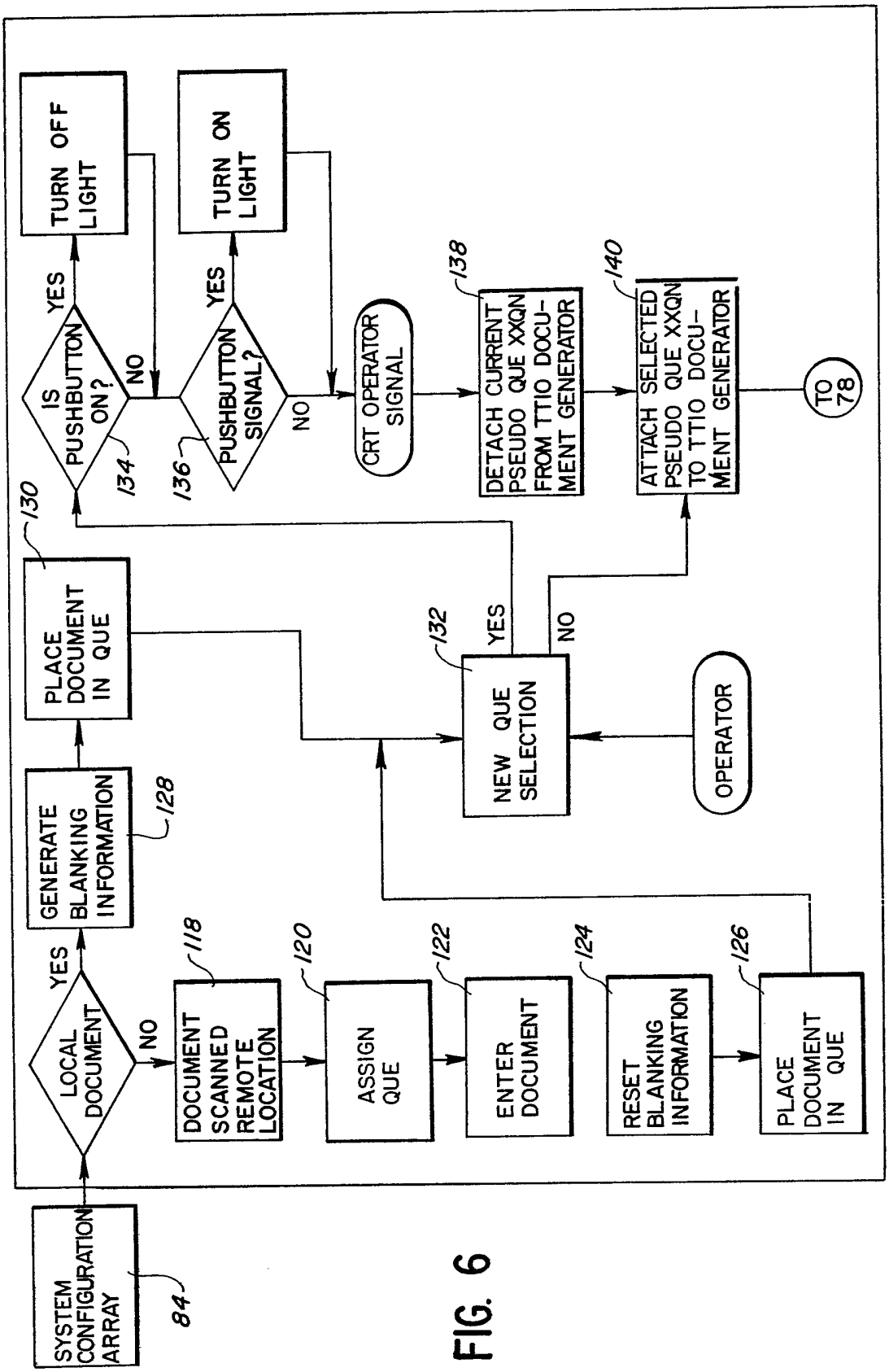

SYSTEM CONFIGURATION ARRAY
84
LOCAL DOCUMENT
YES
NO
GENERATE BLANKING INFORMATION
128
PLACE DOCUMENT IN QUE
130
DOCUMENT SCANNED REMOTE LOCATION
118
ASSIGN QUE
120
ENTER DOCUMENT
122
RESET BLANKING INFORMATION
124
PLACE DOCUMENT IN QUE
126
NEW QUE SELECTION
132
YES
NO
OPERATOR
IS PUSHBUTTON ON?
134
YES
NO
TURN OFF LIGHT
PUSHBUTTON SIGNAL?
136
YES
NO
TURN ON LIGHT
CRT OPERATOR SIGNAL
DETACH CURRENT PSEUDO QUE XXQN FROM TTIO DOCUMENT GENERATOR
138
ATTACH SELECTED PSEUDO QUE XXQN TO TTIO DOCUMENT GENERATOR
140
TO 78

FIG. 6

POOR QUALITY

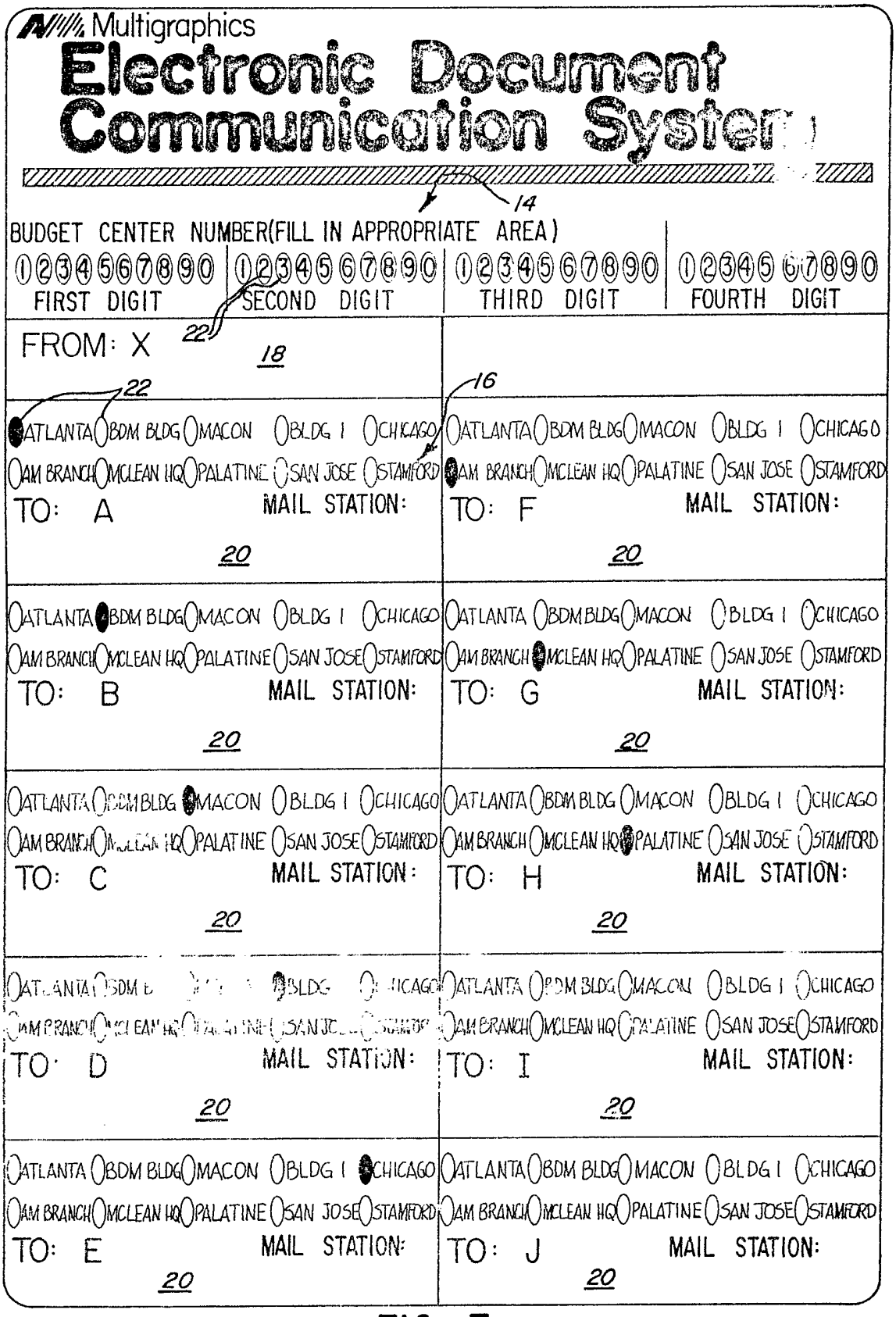


FIG. 7

Multigraphics (LOGO BLOCK ALWAYS PRINTED)

Electronic Document Communication System

BUDGET CENTER NUMBER(FILL IN APPROPRIATE AREA)

0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9
FIRST DIGIT	SECOND DIGIT	THIRD DIGIT	FOURTH DIGIT

FROM: X (ALWAYS PRINTED)

○ATLANTA ○BDM BLDG ○BOSTON ○CHICAGO ○DALLAS ○DENVER ○MCLEAN HQ ○RESTON ○SAN JOSE ○STAMFORD	○ATLANTA ○BDM BLDG ○BOSTON ○CHICAGO ○DALLAS ○DENVER ○MCLEAN HQ ○RESTON ○SAN JOSE ○STAMFORD
TO: A MAIL STATION: 9	TO: F MAIL STATION: 8
○ATLANTA ○BDM BLDG ○BOSTON ○CHICAGO ○DALLAS ○DENVER ○MCLEAN HQ ○RESTON ○SAN JOSE ○STAMFORD	○ATLANTA ○BDM BLDG ○BOSTON ○CHICAGO ○DALLAS ○DENVER ○MCLEAN HQ ○RESTON ○SAN JOSE ○STAMFORD
TO: B MAIL STATION: 7	TO: G MAIL STATION: 6
○ATLANTA ○BDM BLDG ○BOSTON ○CHICAGO ○DALLAS ○DENVER ○MCLEAN HQ ○RESTON ○SAN JOSE ○STAMFORD	○ATLANTA ○BDM BLDG ○BOSTON ○CHICAGO ○DALLAS ○DENVER ○MCLEAN HQ ○RESTON ○SAN JOSE ○STAMFORD
TO: C MAIL STATION: 5	TO: H MAIL STATION: 4
○ATLANTA ○BDM BLDG ○BOSTON ○CHICAGO ○DALLAS ○DENVER ○MCLEAN HQ ○RESTON ○SAN JOSE ○STAMFORD	○ATLANTA ○BDM BLDG ○BOSTON ○CHICAGO ○DALLAS ○DENVER ○MCLEAN HQ ○RESTON ○SAN JOSE ○STAMFORD
TO: D MAIL STATION: 3	TO: I MAIL STATION: 2
○ATLANTA ○BDM BLDG ○BOSTON ○CHICAGO ○DALLAS ○DENVER ○MCLEAN HQ ○RESTON ○SAN JOSE ○STAMFORD	○ATLANTA ○BDM BLDG ○BOSTON ○CHICAGO ○DALLAS ○DENVER ○MCLEAN HQ ○RESTON ○SAN JOSE ○STAMFORD
TO: E MAIL STATION: 1	TO: J MAIL STATION: 0

FIG. 8

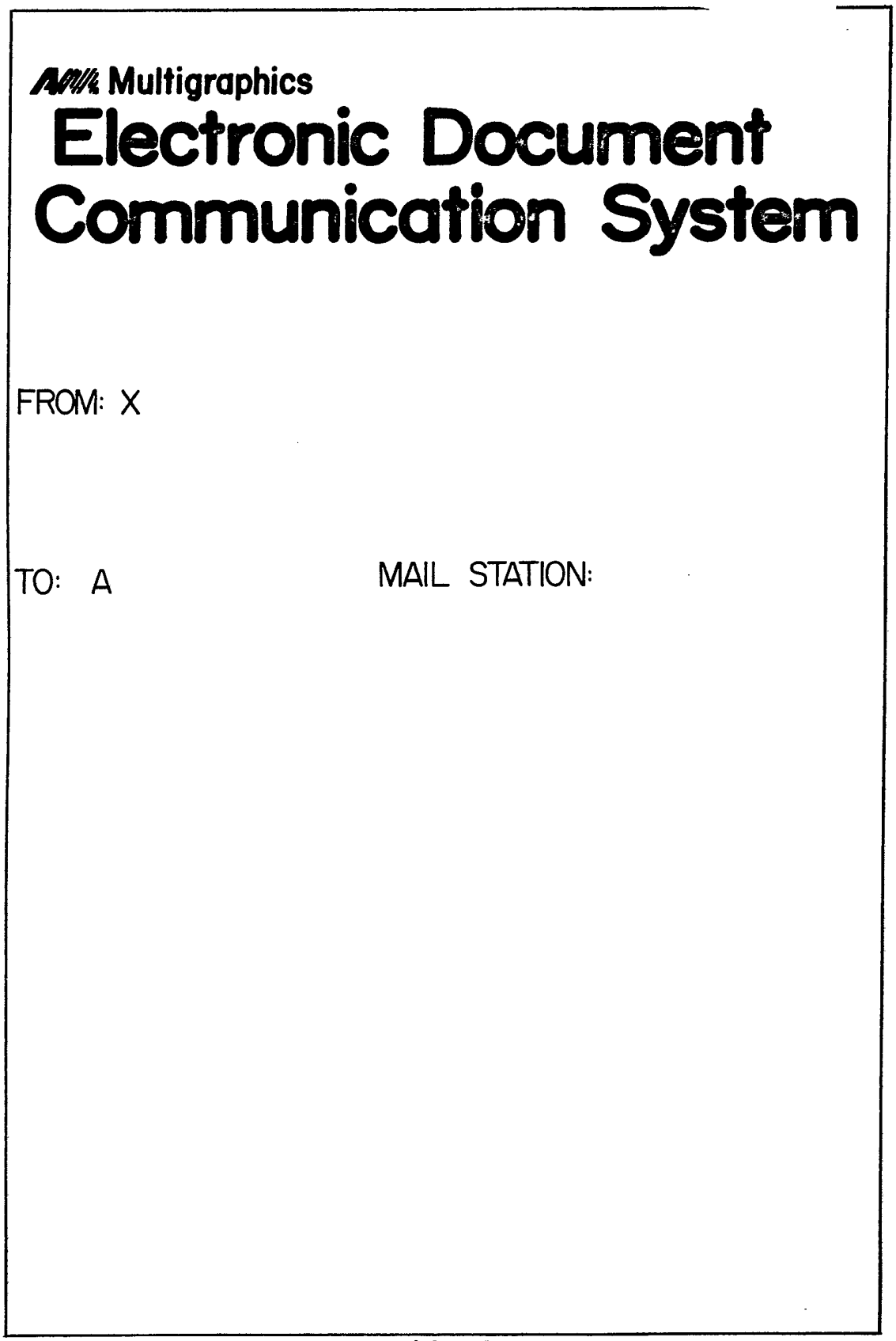

Multigraphics
Electronic Document Communication System
FROM: X
TO: A
MAIL STATION:

FIG. 9

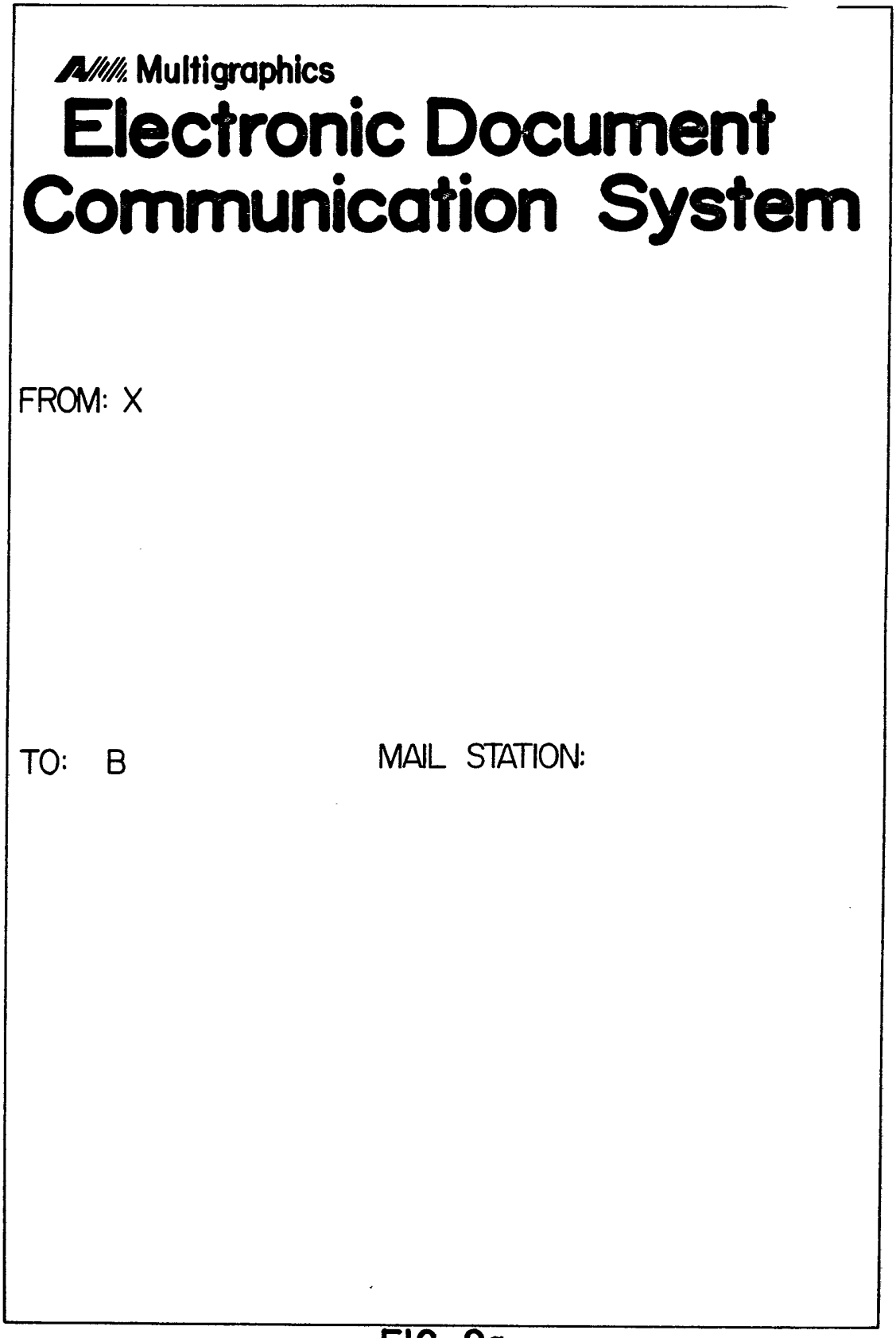

Multigraphics
Electronic Document Communication System
FROM: X
TO: B
MAIL STATION:

FIG. 9a

SPECIFICATION

Facsimile transmission system including bulk sorting

The present invention relates to facsimile document transmission systems, and more particularly to a method and apparatus for transmitting documents, in bulk, from one or more transmitting stations to one or more receiving stations, where the documents are automatically sorted and stored at a predetermined address for receipt by the designated addressee.

Image communications systems are in general quite well known and are in common use. One form of such systems in common commercial use is often referred to as a facsimile system. In such systems, the original document at a sending station is scanned by a transducer to convert the optical or visual image of the document into a train of electrical signals. These electrical signals are transmitted to a receiving station by a telephone line, radio or satellite communication link. At the receiving station, the train of electrical signals are converted into an optical or visual image presentation of the original document.

One example of such a system is disclosed in the copending applications S. N. 123,577, filed February 2, 1980, entitled: "Header Sheet for Image Communication System" and S.N. 149,362, filed May 13, 1980, entitled: "RealTime Data Compression/Decompression Scheme for Facsimile Transmission System", both assigned to the present assignee. Both of these applications are incorporated herein by reference. As described therein, a header sheet is adapted for use with documents to be transmitted and is used to define both the sender and the one or more recipients of the documents to be transmitted.

The purpose of the header sheet is to identify for the system, first, the fact that a new document is beginning, second, the identity of the sender or sending station (e.g. for billing purposes), and third, the identity of the intended recipient or receiving station. The foregoing information is presented by data representation for processing by the system. In addition, the header sheet may be used for visual presentation of the sender and addressee that will be transmitted with the document information for reconversion and visual presentation at the receiving station.

The header sheet includes identifying means that designate to the system the fact that the sheet is in fact a header sheet and not a document page. The header sheet also includes further identifying means that designate to the system that the header sheet is properly oriented in order that the addressee and sender data will be properly interpreted by the system, and that the data face of the sheet is facing the scanning transducer.

The facsimile transmission system scans the header sheet, determines one or more addresses identified thereon and sends the document to the receiving station associated with each addressee.

The present invention is directed to means for sorting the documents transmitted to each receiving station according to particular recipients associated with the station. The invention is contemplated for use with a facsimile system capable of scanning and transmitting a large volume of documents to various receiving stations in a short period of time. Each receiving station will have associated with it a plurality of addressees or recipients.

Since it is not desirable to control the order of transmission of the documents, they are in effect, transmitted at random to each receiving station associated with a predetermined plurality of recipients. It is, therefore, desirable to bulk sort the documents once received and store them according to recipient, once received by the receiving station.

The preferred practice of the present invention enables us to provide means for identifying the particular recipient or recipients of documents sent to one or more receiving stations by facsimile transmission;

to provide for definition and designation of particular addresses or recipients at predetermined receiving stations; and

to provide for production of the facsimile documents transmitted to a particular receiving station, as requested, by any one of a plurality of recipients associated with the receiving station.

The practice of the invention will be more readily apparent from the following detailed description read in conjunction with the attached drawings.

FIG. 1 is a functional flow diagram of a facsimile transmission system of the type adapted for use in accordance with the teachings of the present invention.

FIG. 2 is an expanded flow diagram of a portion of the system illustrated in FIG. 1, and is presented as Figures 2*a* to 2*c*.

FIG. 3 is an expanded block diagram of the routing/blanking work module of FIG. 2.

FIG. 4 is an expanded block diagram of the address sheet creation module of FIG. 2.

FIG. 5 is an expanded block diagram of system configuration creation module of FIG. 2,

FIG. 6 is an expanded block diagram of the check system configuration module of FIG. 2.

FIG. 7 is a sample header sheet for use with a document to be transmitted via the system of FIGS. 1 and 2.

FIG. 8 shows the blocking technique used on the header sheet of FIG. 7, in order to produce from the header sheet a unique address sheet in accordance with the teachings of the invention.

FIGS. 9 and 9a are typical address sheets produced from the header sheet of FIG. 3.

With particular reference to Fig. 1, each document to be scanned is associated with a particular header sheet diagramatically illustrated at 10. As more clearly shown in Fig. 7, the header sheet includes two basic data areas: the first is the sender identification area 14 labeled "BUDGET CENTER NUMBER"; and the second is the addressee identification area 16. Each data area has an associated visual presentation area: block 18 for the sender, and blocks 20 for the addressee. The data areas are coded by their positions in the raster scan for interpretation by the system to control the transmission operation. These data areas

include a number of defined oval areas 22 to be marked by the user with pen or pencil, in accordance with the information intended. In order to insure against confusion by the system, the preprinted ovals and any guidance or instructional information contained therein may be printed in a color to which the scanning transducer is blind, so data will be recognized only when an oval has been marked by pencil or pen. The visual presentation areas 18 and 20 are intended to have visual information written or typed therein, and that information is transmitted as part of the facsimile or image communication for reproduction at the addressee station.

To illustrate usage of the particular form of header sheet shown in Fig. 7, the user, either as an individual or a billing center is identified by a four digit number which must be noted by appropriately marking four ovals 22 in the sender identification data area 14. In addition, identification of the sender is written or typed in area 18.

The addressee area 16 of the particular header sheet is designed for a choice of a plurality of predetermined addressee stations. In each box 20, the user may mark one addressee station by marking an appropriate data oval 22. Also, the individual addressee is visually identified by typing or writing his name and particular address information "A–J" in the appropriate area of the box 20. If only one copy of the document is to be transmitted, then only one box 20 should be used. A separate box 20 is required for marking each additional addressee station to which a copy of the document is to be transmitted.

The facsimile transmission system adapted for reading and sending the header sheet 10 and the document associated therewith includes an input scanning module or document scanner 24 adapted for input of an original document and scanning it by means of a raster scanning device such as, by way of example, a laser raster scanner which for purposes of this disclosure is capable of receiving, advancing and scanning an 8-1/2 x 11 inch document past a scanning window such that the vertical dimension of the document is advanced through the window and the scanning cycle is completed within two seconds of initiation. The preferred scanning module generates 90,000 pels per square inch of document area, thereby producing high quality definition of the scanned document. For purposes of this disclosure, it may be assumed that the scanner makes 300 scans per inch and that each scan line is defined by 300 pels per inch. Typically, the pels will be grouped into 16-bit or 16-pel words. The scanner produces an electronic signal which is an encoded facsimile definition of the document. This signal is output from the scanner into the controller/storage module 26 where, in accordance with the addressee information provided on header sheet 10, the encoded document is routed to a local (on line) document generator 28 or to a remote document generator 30 via the communications interface modules 32 and the diagramatically illustrated communications link 34.

Generally each document generator has associated with it a plurality of addresses or recipients. For example, it can be assumed that document generator 28 has associated with it the following arbitrary addresses:

A. Atlanta
B. BDM Bldg.
C. Macon
D. Bldg. 1, and

that document generator 30 has associated with it the following arbitrary addresses:

E. Chicago
F. AM branch
G. McLean Hq.
H. Palatine.

Still other addresses may be associated with additional document generators, as shown for example:

I. San Jose and J. Stanford.

Typically, the header sheet 10 is marked by the sender X to indicate a plurality of recipients, A–H as shown, who are to receive the document associated with the header sheet. The operator then enters the document, with the header sheet, into the scanner 24 and the system transmits and routes the encoded document signal to the document generators associated with the designated recipients.

By way of definition, the specific document generator associated with an address is the first level address for the document. That is, the designated document generator is selected by the system and the document signal is transmitted thereto regardless of the particular designated recipient. The second level address is the particular address location within the document generator.

This is not unlike typical postal sorting operations wherein the "zip" code defines the town or a zone within an area where a package is to be delivered, i.e., the first level address. Once delivered to the defined town or zone, a local authority then determines the second level address to which the package is ultimately delivered.

In the present example, if Atlanta, BDM bldg., Macon and/or Bldg. 1 are marked on a header sheet scanned by the scanner 24 which is on-line with document generator 28, the first level address will be identified as document generator 28 and the system will transmit the document in the local mode to the on-line document generator 28. When Chicago, AM branch, McLean Hq. and/or Palatine are marked on the header sheet, the system will transmit the document in the remote mode over the communications channel 34 to the document generator 30 which is associated with the selected addresses. Other addresses may be associated with still other document generators in the system. It will, of course, be understood that a header sheet may have any combination of addresses associated with any of the document generators in the transmission network and that the encoded document facsimile signal will be automatically routed to each document generator associated with a selected address.

Referring now to Fig. 2, it will be appreciated that the document scanner 24 comprises an essentially electro-mechanical input scanner 36, an electronic control module 38 and an encoder module 40. A more detailed explanation of the entire document scanner system 24 will be found in the aforementioned copending application S.N. 149,362. For the

present purposes, it is sufficient to state that the scanner 24 produces an electronic, digital signal defining, page-by-page, the entire document, including header sheet. This signal is introduced, page-by-page into the storage section 42 of the storage/controller module 26 at the input signal designated at 44.

At this point, it is determined whether the current page signal represents a header sheet or a document page. This may be accomplished by using a gating circuit or gating logic 46 and, where convenient, may be implemented with software. In the event the current page is a document page, the document page is appended to the document storage module at 48, and it is then determined whether the just processed signal represents the last page of the particular document being scanned, as shown at gate 50. If more pages are present in the document, a signal is sent over line 52 energizing the scanner to enter and scan the next document page. If the current page is the last page of the document, then gate 50 closes out the document storage module, as indicated at 54, thus readying the document for entry into the controller section 56 of the storage/controller module 26.

Essentially, the last page of a document is defined by the presence of a header sheet for a new document or by the lack of any additional pages, indicating the end of a scanning sequence. Once the document is fully scanned and the document storage module is finalized as indicated at 54, the number of pages for each document is tabulated and stored.

Returning to logic gate 46, if the page signal introduced into the storage section 42 indicates a header sheet, the gate produces a signal for initializing the document storage module for storing the scanned document that will follow, as indicated at 58. Next, as indicated at 60 the header sheet data signal is read to determine how many local and how many remote addresses are marked and thus, how many copies will be produced, both local and remote, in accordance with the instructions marked on the header sheet being scanned. After the sequence is completed, the header sheet data signal is processed to define the routing and blanking word signal for the document, as indicated at 62. Once this is generated, it is introduced into the document storage module as indicated at 64. This signal, then, becomes the leading signal for the document following the header sheet and defines the addresses to which the document is to be transmitted.

The logic sequence for generating the routing and blanking word for a header sheet is diagrammatically illustrated in Fig. 3. A separate routing and blanking word is generated for each individual addressee marked on the header sheet. Also, a plurality of header sheets "N" may be associated with a document thus permitting additional addressees to be designated as copy recipients. Thus, if each header sheet has a possibility of 10 addressees (as shown in the sample) and a particular document is associated with "N" header sheets, then the document may be sent to up to 10N addresses and 10N routing and blanking words will be generated and stored at the document storage module.

As shown in Fig. 3, once a header sheet is identified at gate 46 and the data is received in logic module 62 from module 60, the header sheet counter 66 is indexed to indicate that the particular header sheet is the "Nth" header sheet for this document. The header sheet data signal is then entered into logic module 68 where it is determined which address is marked in any number of the ten addressee blocks. Of course, the same or different address ovals 22 can be marked in any number of the ten address blocks 20 on a header sheet (see Fig. 7).

Each block 20 which is marked is identified by a unique routing and blanking word which is generated at module 70. In the preferred embodiment, a five-bit binary signal "$b_4\ b_3\ b_2\ b_1\ b_0$" is generated to produce the blanking word, where:

(1) b_4 is the Command Bit, and when $b_4=0$, a document page is indicated at gate 46 and the blanking function is overridden, or when $b_4=1$, a header sheet is indicated and an address sheet is to be produced from this signal.

(2) $b_3\ b_2\ b_1$ are the level codes and indicate which of the ten potential blocks 20 is defined, according to the following table:

b_3	b_2	b_1	Level	Address Block
0	0	0	0	0 or 1
0	0	1	1	2 or 3
0	1	0	2	4 or 5
0	1	1	3	6 or 7
1	0	0	4	8 or 9

(3) b_0 indicates whether the even or odd address block defined by bits $b_3\ b_2\ b_1$ is to be selected. If:

$b_0=0$, the even block is selected (right half of page),

$b_0=1$, the odd block is selected (left half of page).

The header sheets blocks are identified in such a manner that the five bit code clearly defines a single address block. Referring to Fig. 7, the right half of the header sheet includes address blocks F, G, H, I and J which are defined as even blocks 8, 6, 4, 2 and 0, respectively, and the left half includes blocks A, B, C, D and E which are odd blocks 9, 7, 5, 3 and 1, respectively, as follows:

BLOCK	LEVEL	SIDE OF PAGE	FIVE BIT CODE				
			b_4	b_3	b_2	b_1	b_0
J	0	Right	1	0	0	0	0
E	0	Left	1	0	0	0	1
I	1	Right	1	0	0	1	0
D	1	Left	1	0	0	1	1
H	2	Right	1	0	1	0	0
C	2	Left	1	0	1	0	1
G	3	Right	1	0	1	1	0
B	3	Left	1	0	1	1	1
F	4	Right	1	1	0	0	0
A	4	Left	1	1	0	0	1

Thus, a blanking word defined by the following five bit code: "10011" defines block D on the header sheet of Fig. 7. In order to route the document according to the header sheet instructions, each used block A–J is scanned and the location of the marked oval 22 indicates proper routing. Thus, in block D the routing word indicates "Bldg. 1", which is associated with the local document generator 28 in the present example.

Returning now to Fig. 2, once all of the header sheets and document pages have been scanned and processed for a particular document and the document storage module has been finalized and closed as indicated at logic module 54, the document and associated addresses are fully defined and are ready for entry into the controller section 56 of the storage/controller module 26. At this point the system configuration check logic is activated as shown at logid block 76. By way of background, it is contemplated that the various addresses associated with each document generator will be stored in a volatile file which can be changed at any time, thus permitting updating of the address locations, as needed. Therefore, it is desirable to check the system configuration prior to sending the document to determine if the intended addressees are still at the same locations.

This is particularly important when the configuration is changed after scanning but prior to sending, since routing data is identified at logic modules 60 and 62 and discrepancy could occur at the destination logic gate 78. If a discrepancy occurs, the operator is alerted at block 76 and has an opportunity to revise the system configuration, as indicated at 80. Of course, the operator can also arbitrarily change the system configuration at any time. In either case, the operator defines the modified system configuration by keyboard entry at 80. This input is introduced into the system configuration creation module 82, where data defining the new system configuration is generated and then introduced into the system configuration array 84.

An expansion of the system configuration creation module 82 is shown in Fig. 5. The operator may change the entire system configuration or make a selected modification at any time. Therefore, the logic decision, as indicated by logic gate 86, is whether a total or partial reconfiguration is to be made. In the event of a total reconfiguration, an alpha numeric display of all addresses and locations is produced at 88 for operator review at a readout device such as, by way of example, a cathode ray tube or the like (not shown). When a partial configuration change is made, the operator designates the address or addresses which are to be changed, as indicated at block 90.

As the operator updates the information, it is entered into the module through gate 92, and the data is introduced into a logic gate 94 where it is determined whether or not the new data indicates a local or a remote location. If local, the location is entered into the configuration array 84 and assigned to a local pseudo que, at which time the counter is incremented to the next available pseudo que, as shown at logic modules 96, 98, 100. If remote, the remote location is defined via node number, wherein a particular node number is associated with each document generator in the entire system. The predetermined node number is assigned at module 102 and thereafter, the remote address is assigned (with node number) to a remote pseudo que and entered into the local configuration array 84, as shown at logic modules 104 and 106.

When the last configuration data is introduced into gate 92, the locations for the local document generator are set, as shown at modules 108, 110, 112 and 114. By way of explanation, each document generator of the exemplary system has four potential addresses. This number is arbitrary and is strictly a matter of choice and economics. One of the four addresses is designated as the "primary" location and the remaining three are designated as "secondary" locations. Again, this designation is arbitrary Essentially, unless one of the "secondary" locations is selected, the "primary" location is activated. By way of convenience, the selection of secondary locations has been indicated as being accomplished by activating a plurality of pushbuttons which are provided on the consoles of document generators 28 and 30 as shown in Figure 1.

An expanded diagram of the system configuration check module 76 is shown in Fig. 6. Here, the encoded documents are properly associated with the assigned pseudo ques depending upon the current system configuration. Gate 116 determines whether the document was scanned locally (on line) or at a remote scanner. If the document is scanned at a remote location, as indicated at 118, it is then assigned the remote psuedo que, the remote que is transmitted, the blanking word is generated from the routing words and the document is received into storage at the appropriate local pseudo que(s) of the designated document generator based on the configuration array, as shown at modules 120, 122, 124 and 126. If the document has been locally scanned, the blanking word is generated from the routing words and the document is stored in the appropriate local pseudo que(s), as shown at modules 128, 130. At this point the system no longer differentiates between a local or a remote scanned document.

The operator may select one of the three "secondary" addresses or the "primary" address associated with the local document generator or, if no selection is made, the process continues with the address that had been previously selected or the "primary" address if no previous selection has been made. This step is indicated at logic module 132. If the operator does intervene, the proper address is selected and an indicator light is activated, in accordance with the gates 134 and 136 and associated circuitry. At this point, the proper pseudo que associated with the selected address is assigned to the document generator, as shown at modules 138 and 140 and the document generator will now generate documents marked for the selected address. Of course, other documents remain available in storage.

It will be noted that the system configuration check module is inserted at several points in the data path (see Fig. 2) since the configuration can be changed at

any time. This insures that the ultimate destination of the document is the location intended, even though the system configuration may have changed between scanning and regeneration.

Once the system configuration has been checked and the data is entered into gate 78, a signal is generated indicating whether a particular document is destined for a remote location or a local location. Assuming a remote location, the document is then moved to a remote que as indicated at module 142. At this point the document is transmitted via the communications interface 32 and communications link 34 to the controller 56 associated with the designated document generator 30. Once the document is received by the controller, the system configuration is again checked and (assuming the system configuration has not changed), as proviously stated, the document is now treated as a local document. Thus, as shown in Fig. 2, every document, whether locally or remotely scanned, is assigned a local que at module 144. Again the system configuration is checked and, assuming no change, the system is now ready to generate facsimile copies from the document data signals assigned to the various queues.

Once the particular local "primary" or "secondary" address has been selected, the controller is ready to activate printing of all queued (or stored) documents assigned to that address at the associated document generator. The data is now entered into the document generator via logic gate 146 which assures orderly flow of the data from the queues to the document generator.

The print task module 148 is activated. At this point it is determined whether the data represents a header sheet (from which a unique address sheet is to be produced) or a document page, as shown at gate 152 of Fig. 2.

If the data represents a document page, the command bit b_4 of the blanking word is set to the "zero" logic level as shown at gate 153a. If the data represents a header sheet, b_4 is set to a "one" logic level as shown at gate 153b.

The blanking word is loaded into the address sheet creation module 160, as shown at gate 155. When $b_4=0$, indicating a document page, the blanking function of the address sheet creation module is overridden. When $b_4=1$, indicating a header sheet, the blanking function is enabled, and a unique address sheet will be printed. The address block to be printed is defined by the address block code represented by b_3-b_0 of the blanking word.

The data is sent to the document generator, as shown at gate 157, where it is received by the decoder/decompression module 150. The writing head interface module 154 is activated and the page is printed, as indicated at 156, in accordance with the instruction specified in the blanking word. This process continues until the last page of the document has been printed, as controlled by gate 158.

Assuming a header sheet is defined by the data at gate 152, b_4 is set to logic level "one", activating the blanking function of the address sheet creation module 160. As shown in Fig. 7, each header sheet contains a plurality of addresses and recipients. The address creation module 160 generates from the header sheet a unique address sheet for each individual recipient indicated on the header sheet and further, deletes confidential or unnecessary information from the address sheet. With reference to Fig. 8, The cross-hatched areas are always blocked out and therefore, are not produced on the address sheet. In accordance with the blanking word, a unique address sheet for each marked block location A–J can be produced with the logo and sender block always being reproduced. For example the address sheet for block 9 is illustrated in Fig. 9 and contains only the logo, sender block and single address block identifying X as the sender and A as the recipient. Similarly, the unique address sheet for block 7 is shown in Fig. 9a.

An expension of the address sheet creation module is shown in Fig. 4. As stated, the blanking word is contained in the five-bit code. The routing word has, via the system configuration array, transmitted the document to the particular document generator and the particular location que within the storage module associated with the document generator. The blanking word is now used to generate the unique address sheets when the document is printed for each location identified by the routing word. Each five-bit blanking word for the header sheet is entered into the block code registers 162. From there, b_3-b_0 is entered into the block selection logic 166 and b_4 is entered into the blanking logic module 164. The most significant bit (b_4) determines, whether the word is associated with a document page or a header sheet. If bit b_4 indicates a document page, the blanking function is disabled and a signal is sent to gate 150 activating the decoder/decompression module to print all the data associated with the page. If the word identifies the data as being associated with a header sheet, then the blanking function is enabled and a signal is sent to decoder/decompression module 150 to print only the data within the areas selected by block selection logic 166.

By way of example, the illustrated system is used in conjunction with a scanner that outputs 2550 scan lines per page. By tracking the start of each page, as shown at module 167, the data being reviewed can always be identified with the location on the page and the location (pel count) within the scan line. Since bits b_3-b_0 of the five-bit code defines a particular "to" block on the header sheet, the system counts scan lines at counter 168 and pels at counter 170 to determine when data representing that block is being presented. The logic module 164 activates gate 150 to print that portion of the data. Of course, the sender or "from" block and logo block are also printed by counting. In the present example, scan lines 1–1275 are on the right side of the page, and indicate an even block, in accordance with bit "b_0". Likewise, scan lines 1276–2550 indicate an odd block via bit "b_0". The levels identified by bits "b_3 b_2 b_1" indicate the pel count in the scan line which identifies a certain block of the header sheet.

Thus, by counting, the scan line counter 168 and the scan position counter 170 track the precise location of the data being presented. This can be compared with the block selection logic at 166 to determine when the data representing the selected block

is being entered. This is accomplished by converting the block selection logic data into a programmed count at block position programming module 172 and comparing with the actual count in counters 168 and 170 at comparator 174. When the selected block data is available, an activating signal is sent to gate 150 and the data is printed. In this manner, a unique address sheet can be generated for each addressee indicated on the header sheet.

For example, as shown in Figs. 9 and 9a, the header sheet is reproduced as a plurality of individual address sheets each identifying only a single recipient. Each recipient receives the unique address sheet and copy of the associated document. From the foregoing, it can be seen that the present invention provides for the method and apparatus for transmitting, sorting, storing and recalling in selected order documents transmitted via a facsimile system.

CLAIMS

1. A method of transmitting documents at random from one or more sending stations to one or more receiving stations, each receiving station having associated with it one or more addresses, and sorting the documents by the particular addressees associated with each receiving station, the method comprising the steps of:

a) scanning at each sending station address defining information associated with the documents introduced thereat and generating therefrom an address code for each address to which a document is to be sent;

b) transmitting the documents to each of the receiving stations associated with the particular address codes; and

c) sorting, in accordance with the address codes, the documents received at each receiving station.

2. A method according to Claim 1, wherein each address code includes: (i) a first level code identifying one of a plurality of receiving stations; and (ii) a second level code identifying one of a plurality of addresses associated with the identified receiving station, wherein:

a) the transmitting step includes transmitting the documents to the receiving station identified by the first level code, and

b) the sorting step includes sorting and storing the documents transmitted to a receiving station according to the second level code.

3. An apparatus for transmitting documents at random from one or more sending stations to one or more receiving stations, each receiving station having associated with it one or more addresses, and sorting the documents by particular addresses associated with each receiving station, comprising:

a) means for reading address information associated with a document introduced at a sending station;

b) transmission means for delivering the document to a receiving station associated with the address identified by the address information; and

c) means for sorting and storing the document received at the receiving station according to a particular address identified by the address information.

4. The apparatus of Claim 3, further comprising means for generating an address code from the address information, the code including a first level address identifying a particular receiving station and a second level address identifying a particular address associated with the receiving station.

5. A method of transmitting documents at random from one or more sending stations to one or more receiving stations, substantially as hereinbefore described with reference to the accompanying drawings.

6. Apparatus for transmitting documents at random from one or more sending stations to one or more receiving stations, substantially as hereinbefore described with reference to the accompanying drawings.

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