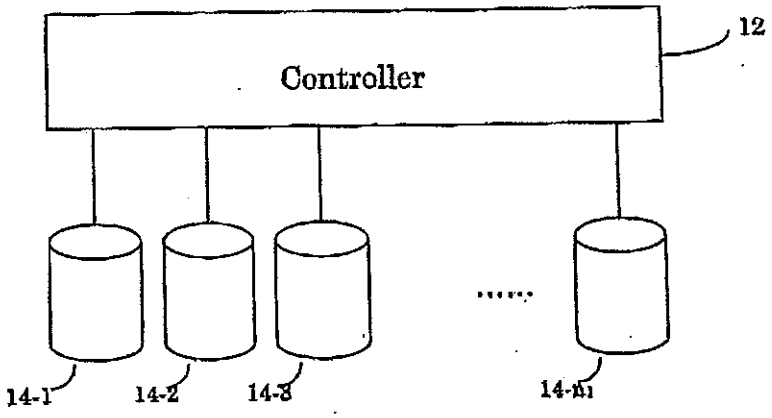

Controller
12
14-1
14-2
14-3
14-n1

Fig. 1(a)

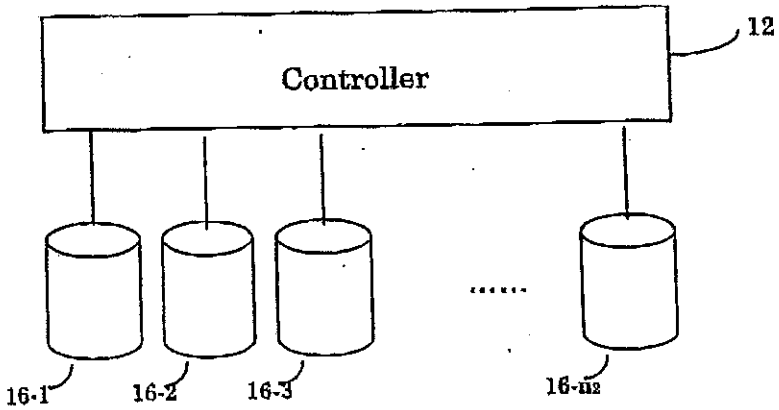
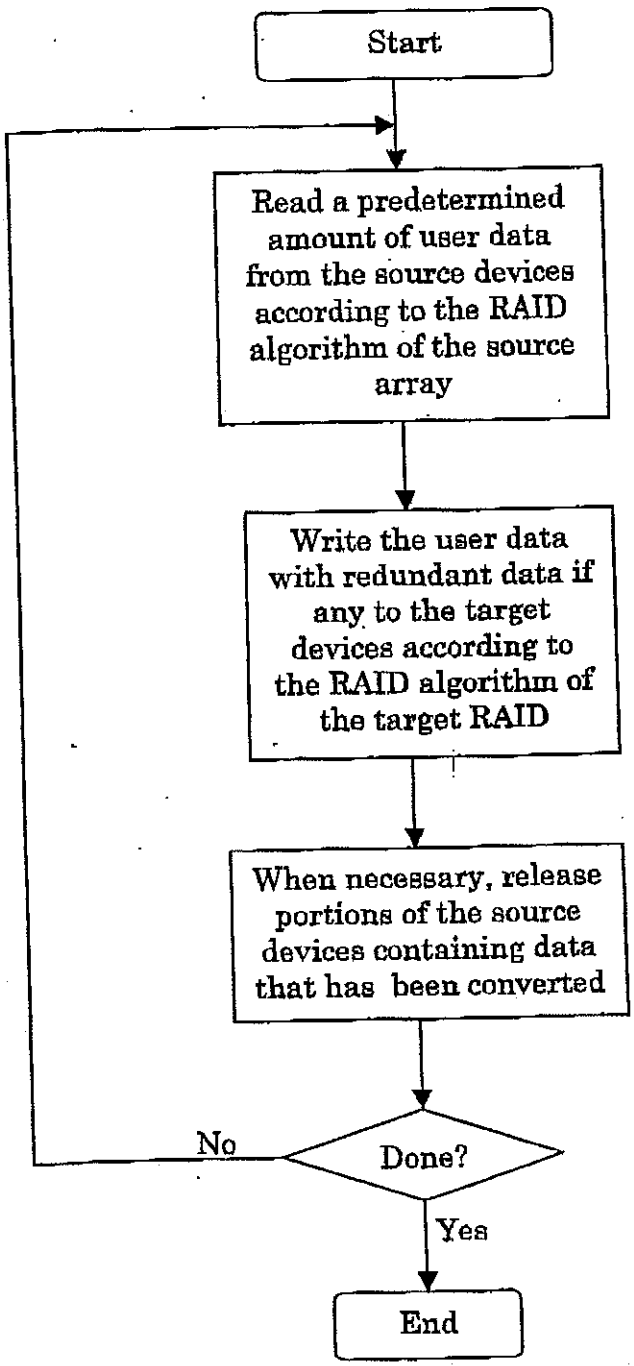

Controller
12
16-1
16-2
16-3
16-n2

Fig. 1(b)

Fig. 2


Start
Read a predetermined amount of user data from the source devices according to the RAID algorithm of the source array
Write the user data with redundant data if any to the target devices according to the RAID algorithm of the target RAID
When necessary, release portions of the source devices containing data that has been converted
Done?
No
Yes
End

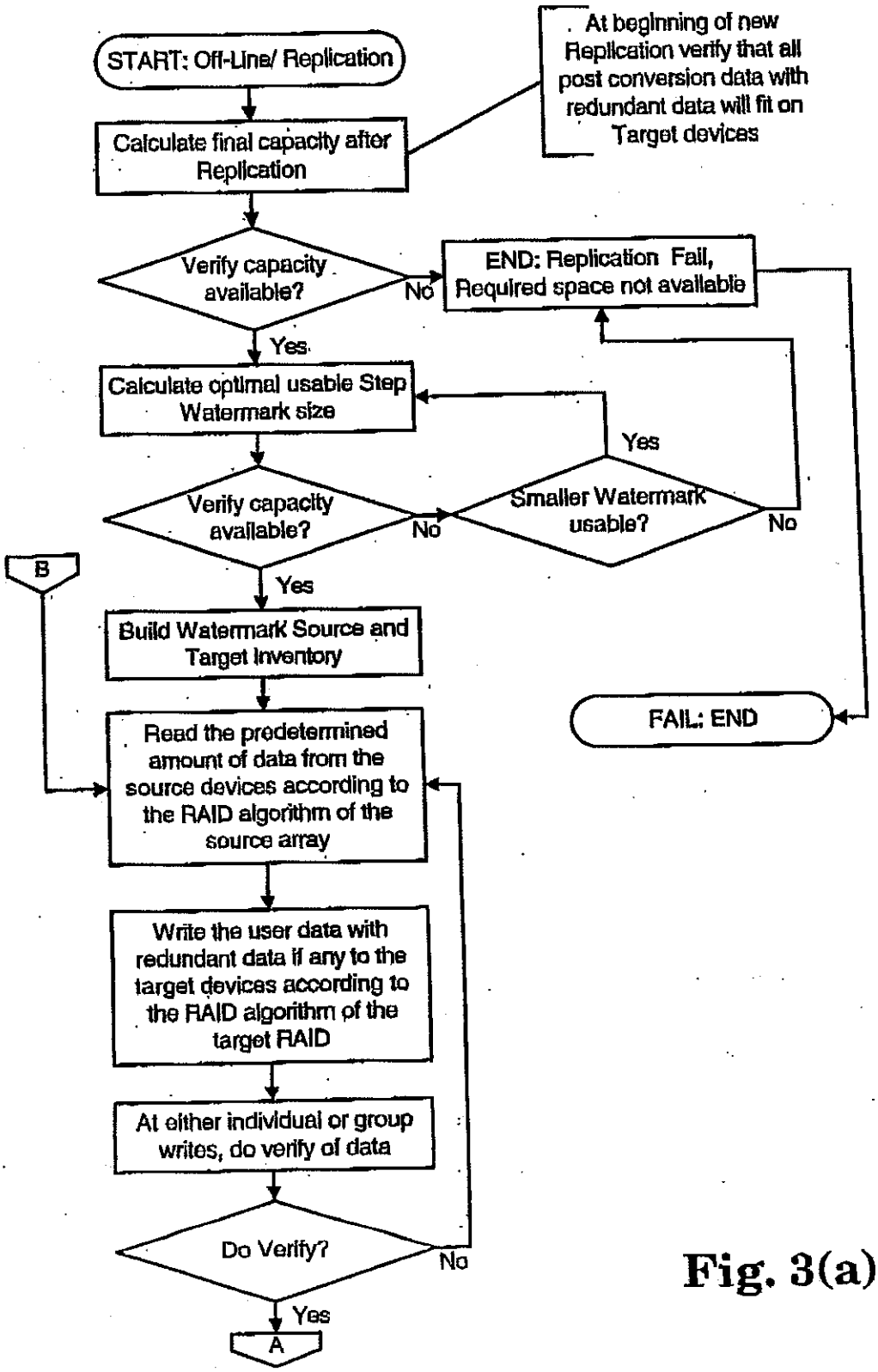

START: Off-Line/ Replication
Calculate final capacity after Replication
At beginning of new Replication verify that all post conversion data with redundant data will fit on Target devices
Verify capacity available?
No
END: Replication Fail, Required space not available
Yes
Calculate optimal usable Step Watermark size
Yes
Smaller Watermark usable?
No
Verify capacity available?
No
Yes
B
Build Watermark Source and Target Inventory
FAIL: END
Read the predetermined amount of data from the source devices according to the RAID algorithm of the source array
Write the user data with redundant data if any to the target devices according to the RAID algorithm of the target RAID
At either individual or group writes, do verify of data
Do Verify?
No
Yes
A

Fig. 3(a)

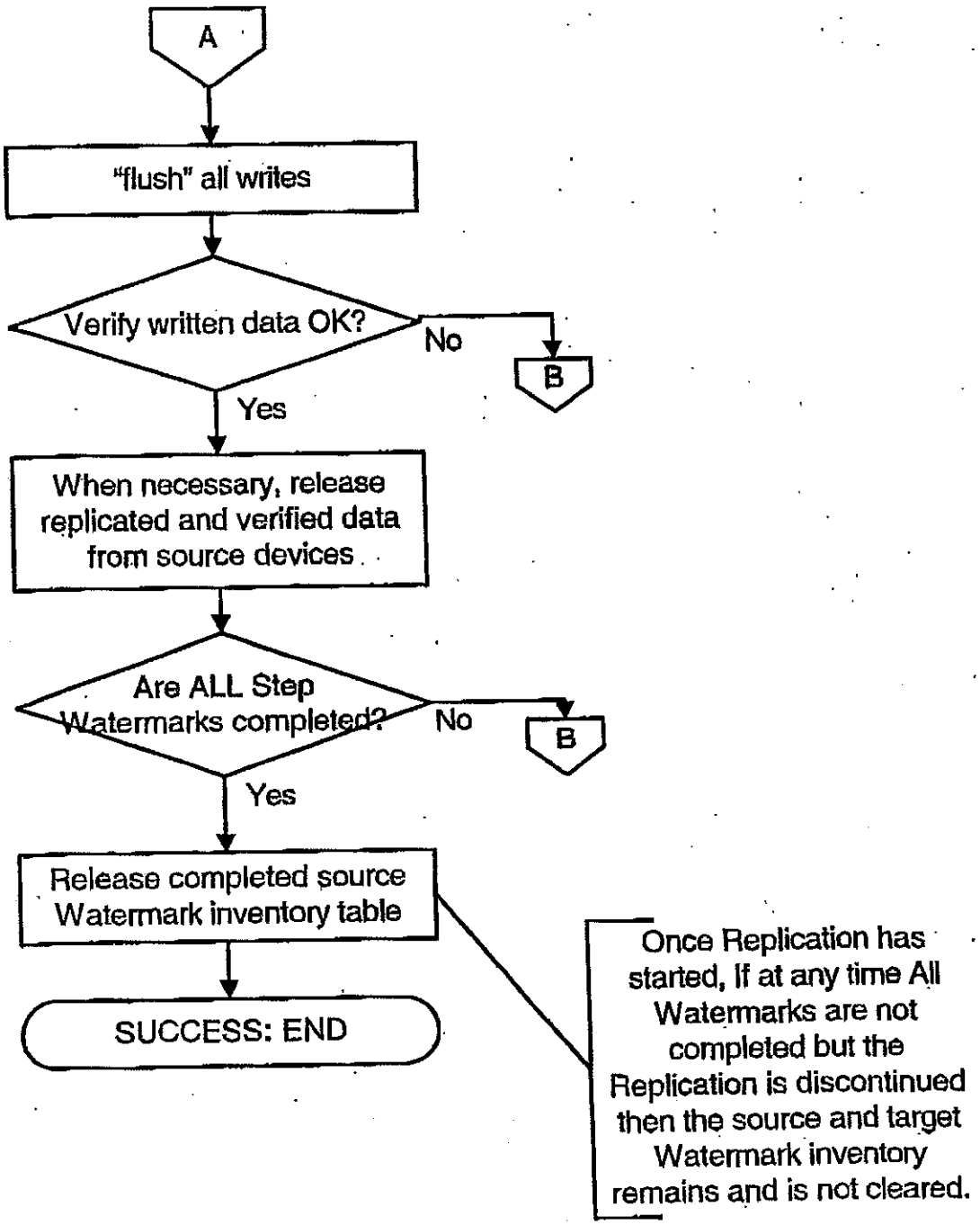

A
"flush" all writes
Verify written data OK?
No
B
Yes
When necessary, release replicated and verified data from source devices
Are ALL Step Watermarks completed?
No
B
Yes
Release completed source Watermark inventory table
SUCCESS: END
Once Replication has started, If at any time All Watermarks are not completed but the Replication is discontinued then the source and target Watermark inventory remains and is not cleared.

Fig. 3(b)

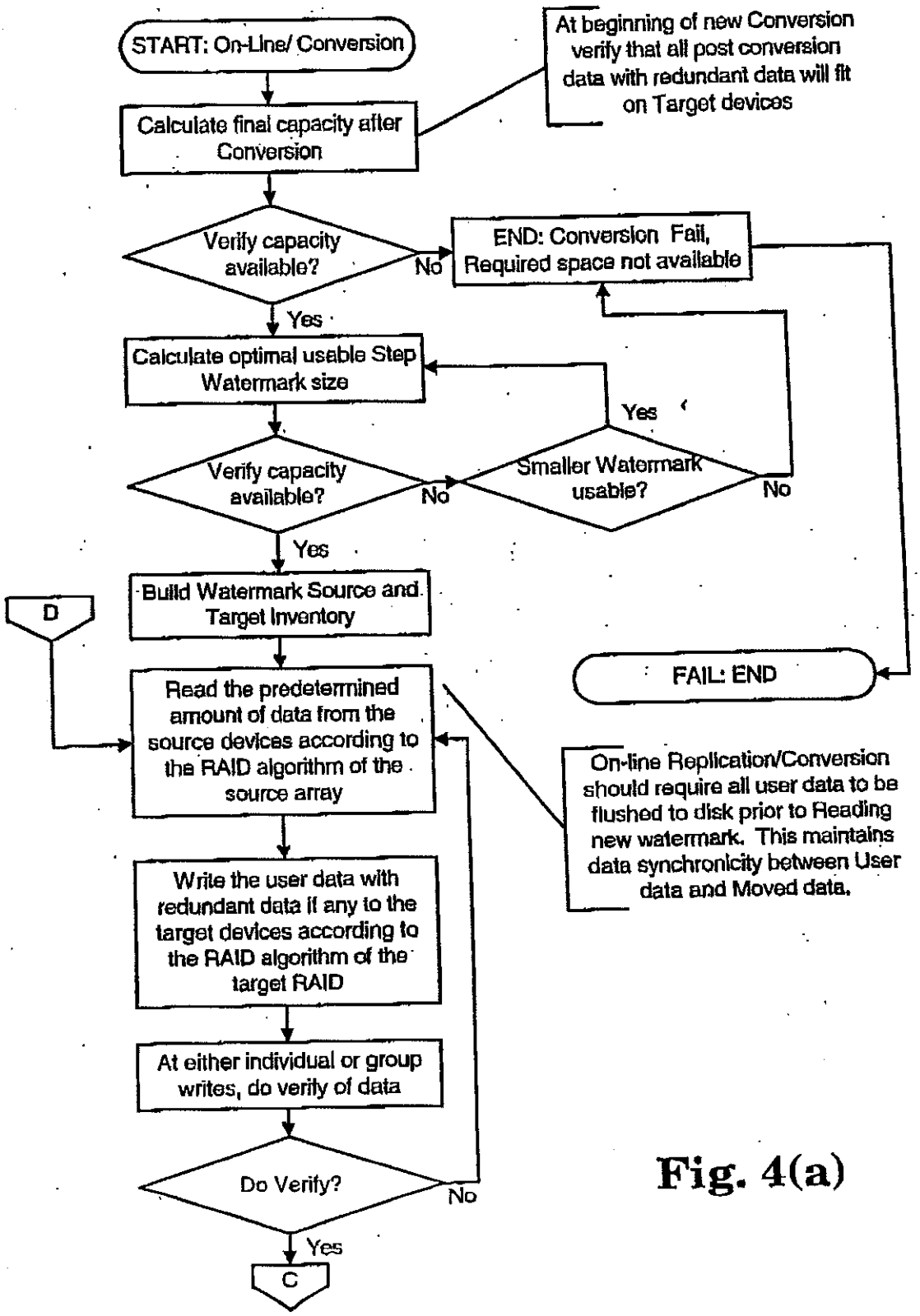

START: On-Line/ Conversion
Calculate final capacity after Conversion
At beginning of new Conversion verify that all post conversion data with redundant data will fit on Target devices
Verify capacity available?
No
END: Conversion Fail, Required space not available
Yes
Calculate optimal usable Step Watermark size
Yes
Verify capacity available?
No
Smaller Watermark usable?
No
Yes
Build Watermark Source and Target Inventory
D
FAIL: END
Read the predetermined amount of data from the source devices according to the RAID algorithm of the source array
On-line Replication/Conversion should require all user data to be flushed to disk prior to Reading new watermark. This maintains data synchronicity between User data and Moved data.
Write the user data with redundant data if any to the target devices according to the RAID algorithm of the target RAID
At either individual or group writes, do verify of data
Do Verify?
No
Yes
C

Fig. 4(a)

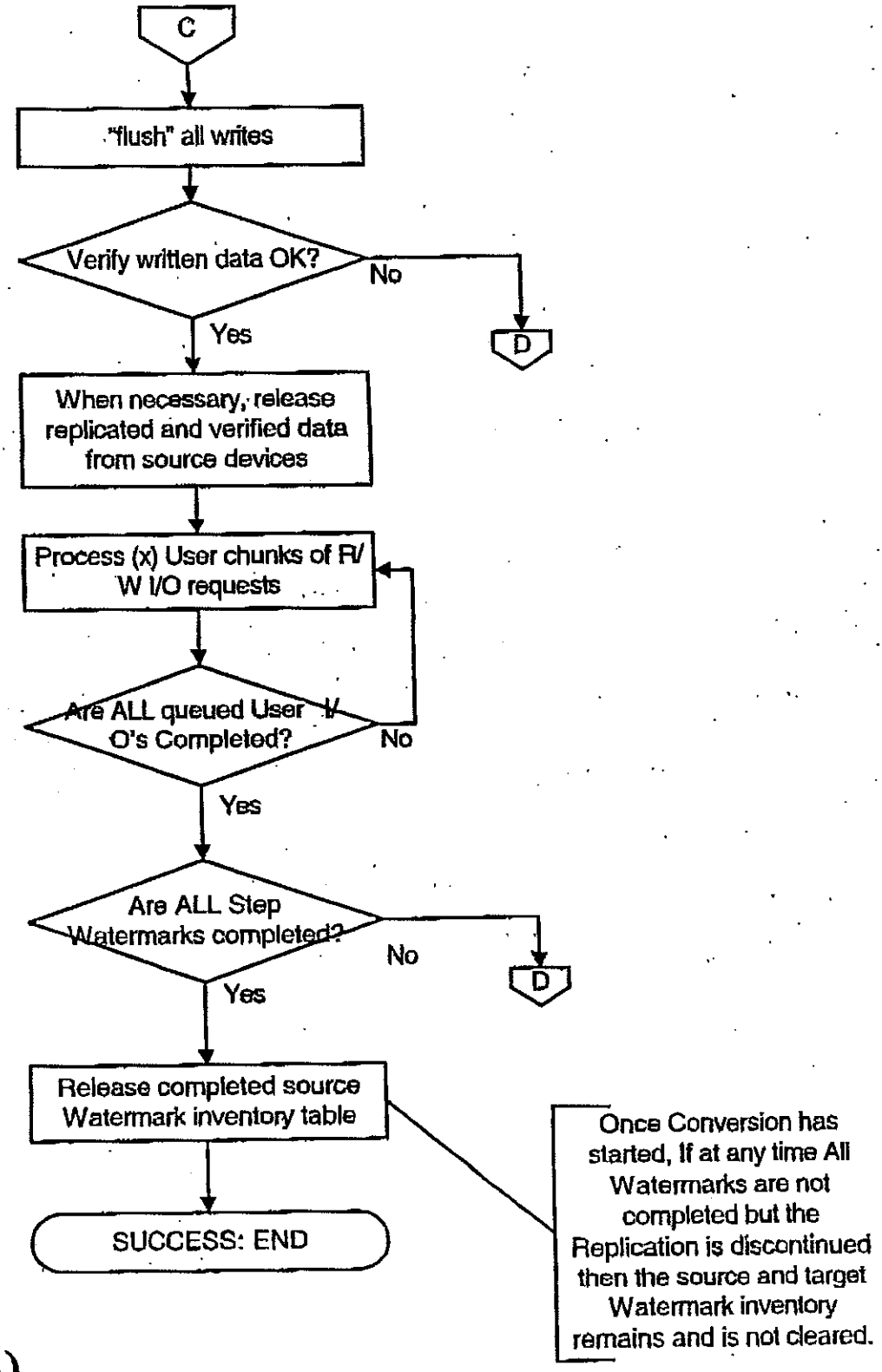
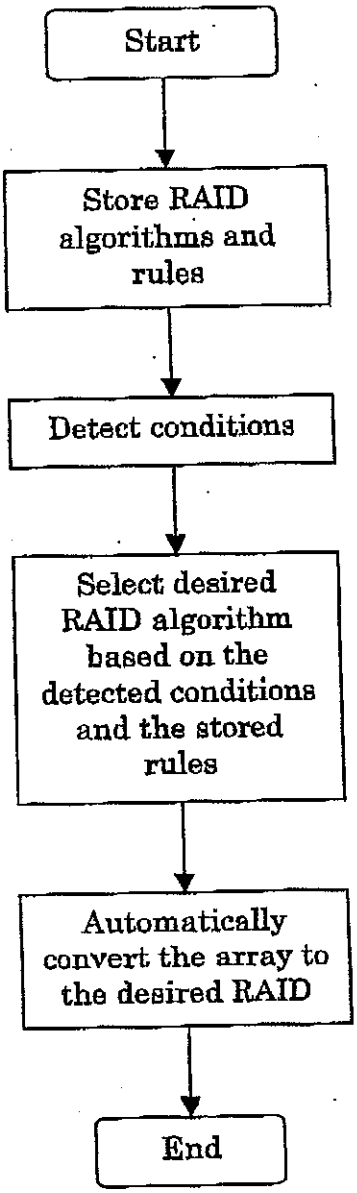

C
"flush" all writes
Verify written data OK?
No
Yes
D
When necessary, release replicated and verified data from source devices
Process (x) User chunks of R/W I/O requests
Are ALL queued User I/O's Completed?
No
Yes
Are ALL Step Watermarks completed?
No
D
Yes
Release completed source Watermark inventory table
SUCCESS: END
Once Conversion has started, If at any time All Watermarks are not completed but the Replication is discontinued then the source and target Watermark inventory remains and is not cleared.

Fig. 4(b)

Fig. 5


Start
Store RAID algorithms and rules
Detect conditions
Select desired RAID algorithm based on the detected conditions and the stored rules
Automatically convert the array to the desired RAID
End