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(54) Multi-station document inserter with automatic startup and shutdown document collation sequences.

(57) A method and associated apparatus is disclosed for automatically providing a complete document collation during start up and shut down of a multi-station document inserter. The steps involved are initiating a Sequence Start Routine during start up of the inserter in which each feeder module is activated sequentially beginning with the document feeder module most remote from the envelope feeder module and entering with the feeder module closest to the envelope feeder module, and initiating a Clear Deck Routine during shut down of the document inserter in which each feeder module is deactivated sequentially beginning with the document feeder module most remote from the envelope feeder module and ending with the feeder module closest to the envelope feeder module.

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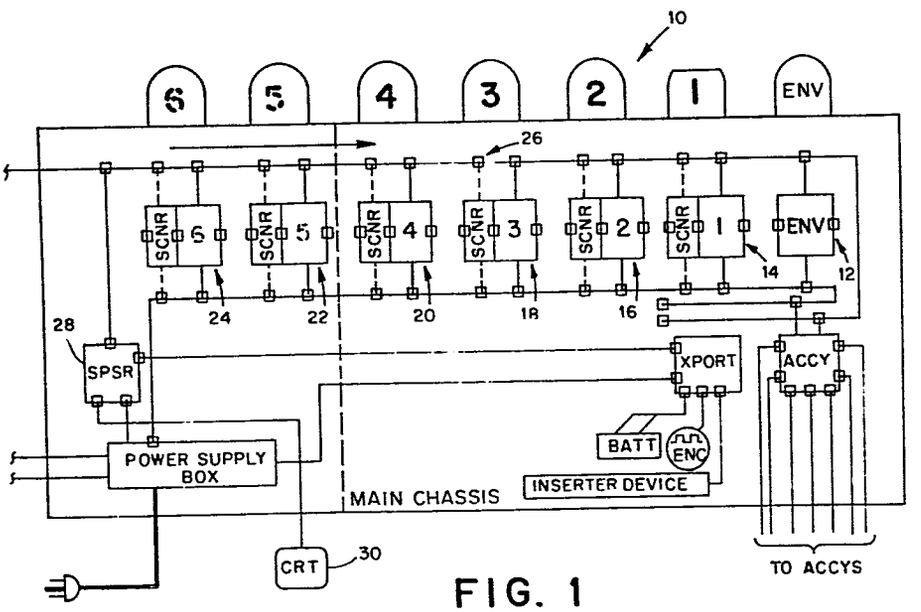
10
6
5
4
3
2
1
ENV
26
SCNR
6
5
4
3
2
1
ENV
24
22
20
18
16
14
12
28
SPSR
XPORT
ACCY
BATT
ENC
POWER SUPPLY BOX
INSERTER DEVICE
MAIN CHASSIS
CRT
30
TO ACCYS

FIG. 1

MULTI-STATION DOCUMENT INSERTER WITH AUTOMATIC START UP AND SHUT DOWN DOCUMENT COLLATION SEQUENCES

The present invention relates to document inserters, and more particularly to multi-station document inserters.

Known multi-station document inserters require substantial training of inserter operators to enable them to locate any documents present on the transport deck of the inserter prior to start up or after shut down and to manipulate the documents and feeder modules to provide a complete document collation when the inserter is activated. That is, prior to start up the operator would often have to remove the documents from the transport deck and reinsert them by hand into the proper feeders or discard them.

According to the present invention there is provided a multi-station document inserter having a plurality of document feeder modules and an envelope feeder module, the inserter comprising:

switch means for initiating Sequence Start and Clear Deck Routines;

supervisory control means for transmitting control signals to each of the document feeder modules of the document inserter in sequence beginning with the document feeder station most remote from the envelope feeder module upon activation of said switch means; and

distributed processing means associated with each of said document feeder modules, said distributing processing means receiving the control signals from said supervisory control means and activating its associated feeder module to feed a document during the Sequence Start Routine, said distributed processing means receiving control signals from said supervisory control means and deactivating its associated feeder module after feeding a document during the Clear Deck Routine; whereby, in use, the inserter can provide a complete document collation during start up and shut down.

In this specification, there is disclosed a method and associated apparatus for automatically providing a complete document collation during start up and shut down of a multi-station document inserter, comprising the steps of initiating a Sequence Start Routine during start up of the inserter in which each feeder is activated sequentially beginning with the document feeder module most remote from the envelope feeder module and ending with the feeder module closest to the envelope feeder module, and initiating a Clear Deck Routine during shut down of the document inserter in which each feeder module is deactivated sequentially beginning with the document feeder module most remote from the envelope feeder module and ending with the feeder module closest to the envelope feeder module.

The invention will be better understood from the following non-limiting description of an example thereof given with reference to the accompanying drawings in which:-

FIGURE 1 is a schematic view of the arrangement of the feeder modules for a six station document inserter, excluding the envelope feeder module; and

FIGURE 2 is a flow chart of the supervisory program illustrating the Sequence Start and Clear Deck Routines used in a document inserter according to the present invention.

Referring to Figure 1, one arrangement for a multi-station document inserter is illustrated as 10. The details of such a multi-station document inserter, including the programs and circuitry therefor, are disclosed in U.S. Patent Application Serial No. 394,388, European Patent Application No. (Ref: E59/13) of which the inventors are Peter N. Piotroski and John M. Gomes, entitled, UNIVERSAL MULTI-STATION DOCUMENT INSERTER the disclosure of which is incorporated herein by reference.

As illustrated in Figure 1, the document inserter 10 includes a plurality of feeder modules 12, 14, 16, 18, 20, 22, and 24. Feeder module 12 is an envelope feeder and is positioned at one end of transport deck or

path 26. The other document feeder modules, 14-24, may comprise any type feeder modules, such as those disclosed in the aforementioned patent application. Further, the feeder module 24, which is the feeder module most remote from the envelope feeder module 12, is typically a control document feeder. Moreover, it is the first document feeder along the document transport path 26 of the inserter 10 since the documents are fed from left to right in the direction of the arrow in Figure 1. Further, as disclosed in the aforementioned copending patent application, the feeder modules 14-24 typically include scanners for communicating with the supervisory control circuit 28. Further, the supervisory control circuit 28 includes a plurality of PROMS programmed to operate the inserter in accordance with a desired customer configuration.

The operator actuates a switch (finger touch) on the central control display 30 to initiate the Sequence Start Routine. Upon activation of the switch for the Sequence Start Routine, the supervisory control circuit 28 initiates a Sequence Start Routine. In carrying out this routine, signals are sequentially transmitted from the supervisory control circuit 28 to each uniquely addressed feeder module and the distributed processor associated therewith over signal bus 32 beginning with the feeder module 24 most remote from the envelope feeder module 12. In response to a signal from the supervisory control circuit 28, the addressed distributed processor activates the appropriate module devices (motor, clutch, and brake) for one cycle to feed a document(s) onto the transport deck 26. The supervisory control circuit 28 then transmits a signal to the next uniquely addressed feeder module 22 and its associated distributed processor activates the appropriate module devices for one cycle to feed a document(s) onto the transport deck 26. This process is repeated sequentially for the remaining feeder modules 20-12 so that a completely collated stack of documents is transmitted to and inserted into the envelope at the envelope feeder module 12. Thereafter, all of the feeder modules feed documents onto the transport deck 26 every cycle.

The operator also actuates a switch (finger touch) on the central control display 30 to initiate the Clear Deck (Sequence Stop) Routine. Thereupon, the supervisory control circuit 28 initiates the Clear

Deck Routine. In carrying out the routine, signals are sequentially transmitted from the supervisory control circuit 28 to each uniquely addressed feeder module and the distributed processor associated therewith, beginning with the feeder module 24 most remote from the envelope feeder module 12. The supervisory control circuit 28 sends a signal to the distributed processor to deactivate the feeder module 24. After feeder module 24 is deactivated, the supervisory control circuit 28 sends a signal to the adjacent module 22 to deactivate it. This process is repeated sequentially for the remaining modules 20-12 so that a final completely collated stack of documents is transmitted to and inserted into an envelope at the envelope feeder module 12. That is, no documents will remain on the transport deck 26.

As apparent from the flow chart 34 in Figure 2, once the supervisory control circuit 28 initiates the Sequence Start Routine, the inserter 10 is sequenced on for one cycle with the first feeder module 24, (the one most remote from the envelope feeder module 12) feeding a document(s) onto the transport deck 26. The adjacent feeder module 22 is then sequenced on for one cycle to feed a document(s) onto the transport deck 26. This process is continued sequentially with the remaining feeder modules 20-14, to provide a complete collation of documents for insertion into an envelope feeder module 12. Thereafter, the inserter 10 will undergo continuous operation by feeding the proper documents from each feeder module, 24-14, and the envelope from envelope feeder 12, during each cycle, as described in the aforementioned copending patent application.

Once the supervisory control circuit 28 initiates the Clear Deck Routine, the inserter 10 is sequenced off with the first feeder module 24 (the one most remote from the envelope feeder module 12) being deactivated after it has fed a document(s) onto the transport deck 26. The adjacent feeder module 22 is then sequenced off after it has fed a document(s) onto the transport deck 26. This process is continued sequentially with the remaining feeder modules 20-14 to provide a final completely collated stack of documents for insertion into an envelope at the envelope feeder module 12 without any documents remaining on the

transport deck 26.

It should be understood by those skilled in the art that various modifications may be made in the disclosed and illustrated embodiment without departing from the present invention.

CLAIMS

1. A multi-station document inserter having a plurality of document feeder modules and an envelope feeder module, the inserter comprising:

switch means for initiating Sequence Start and Clear Deck Routines;

supervisory control means for transmitting control signals to each of the document feeder modules of the document inserter in sequence beginning with the document feeder station most remote from the envelope feeder module upon activation of said switch means; and

distributed processing means associated with each of said document feeder modules, said distributing processing means receiving the control signals from said supervisory control means and activating its associated feeder module to feed a document during the Sequence Start Routine, said distributed processing means receiving control signals from said supervisory control means and deactivating its associated feeder module after feeding a document during the Clear Deck Routine; whereby, in use, the inserter can provide a complete document collation during start up and shut down.

2. An inserter according to Claim 1, wherein said supervisory control means is programmed with the Sequence Start and Clear Deck Routines.

3. An inserter according to Claim 1 or 2, wherein said switch means is included in a central control display.

4. An inserter according to Claim 1, 2 or 3, wherein said switch means includes a first switch for initiating the Sequence Start Routine and a second switch for initiating the Clear Deck Routine.

5. A method for automatically providing a complete document collation during start up and shut down in a multi-station document inserter having a plurality of document feeder modules and an envelope feeder module, comprising the steps of;

initiating a Sequence Start Routine during start up of the document inserter in which each feeder module is activated sequentially beginning with the document feeder module most remote from the envelope feeder module and ending with the document feeder module closest to the envelope feeder module; and

initiating a Clear Deck Routine during shut down of the document inserter in which each feeder module is deactivated sequentially beginning with the document feeder module most remote from the envelope feeder module and ending with the document feeder module closest to the envelope feeder module.

6. A method according to Claim 5, including the step of actuating a switch to initiate the Sequence Start Routine.

7. A method according to Claim 5, including the step of actuating a switch to inititate the Clear Deck Routine.

8. A method according to Claim 6, including the step of transmitting a signal to the first feeder module in the sequence upon actuation of the switch initiating the Sequence Start Routine.

9. A method according to Claim 7, including the step of transmitting a signal to the first feeder module in the sequence upon actuation of the switch initiating the Clear Deck Routine.

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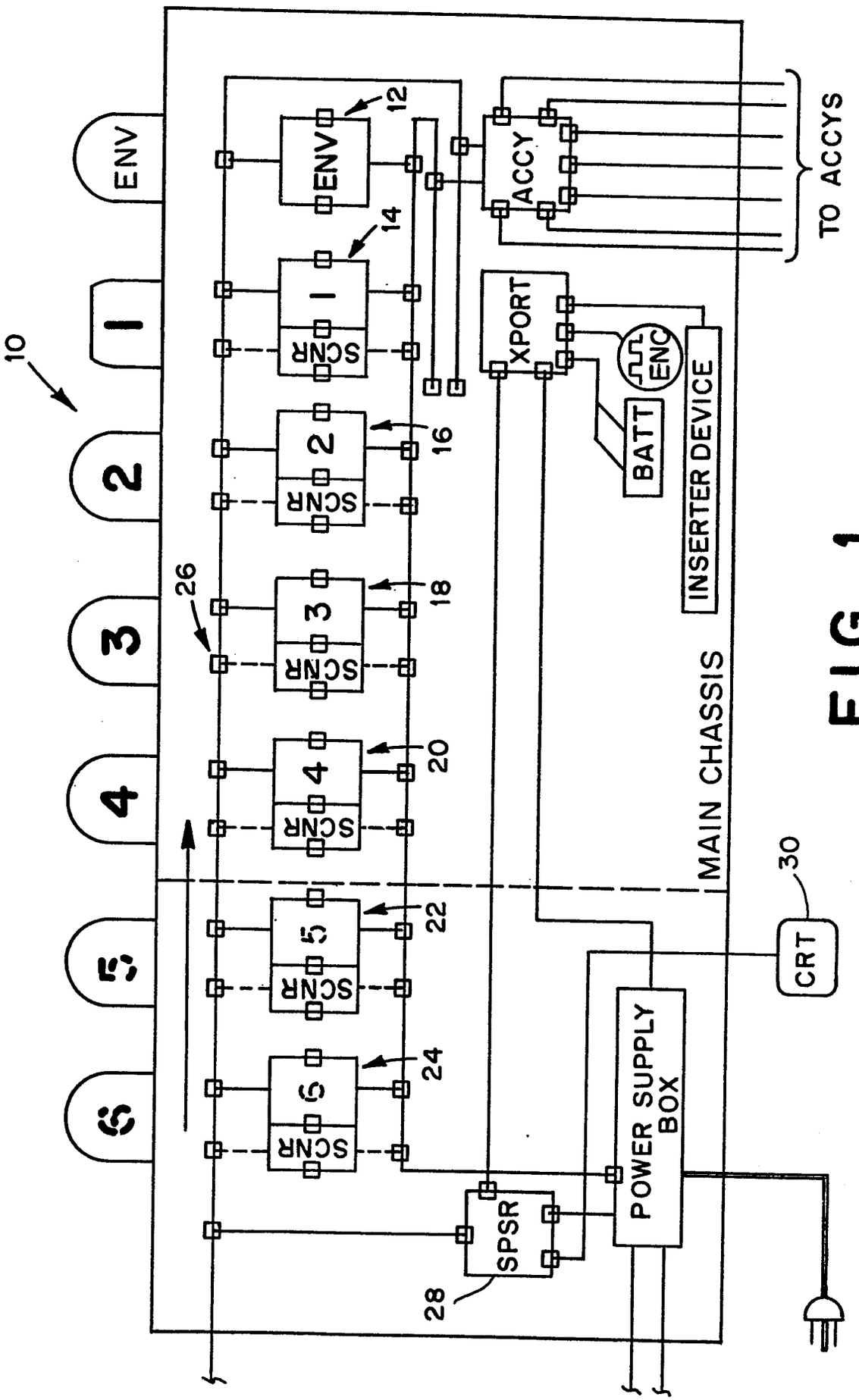

FIG. 1

Fig. 2A.

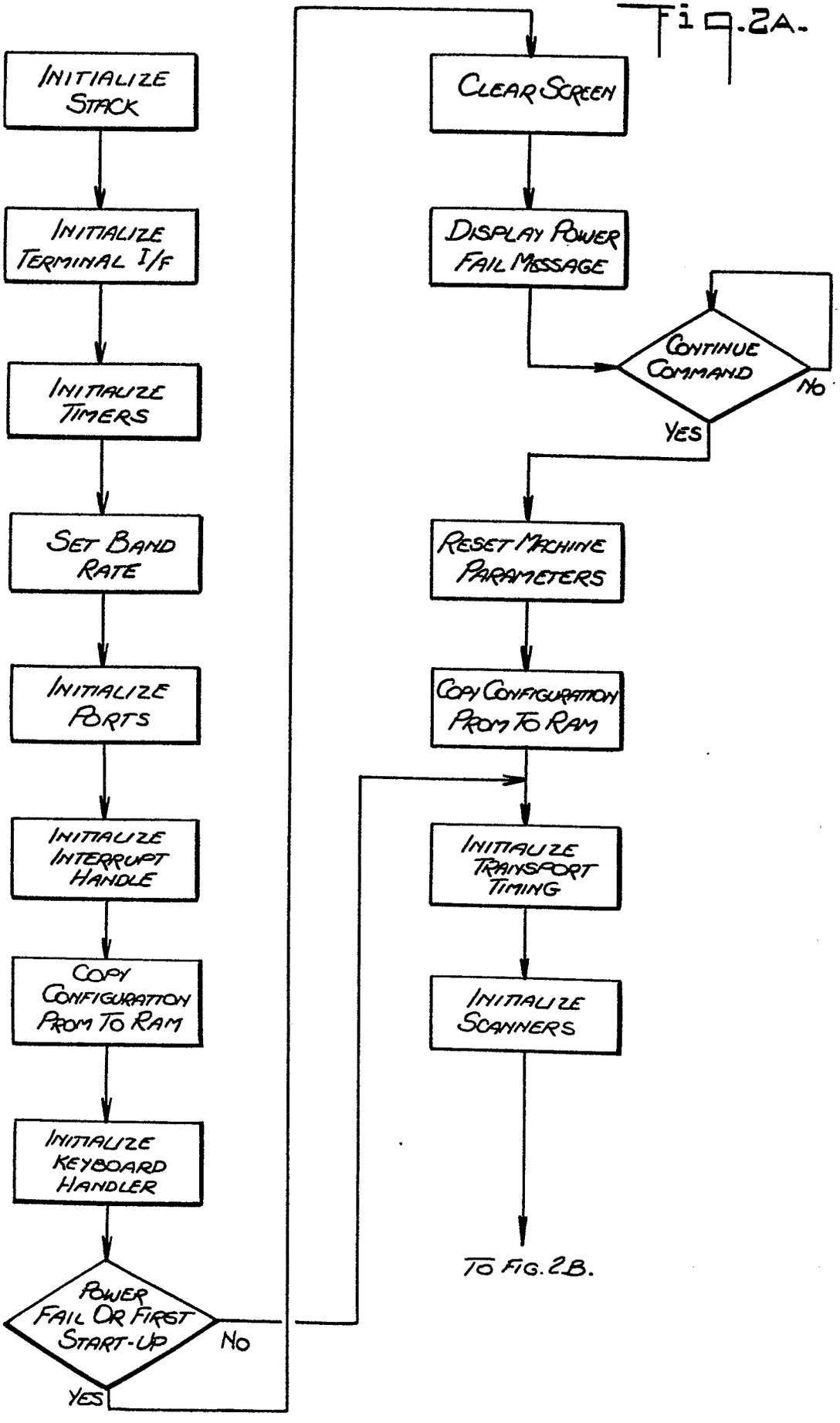
INITIALIZE STACK
INITIALIZE TERMINAL I/F
INITIALIZE TIMERS
SET BAND RATE
INITIALIZE PORTS
INITIALIZE INTERRUPT HANDLE
COPY CONFIGURATION PROM TO RAM
INITIALIZE KEYBOARD HANDLER
POWER FAIL OR FIRST START-UP
No
YES
CLEAR SCREEN
DISPLAY POWER FAIL MESSAGE
CONTINUE COMMAND
No
YES
RESET MACHINE PARAMETERS
COPY CONFIGURATION PROM TO RAM
INITIALIZE TRANSPORT TIMING
INITIALIZE SCANNERS
TO FIG. 2B.

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Fig. 2B.

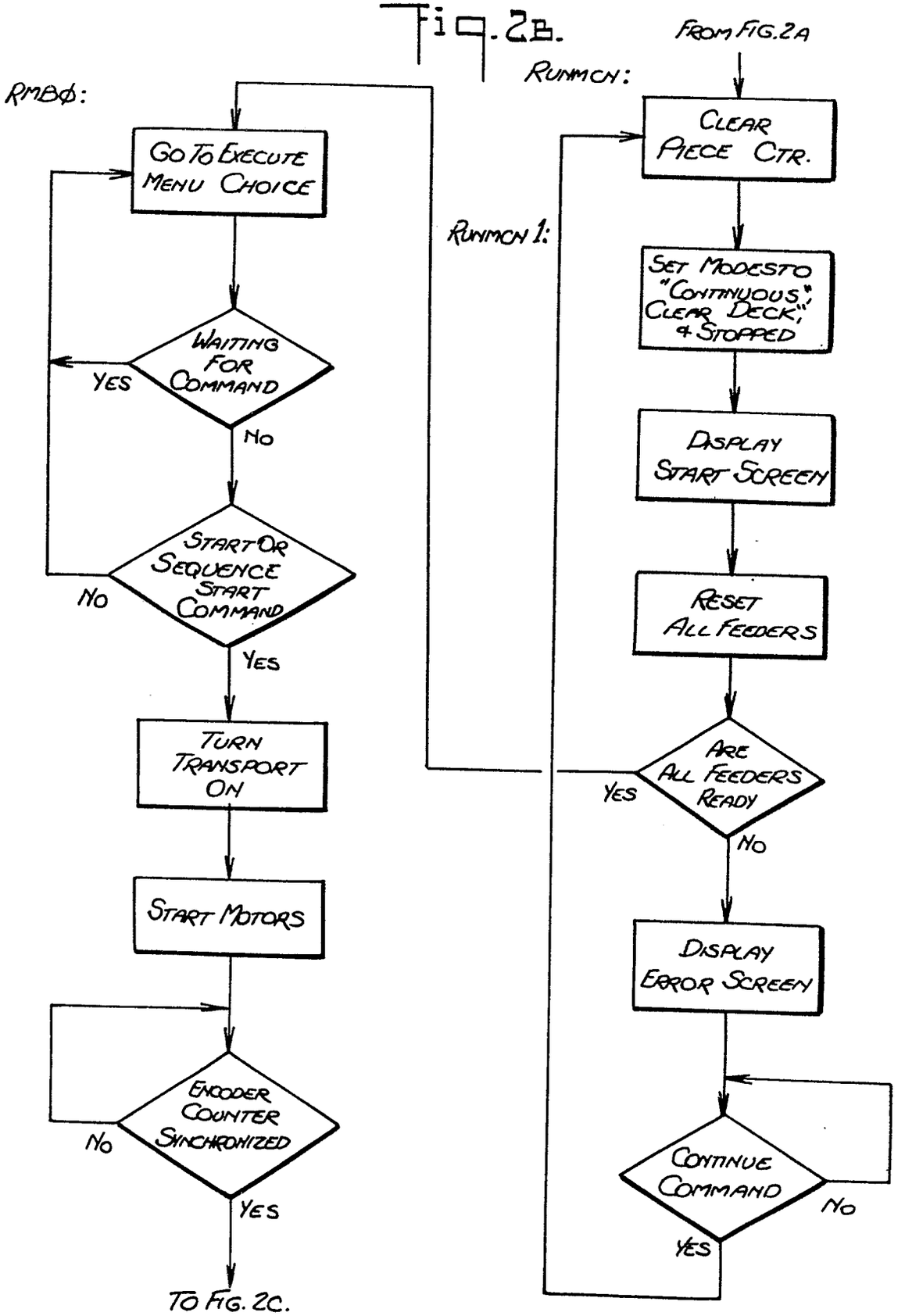

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Fig. 2C.

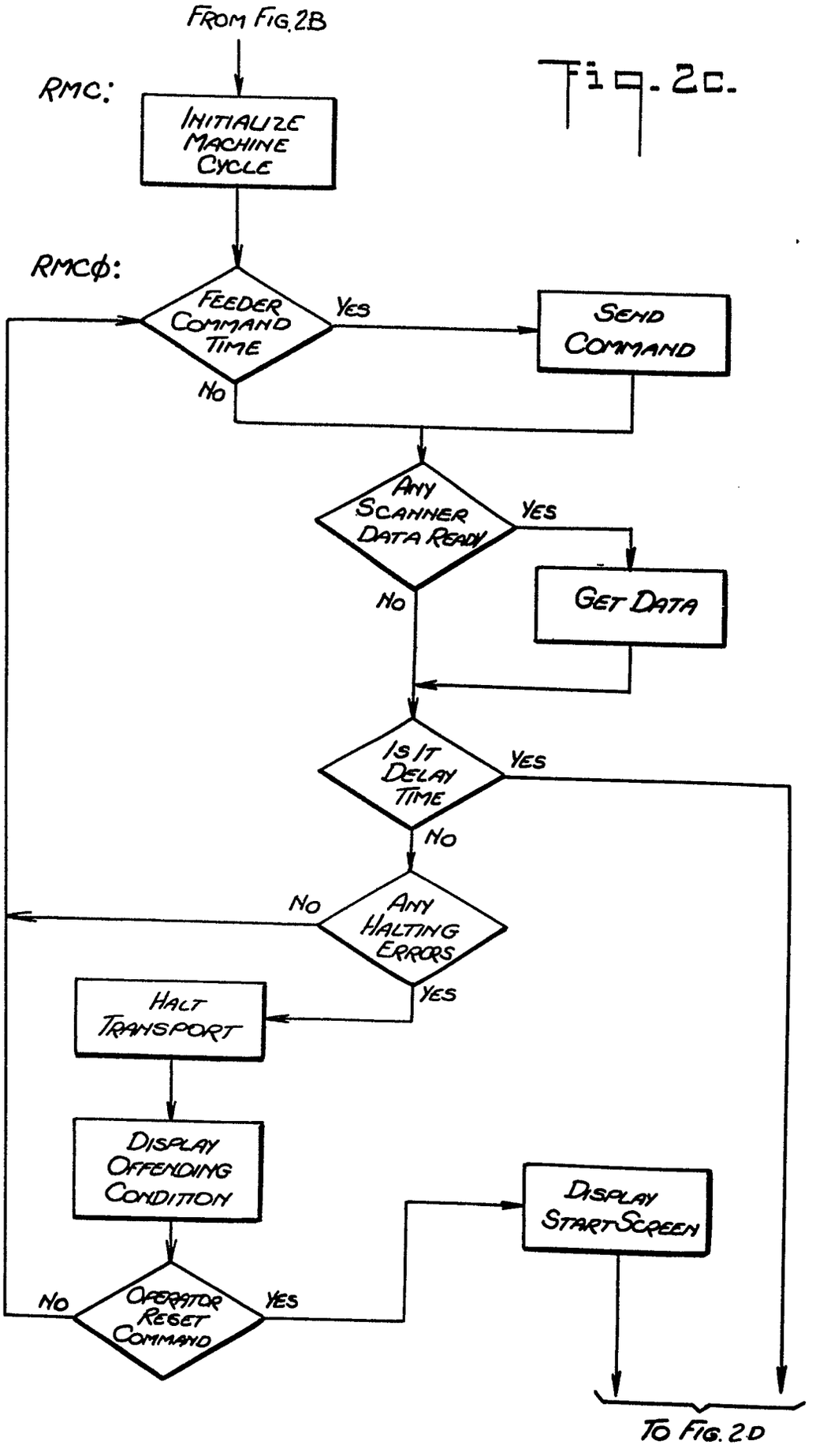

Fig. 2D.

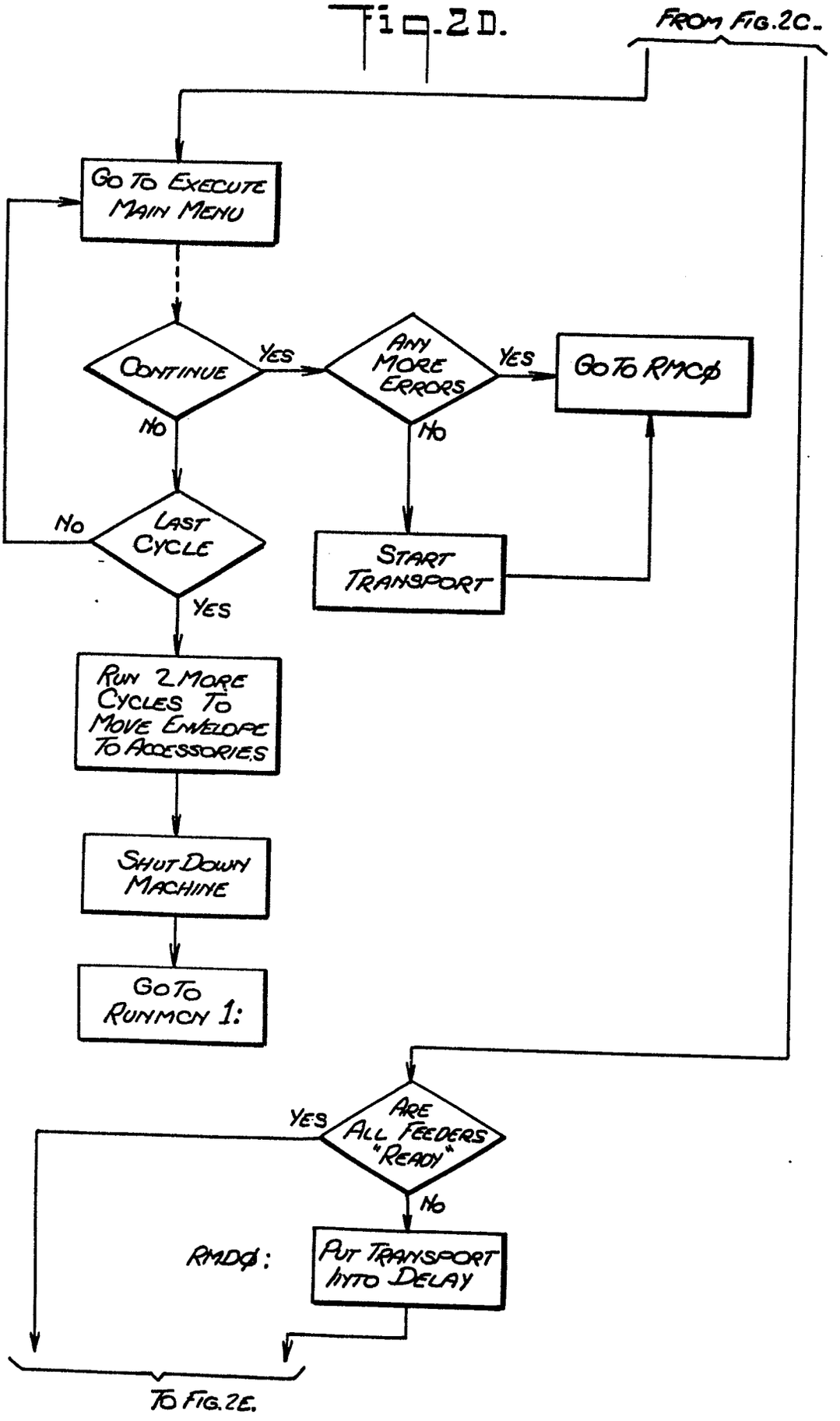
FROM FIG. 2C.
GO TO EXECUTE MAIN MENU
CONTINUE
YES
ANY MORE ERRORS
YES
GO TO RMCØ
NO
NO
NO
LAST CYCLE
START TRANSPORT
YES
RUN 2 MORE CYCLES TO MOVE ENVELOPE TO ACCESSORIES
SHUT DOWN MACHINE
GO TO RUNMCN 1:
YES
ARE ALL FEEDERS "READY"
NO
RMDØ:
PUT TRANSPORT INTO DELAY
TO FIG. 2E.

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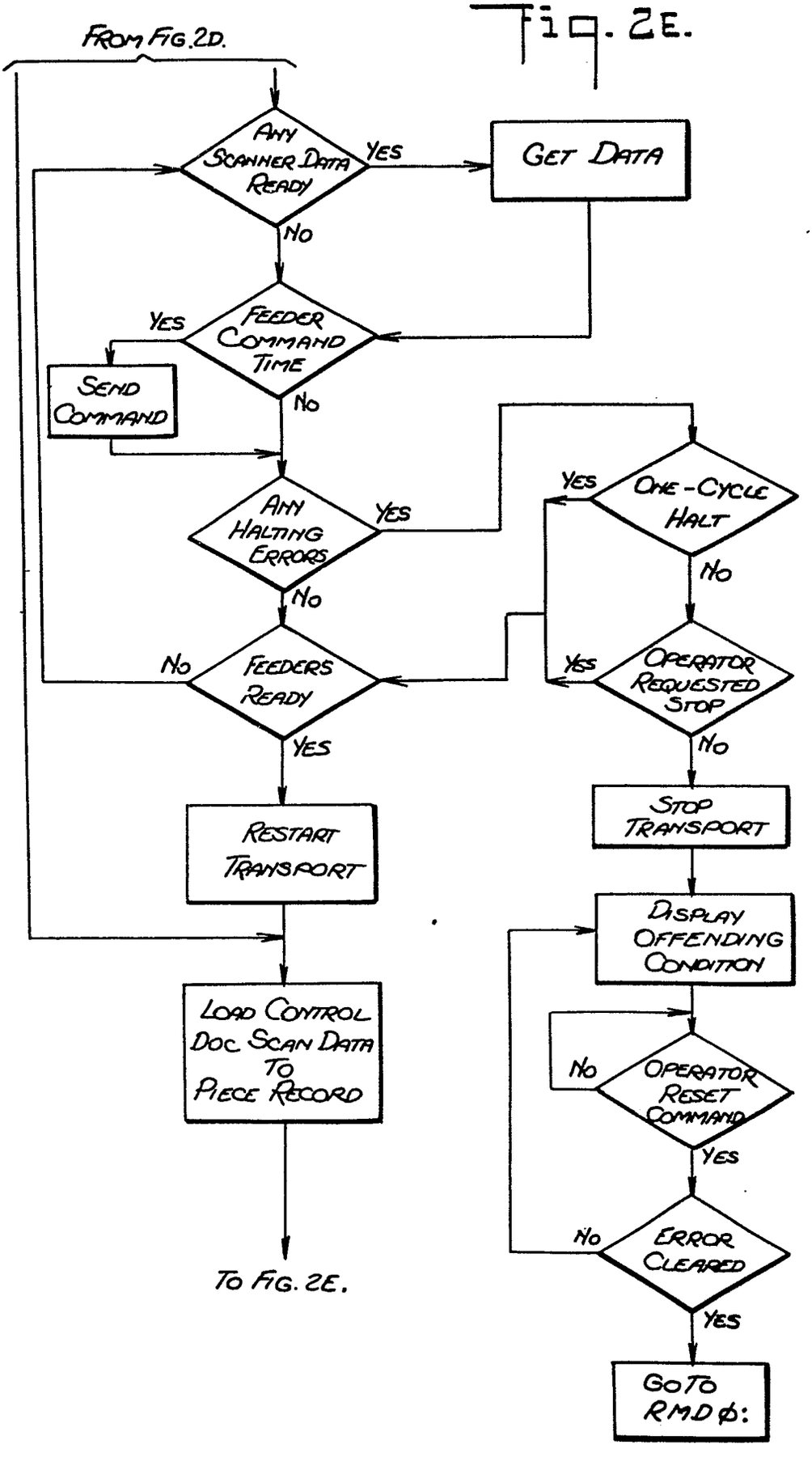
Fig. 2E.



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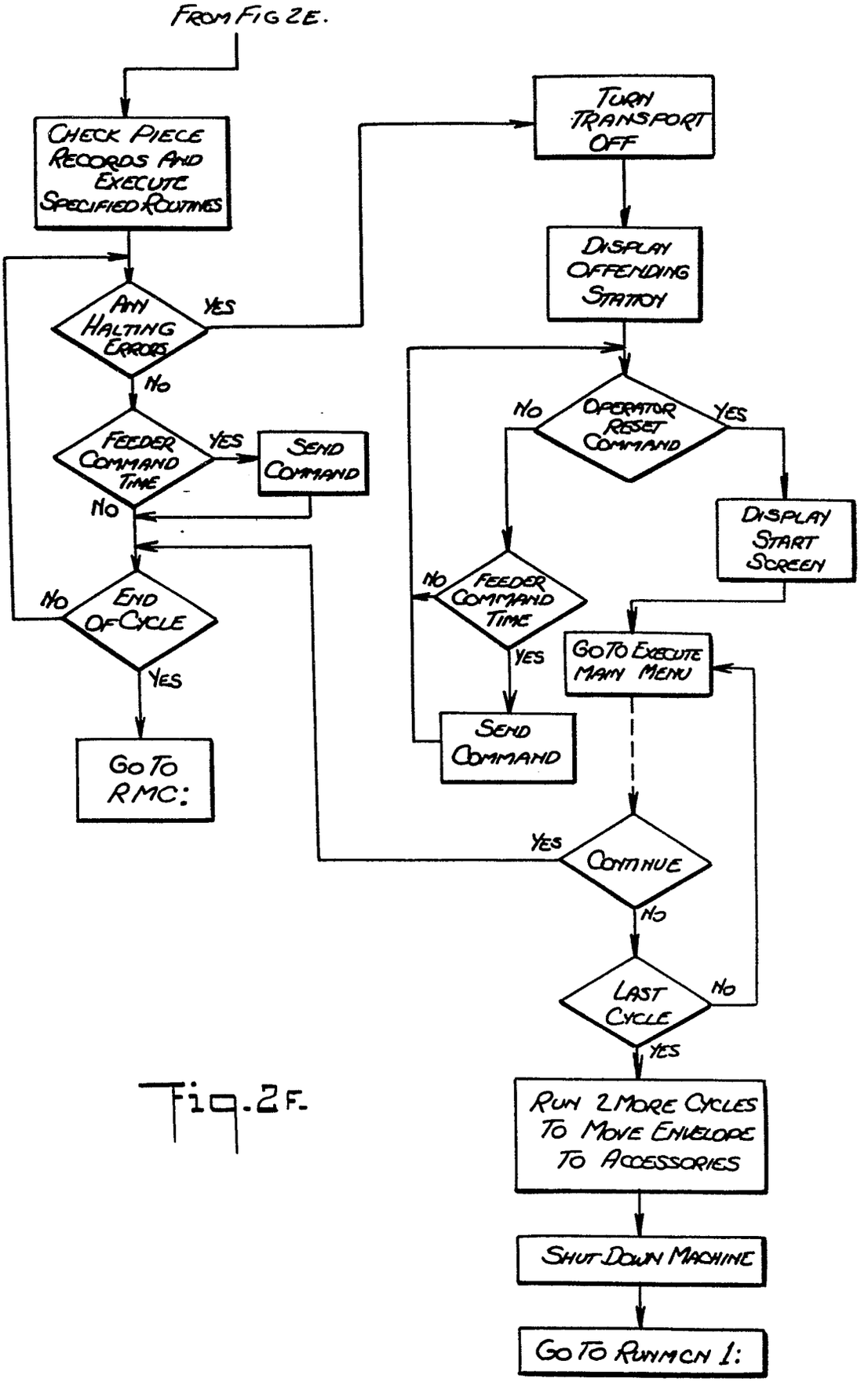
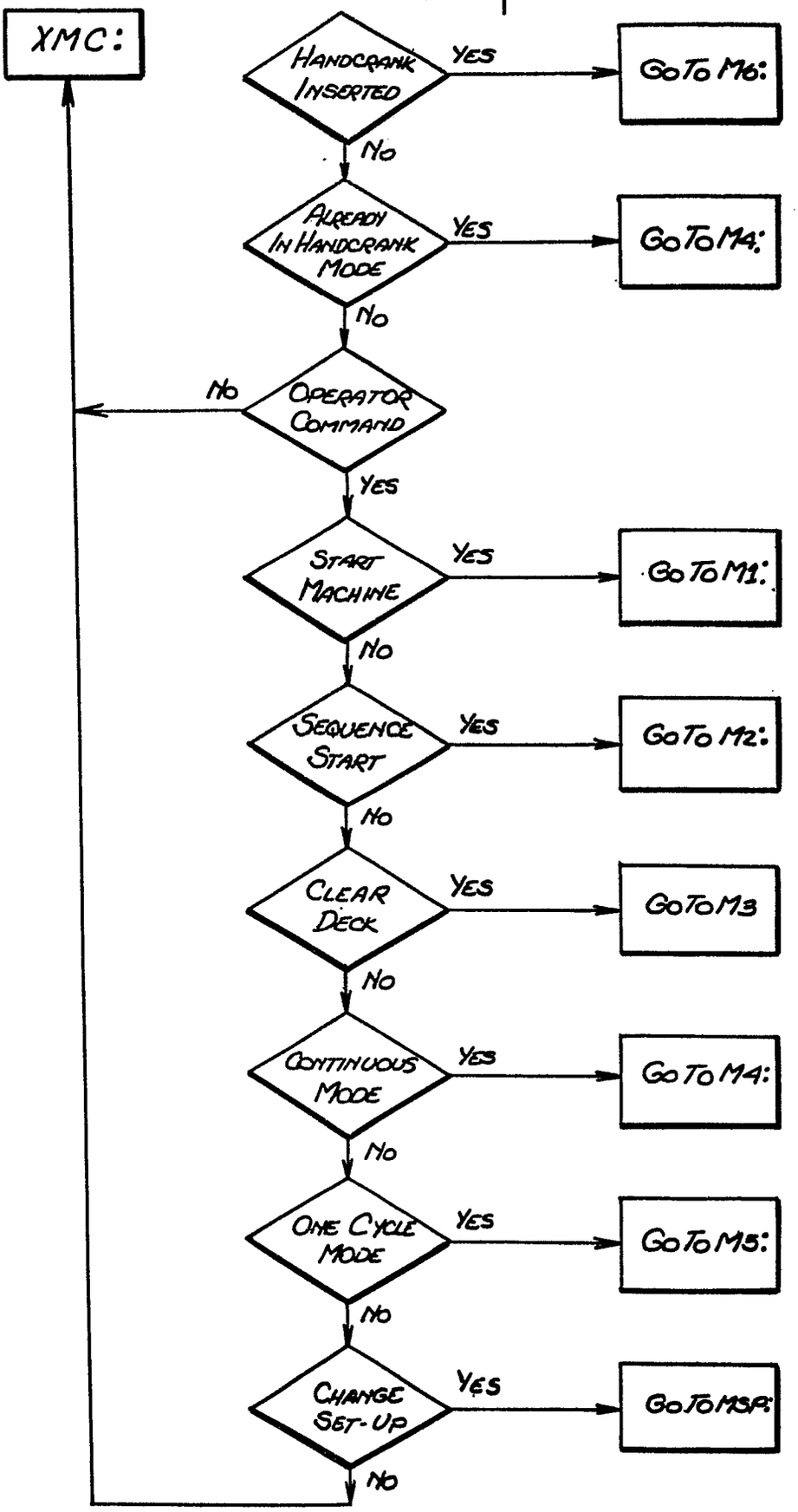


Fig. 2F.

Fig.2G.


XMC:
HANDCRANK INSERTED
YES
GO TO M6:
No
ALREADY IN HANDCRANK MODE
YES
GO TO M4:
No
OPERATOR COMMAND
No
YES
START MACHINE
YES
GO TO M1:
No
SEQUENCE START
YES
GO TO M2:
No
CLEAR DECK
YES
GO TO M3
No
CONTINUOUS MODE
YES
GO TO M4:
No
ONE CYCLE MODE
YES
GO TO M5:
No
CHANGE SET-UP
YES
GO TO M5A:
No

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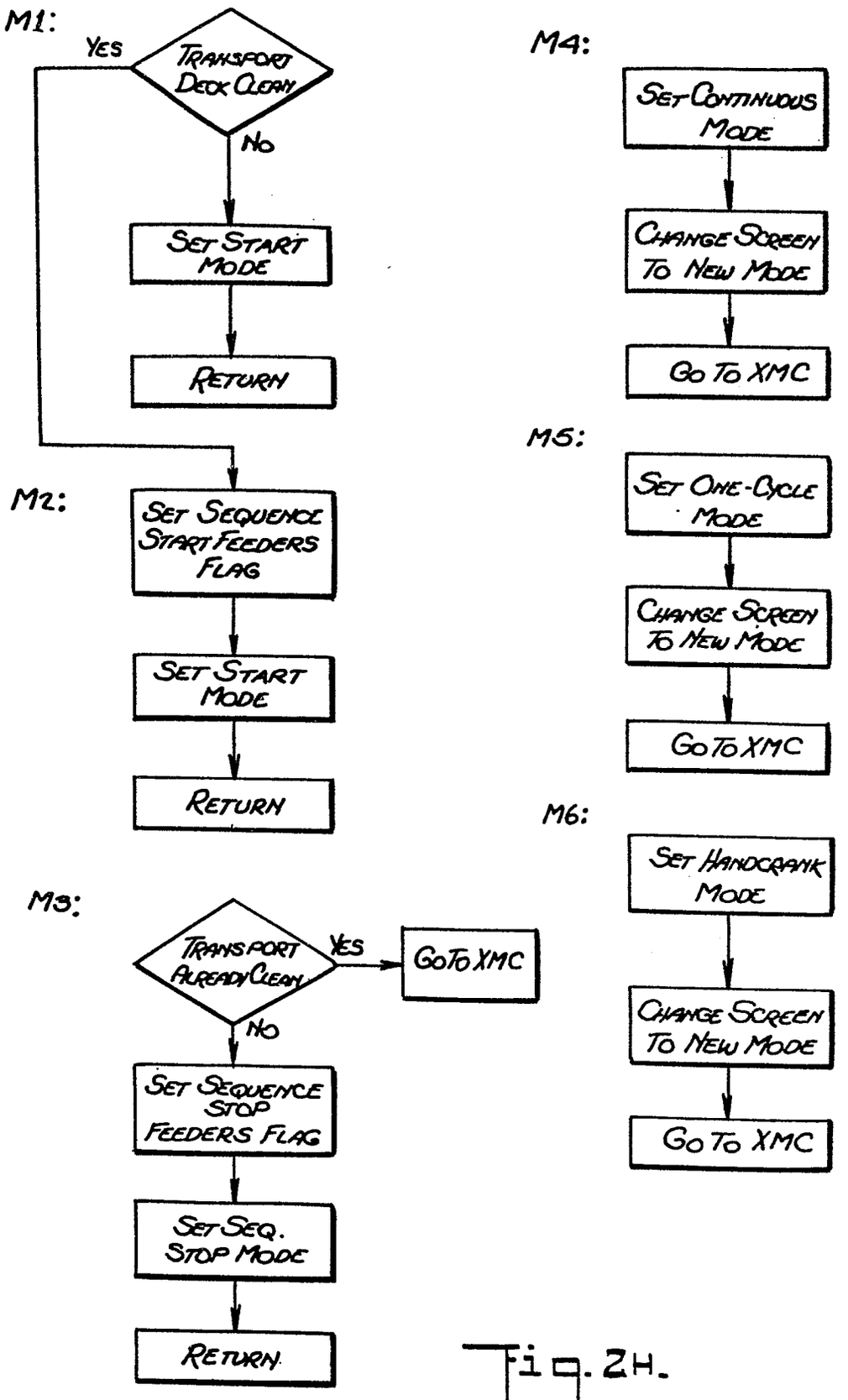


Fig. 2H.

Fig. 2J.

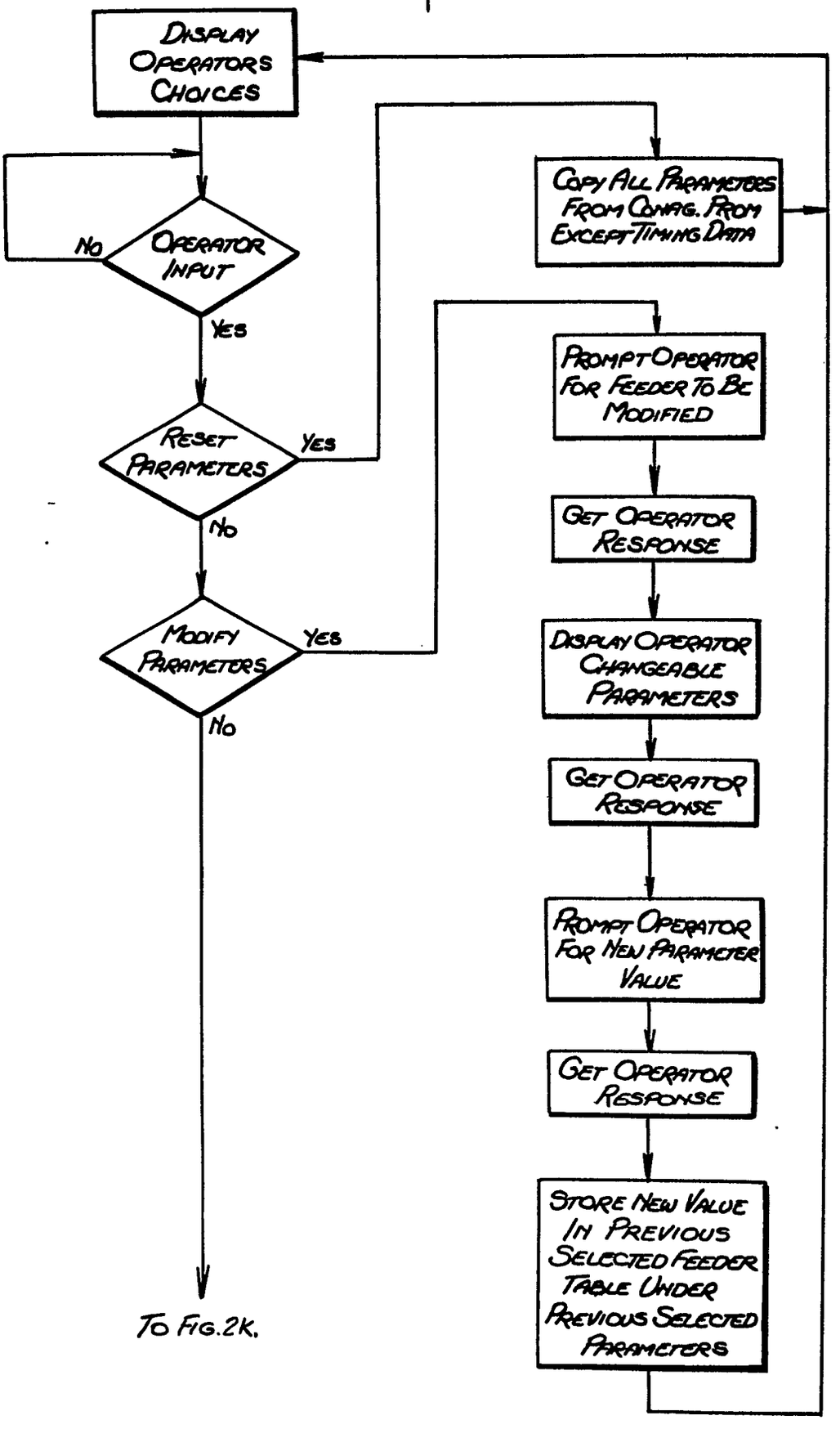

DISPLAY OPERATORS CHOICES
OPERATOR INPUT
No
Yes
RESET PARAMETERS
Yes
No
MODIFY PARAMETERS
Yes
No
COPY ALL PARAMETERS FROM CONFIG. FROM EXCEPT TIMING DATA
PROMPT OPERATOR FOR FEEDER TO BE MODIFIED
GET OPERATOR RESPONSE
DISPLAY OPERATOR CHANGEABLE PARAMETERS
GET OPERATOR RESPONSE
PROMPT OPERATOR FOR NEW PARAMETER VALUE
GET OPERATOR RESPONSE
STORE NEW VALUE IN PREVIOUS SELECTED FEEDER TABLE UNDER PREVIOUS SELECTED PARAMETERS
TO FIG. 2K.

Fig.2K.

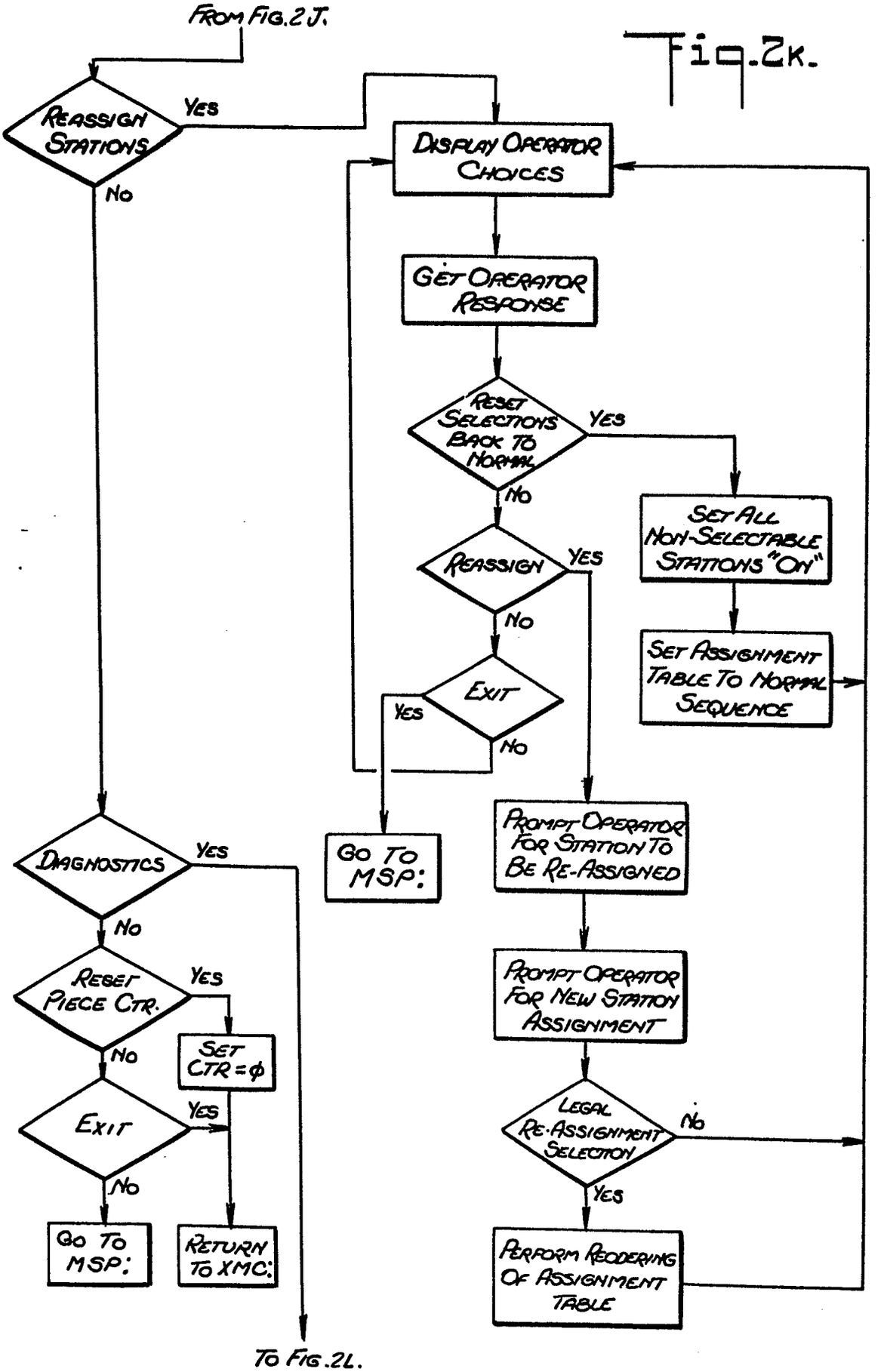
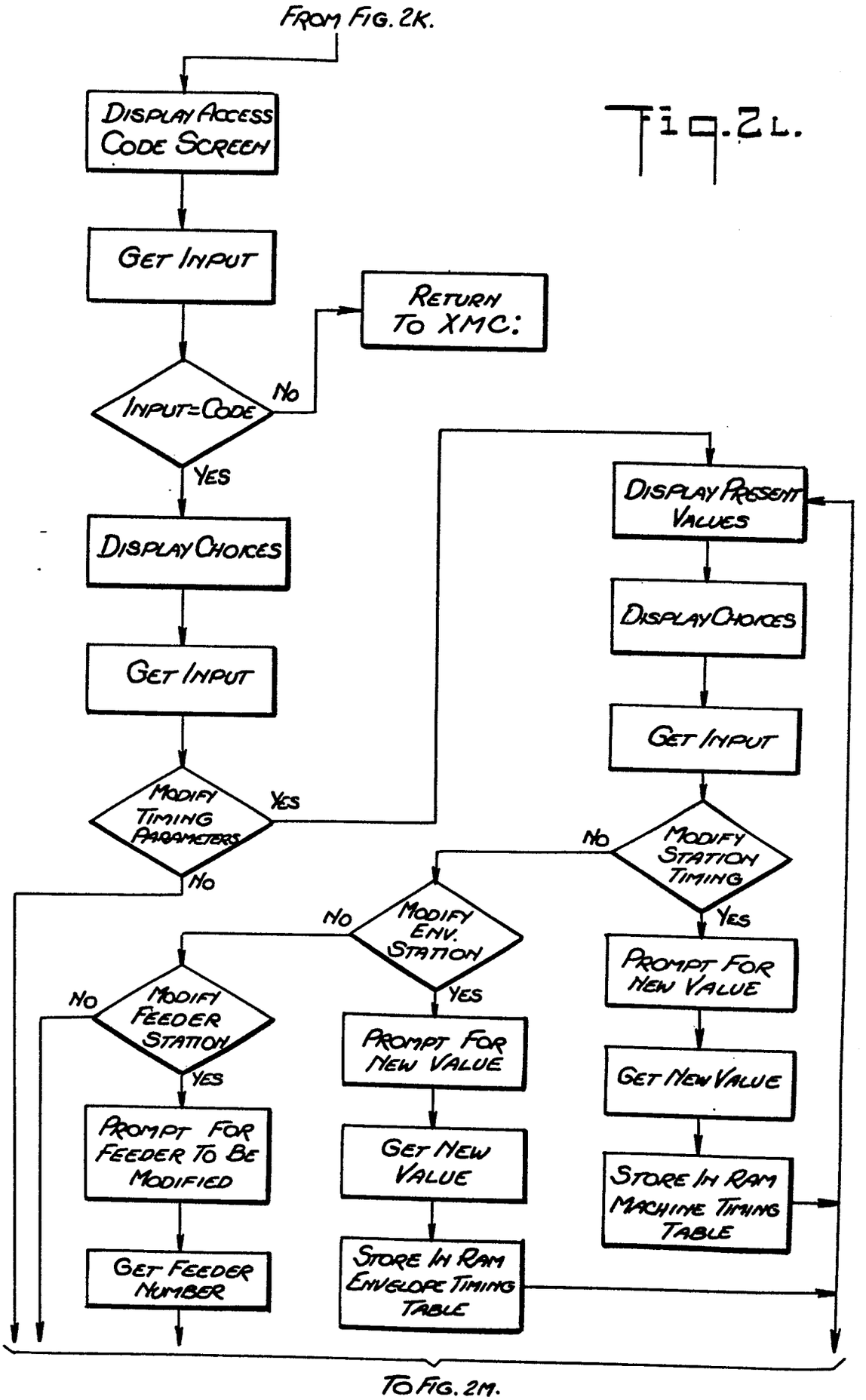

FROM FIG.2J.
REASSIGN STATIONS
YES
NO
DISPLAY OPERATOR CHOICES
GET OPERATOR RESPONSE
RESET SELECTIONS BACK TO NORMAL
YES
NO
SET ALL NON-SELECTABLE STATIONS "ON"
SET ASSIGNMENT TABLE TO NORMAL SEQUENCE
REASSIGN
YES
NO
EXIT
YES
NO
GO TO MSP:
PROMPT OPERATOR FOR STATION TO BE RE-ASSIGNED
PROMPT OPERATOR FOR NEW STATION ASSIGNMENT
LEGAL RE-ASSIGNMENT SELECTION
NO
YES
PERFORM REORDERING OF ASSIGNMENT TABLE
DIAGNOSTICS
YES
NO
RESET PIECE CTR.
YES
NO
SET CTR=ϕ
EXIT
YES
NO
GO TO MSP:
RETURN TO XMC:
TO FIG.2L.

Fig. 2L.


FROM FIG. 2K.
DISPLAY ACCESS CODE SCREEN
GET INPUT
INPUT=CODE
No
RETURN TO XMC:
Yes
DISPLAY CHOICES
GET INPUT
MODIFY TIMING PARAMETERS
Yes
No
DISPLAY PRESENT VALUES
DISPLAY CHOICES
GET INPUT
No
MODIFY STATION TIMING
Yes
PROMPT FOR NEW VALUE
GET NEW VALUE
STORE IN RAM MACHINE TIMING TABLE
No
MODIFY ENV. STATION
Yes
PROMPT FOR NEW VALUE
GET NEW VALUE
STORE IN RAM ENVELOPE TIMING TABLE
No
MODIFY FEEDER STATION
Yes
PROMPT FOR FEEDER TO BE MODIFIED
GET FEEDER NUMBER
TO FIG. 2M.

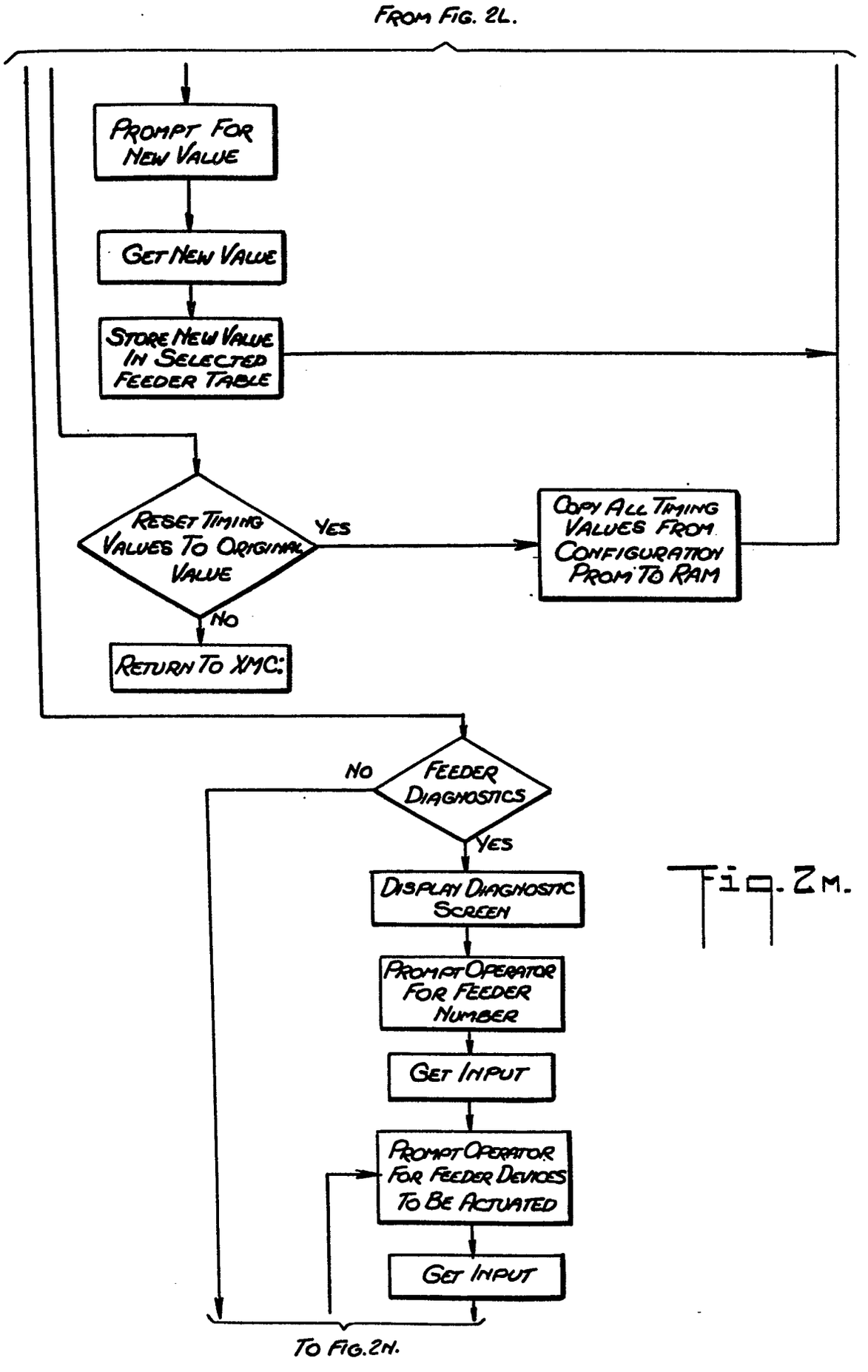

FROM FIG. 2L.
PROMPT FOR NEW VALUE
GET NEW VALUE
STORE NEW VALUE IN SELECTED FEEDER TABLE
RESET TIMING VALUES TO ORIGINAL VALUE
YES
COPY ALL TIMING VALUES FROM CONFIGURATION PROM TO RAM
NO
RETURN TO XMC:
NO
FEEDER DIAGNOSTICS
YES
DISPLAY DIAGNOSTIC SCREEN
PROMPT OPERATOR FOR FEEDER NUMBER
GET INPUT
PROMPT OPERATOR FOR FEEDER DEVICES TO BE ACTUATED
GET INPUT
TO FIG. 2N.

Fig. 2M.

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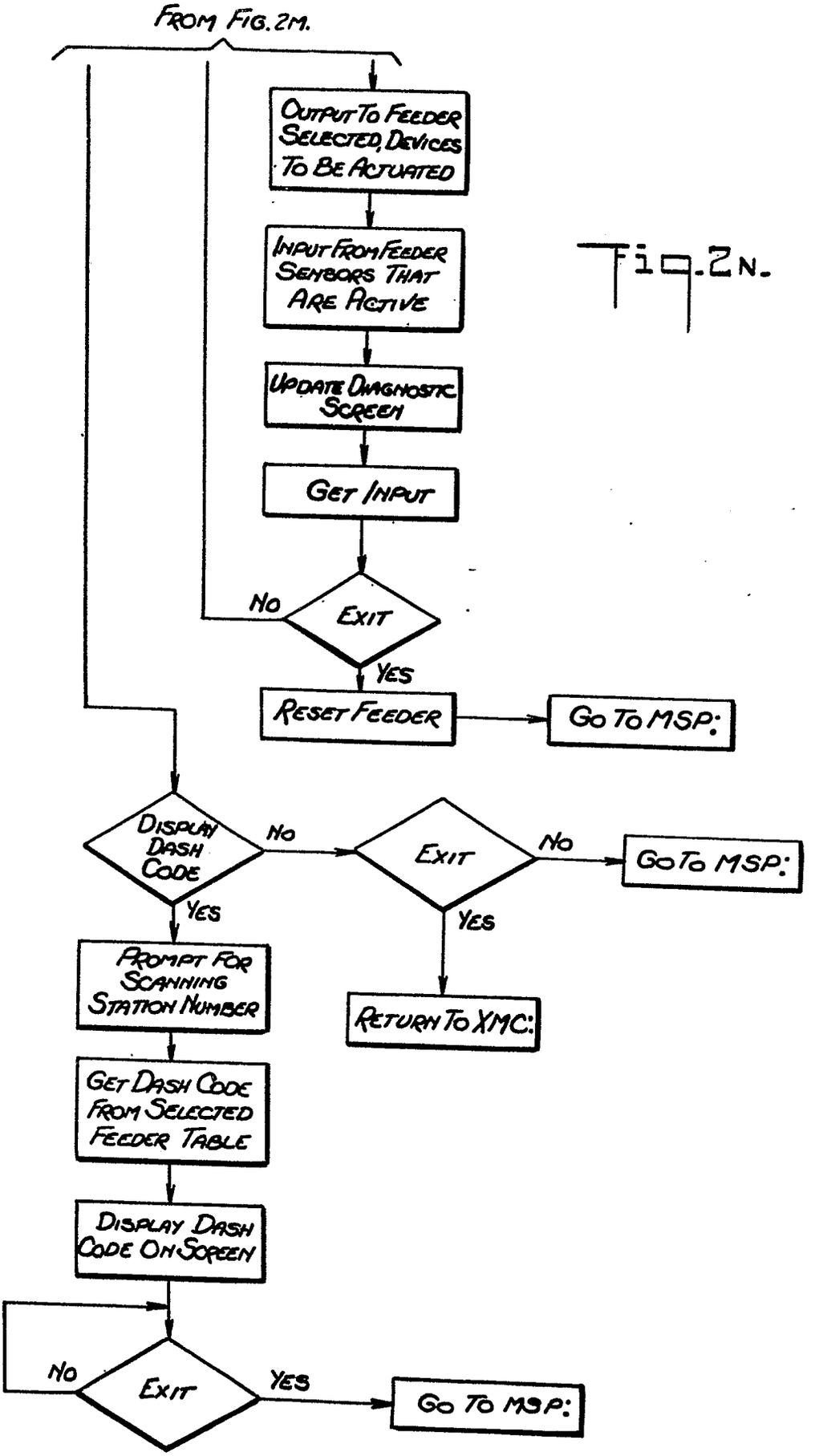

Fig. 2N.