
Chapter 6. Changing Configurations

This chapter explains how to plan for changing products or systems connected to your IBM Cabling System. The first part tells you how to replace or integrate non-LAN products with the IBM Token-Ring Network. The second part of the chapter tells you how to change the configuration of an existing ring. The final part of the chapter explains how to migrate from a 4 Mbps ring to a 16 Mbps ring.

As a planner for an IBM Token-Ring Network, you should be aware of the necessity of maintaining accurate records about the network. A network planner or administrator familiar with both the IBM Cabling System and the IBM Token-Ring Network should be responsible for the accuracy of the network planning charts, both for the initial installation and for subsequent changes to meet the changing needs of the establishment. Refer to Chapter 2 to verify your new configurations.

Planning Migration to an IBM Token-Ring Network

If you are planning to replace systems or workstations currently using the IBM Cabling System with attaching devices for an IBM Token-Ring Network, perform the following steps before you begin planning your network.

1. Collect the following documents:
 - Building plans showing your existing wiring and location of devices
 - Cable Schedules (part of IBM Cabling System records)
 - System Configuration Worksheets (part of IBM Cabling System records).
2. Using these documents, prepare work orders showing which devices are to be removed.
3. Update the System Configuration Worksheets and the Cable Schedules to show the changes made to the systems.

After you have completed these steps, you are ready to go to Chapter 2 of this manual and begin planning your establishment's network.

Changing Network Configurations

As the needs of your establishment change, you will have to change the configuration of your network. Unless such changes are carefully planned and documented, they may jeopardize the efficient operation of your network. The types of changes explained in this section are:

- Removing an attaching device from a ring
- Adding an attaching device to a ring
- Removing an 8230 from a ring
- Removing an 8228 from a ring
- Removing 8218s from a ring
- Removing 8219s from a ring
- Removing 8220s from a ring
- Adding an 8230 to a ring
- Adding an 8228 to a ring
- Adding 8218s to a ring
- Adding 8219s to a ring
- Adding 8220s to a ring
- Dividing a ring
- Joining two rings without a bridge.

Follow the suggestions below for each type of change you plan to make.

Removing an Attaching Device from the Ring

1. Delete the attaching device from the IBM 8228 Cabling Chart.
2. Delete the attaching device's adapter address from both Locator Charts if the attaching device will not be reused in the network. Otherwise, update the ring number on the Locator Charts.
3. Disconnect the attaching device from the faceplate or from the 8228 lobe receptacle.
4. If you will not be connecting another device on that lobe receptacle, disconnect the patch cable leading from the receptacle to the distribution panel.

Note: You may want to leave the patch cable in place, even if you will not be connecting another device right away. This will allow you in the future to connect another device to the faceplate and have it come on line automatically, without intervention in the wiring closet.

IBM 8228 Cabling Chart

Date 10/2/90

Section 1 Identification

Unit Number <u>1006</u>	Building Location <u>119H</u>	Rack-mounted <input type="checkbox"/>	Wall-mounted <input checked="" type="checkbox"/>	Ring <u>1</u>
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Section 2 Receptacle Connections

Receptacle	1	2	3	4	5	6	7	8
Connect to:	<u>119A</u> <u>P150</u>	<u>119B</u> <u>P75</u>	<u>119C</u> <u>P75</u>	<u>119D</u> <u>P30</u>	<u>119H</u> <u>P8</u>	<u>119G</u> <u>P75</u>		

Device	<u>PC70</u>	<u>PC71</u>	<u>PC72</u>	<u>PC73</u>	<u>PC74</u>	<u>PC75</u>		
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Section 3 Ring Connections

A. Connect RI of this 8228 to: <u>138-12-A8</u>
B. Connect RO of this 8228 to: <u>138-12-B8</u>

IBM 8228 Cabling Chart

Date 8/1/90

Section 1 Identification

Unit Number <u>1006</u>	Building Location <u>119H</u>	Rack-mounted <input type="checkbox"/>	Wall-mounted <input checked="" type="checkbox"/>	Ring <u>1</u>
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Section 2 Receptacle Connections

Receptacle	1	2	3	4	5	6	7	8
Connect to:	<u>119A</u> <u>P150</u>	<u>119B</u> <u>P75</u>	<u>119C</u> <u>P75</u>	<u>119D</u> <u>P30</u>	<u>119H</u> <u>P8</u>			

Device	<u>PC70</u>	<u>PC71</u>	<u>PC72</u>	<u>PC73</u>	<u>PC74</u>			
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Section 3 Ring Connections

A. Connect RI of this 8228 to: <u>138-12-A8</u>
B. Connect RO of this 8228 to: <u>138-12-B8</u>

Figure 6-1. Removing an Attaching Device from the Ring

Adding an Attaching Device to the Ring

1. Mark the location of the attaching device on the building plan.
2. On the Cable Schedule, find the numbers of the faceplate, the cable, and the wiring closet. Check to make sure that the lobe will not exceed the allowable lobe length for your ring, according to the rules in Chapter 2.
3. Make sure that the additional device doesn't make the total number of attaching devices on the ring larger than 260, including deductions for repeaters and converters.
4. If there are IBM 8228s in that wiring closet that are members of the ring to which you want to connect this device, consult the IBM 8228 Cabling Charts to find out if any of the 8228s has an unused lobe receptacle.
5. If there is an unused lobe receptacle on an 8228 in the wiring closet, add the attaching device to the IBM 8228 Cabling Chart. If you need to add another 8228, check the Rack Inventory Chart to find a location for the new 8228. Remember that a ring should have no more than 33 IBM 8228s. Mark the location of the 8228 on the Rack Inventory Chart. Then prepare an IBM 8228 Cabling Chart and add the new 8228 to the Ring Sequence Chart.
6. Follow the instructions in the *IBM Token-Ring Network Installation Guide* to connect the cables to the 8228 lobe receptacle.
7. Add the device's adapter address to both Locator Charts.
8. After connecting the attaching device to the faceplate, use a network application program to make sure that the device can communicate on the network.

IBM 8228 Cabling Chart

Date 8/1/90

Section 1 Identification

Unit Number <u>1006</u>	Building Location <u>119H</u>	Rack-mounted <input type="checkbox"/>	Wall-mounted <input checked="" type="checkbox"/>
			Ring <u>1</u>

Section 2 Receptacle Connections

Receptacle	1	2	3	4	5	6	7	8
Connect to:	<i>119A P150</i>	<i>119B P75</i>	<i>119C P75</i>	<i>119D P30</i>	<i>119H P8</i>			

Device	<i>PC70</i>	<i>PC71</i>	<i>PC72</i>	<i>PC73</i>	<i>PC74</i>			
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Section 3 Ring Connections

A. Connect RI of this 8228 to: <u>138-12-A8</u>
B. Connect RO of this 8228 to: <u>138-12-B8</u>

IBM 8228 Cabling Chart

Date 10/2/90

Section 1 Identification

Unit Number <u>1006</u>	Building Location <u>119H</u>	Rack-mounted <input type="checkbox"/>	Wall-mounted <input checked="" type="checkbox"/>
			Ring <u>1</u>

Section 2 Receptacle Connections

Receptacle	1	2	3	4	5	6	7	8
Connect to:	<i>119A P150</i>	<i>119B P75</i>	<i>119C P75</i>	<i>119D P30</i>	<i>119H P8</i>	<i>119C P75</i>		

Device	<i>PC70</i>	<i>PC71</i>	<i>PC72</i>	<i>PC73</i>	<i>PC74</i>	<i>PC75</i>		
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Section 3 Ring Connections

A. Connect RI of this 8228 to: <u>138-12-A8</u>
B. Connect RO of this 8228 to: <u>138-12-B8</u>

Figure 6-2. Adding an Attaching Device to the Ring

Removing an 8230 from a Ring

1. Find the 8230 you wish to remove on both the Ring Sequence Chart and the Rack Inventory Chart.
2. Prepare a new Ring Sequence Chart showing the ring without the 8230. Update the information on the IBM 8230, 8228, 8218, 8219, or 8220 Cabling Charts for the component immediately upstream and the one immediately downstream from the unit you want to remove.
3. Disconnect all of the cables from the 8230.
4. Reconnect the network according to the new Ring Sequence Chart. Mark the changes on the Rack Inventory Chart. Be sure to discard the old Ring Sequence Charts and the old IBM 8230 Cabling Chart.

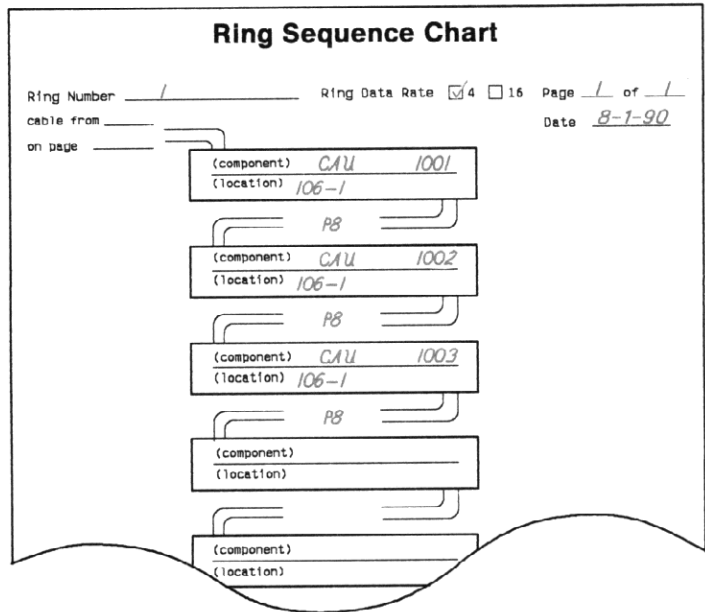
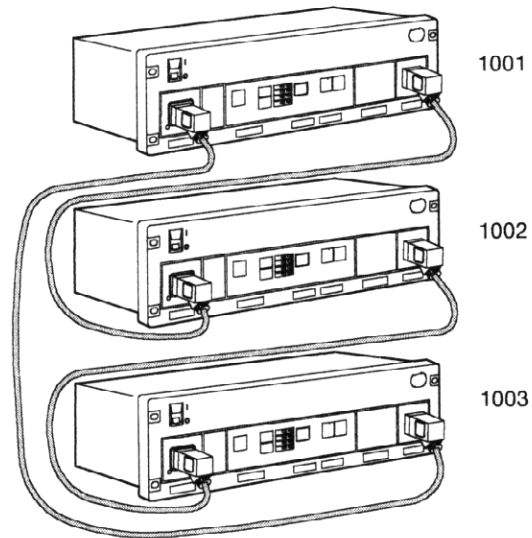
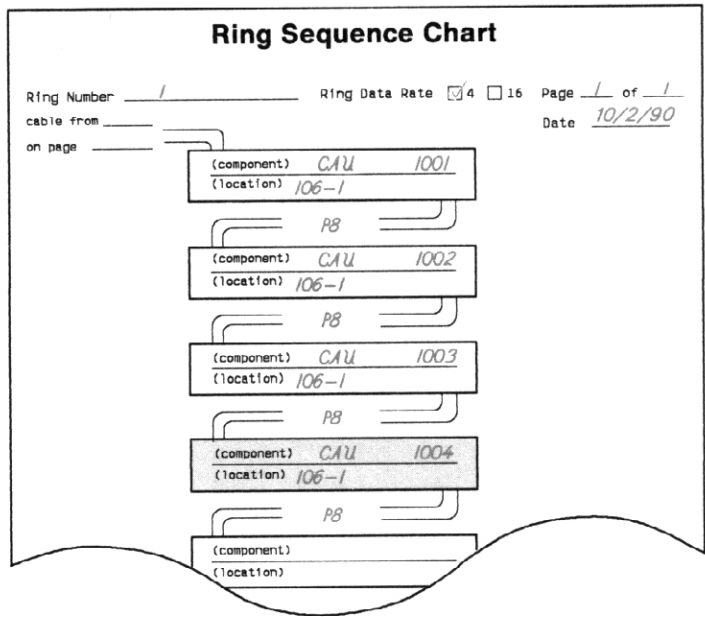
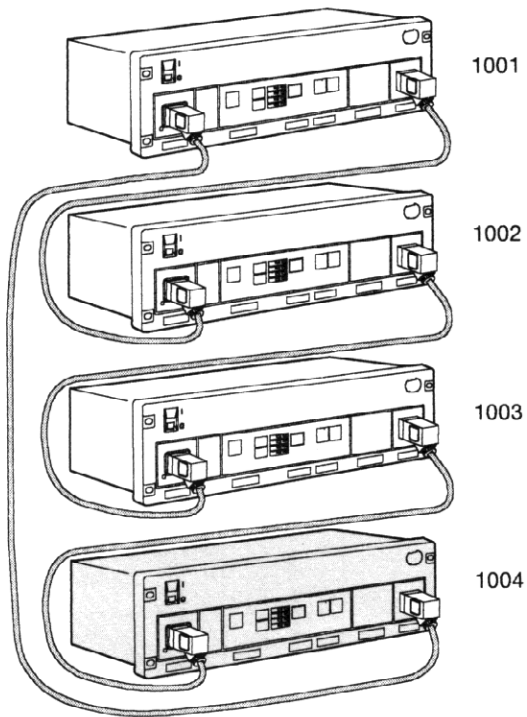


Figure 6-3. Removing an 8230 from a Ring

Removing an 8228 from a Ring

1. Find the 8228 you wish to remove on both the Ring Sequence Chart and the Rack Inventory Chart.
2. Prepare a new Ring Sequence Chart showing the ring without the 8228. Update the information on the IBM 8228, 8218, 8219, 8220, or 8230 Cabling Charts for the component immediately upstream and the one immediately downstream from the unit you want to remove.
3. Disconnect all of the cables from the 8228.
4. Reconnect the network according to the new Ring Sequence Chart. Mark the changes on the Rack Inventory Chart. Be sure to discard the old Ring Sequence Charts and the old IBM 8228 Cabling Chart.

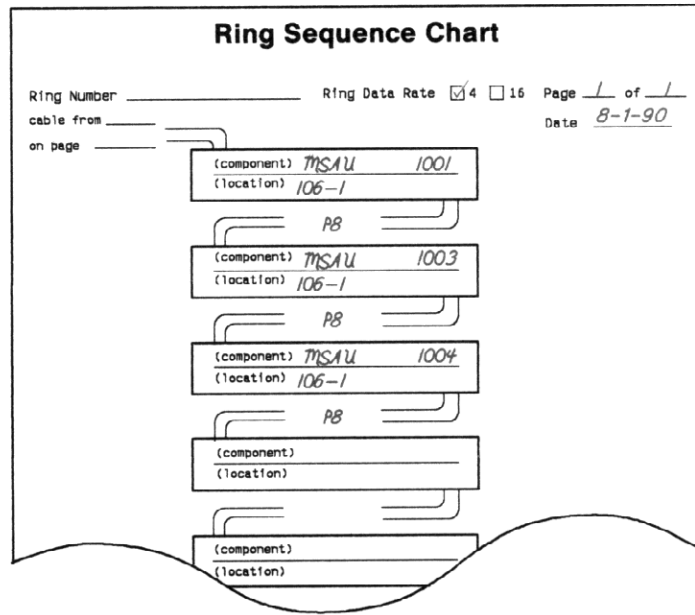
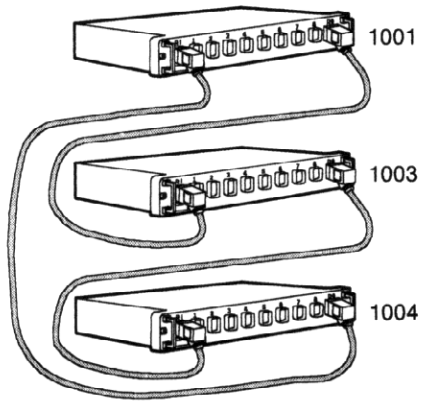
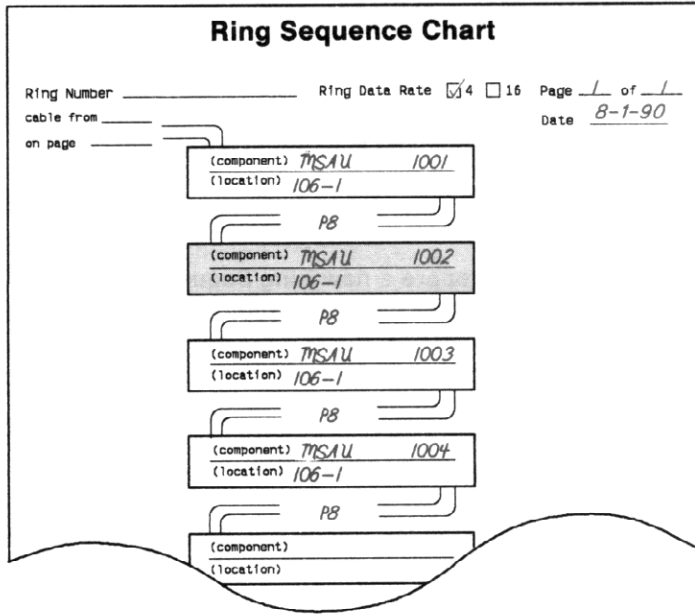
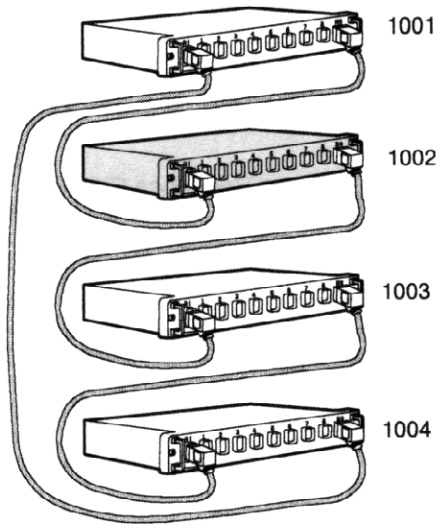


Figure 6-4. Removing an 8228 from a Ring

Removing 8218s from a Ring

Before removing a pair of 8218s from a ring, use the information in Chapter 2 to ensure that the ring will operate without the 8218s you will be removing. Generally, 8218s should be removed only when the number of 8228s or the number of wiring closets in the ring has been reduced.

1. Find the pair of 8218s you wish to remove on both the Ring Sequence Chart and the Rack Inventory Chart.
2. Prepare a new Ring Sequence Chart showing the ring without the 8218s. Update the information on the IBM 8228, 8218, 8219, 8220, or 8230 Cabling Charts for the component that is immediately upstream and the one immediately downstream from the unit you want to remove.
3. Disconnect all of the cables from the 8218s.
4. Reconnect the network according to the new Ring Sequence Chart. Mark the changes on the Rack Inventory Chart. Be sure to discard the old Ring Sequence Charts and the old IBM 8218 Cabling Chart.

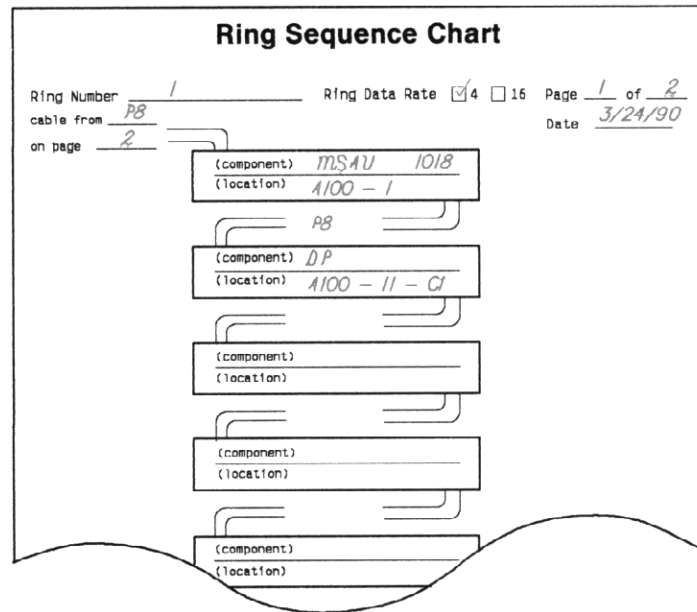
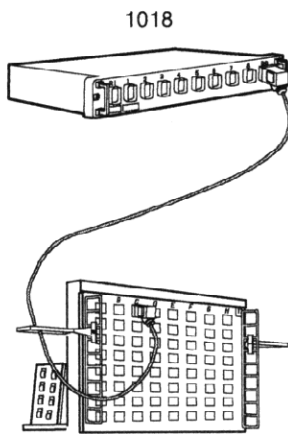
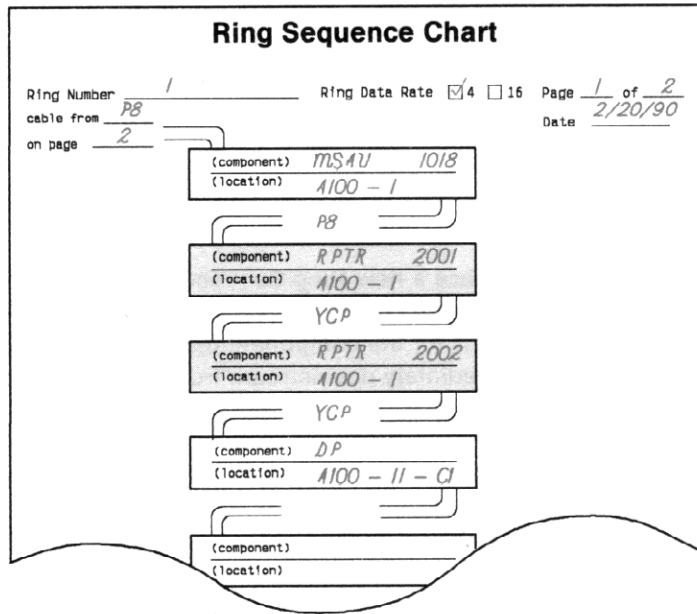
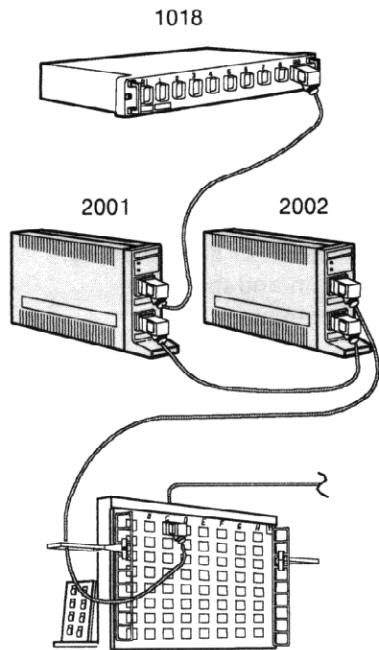


Figure 6-5. Removing 8218s from a Ring

Removing 8219s from a Ring

Before removing a pair of 8219s from a ring, use the information in Chapter 2 to ensure that the ring will operate without the 8219s you will be removing. Generally, 8219s should be removed only when the number of wiring closets in the ring has been reduced.

1. Find the 8219s you wish to remove on both the Ring Sequence Chart and the Rack Inventory Chart.
2. Prepare a new Ring Sequence Chart showing the ring without the 8219s. Update the information on the IBM 8228, 8218, 8219, 8220, or 8230 Cabling Charts for the component that is immediately upstream and the one immediately downstream from the units you want to remove.
3. Disconnect all of the cables from the 8219s.
4. Reconnect the network according to the new Ring Sequence Chart. Mark the changes on the Rack Inventory Chart. Be sure to discard the old Ring Sequence Charts and the old IBM 8219 Cabling Chart.

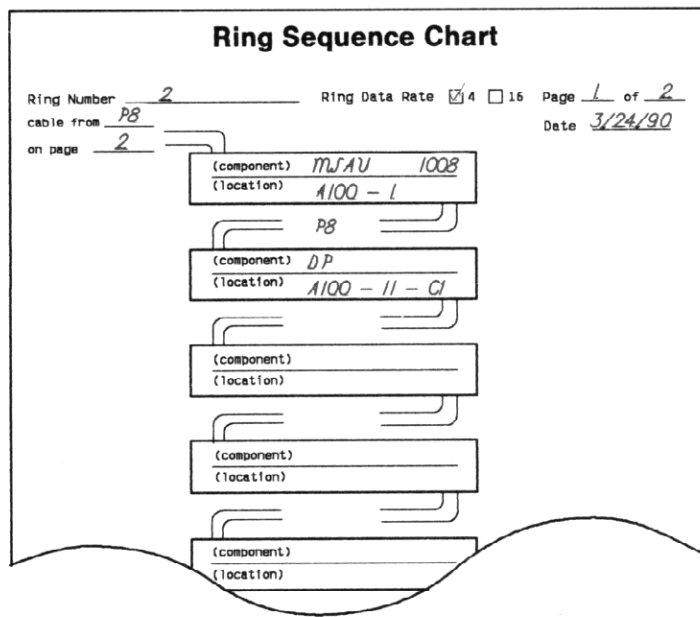
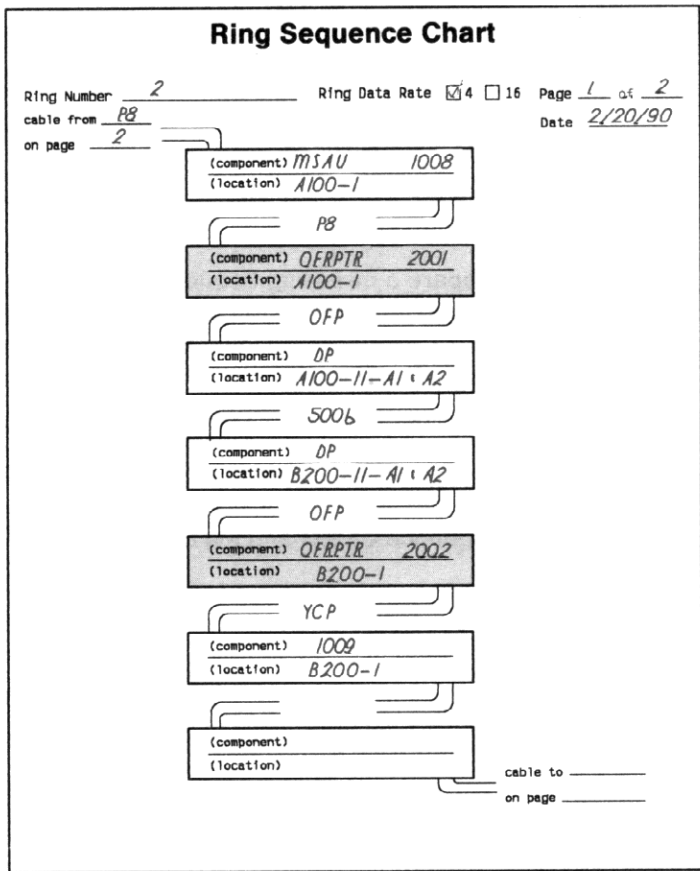
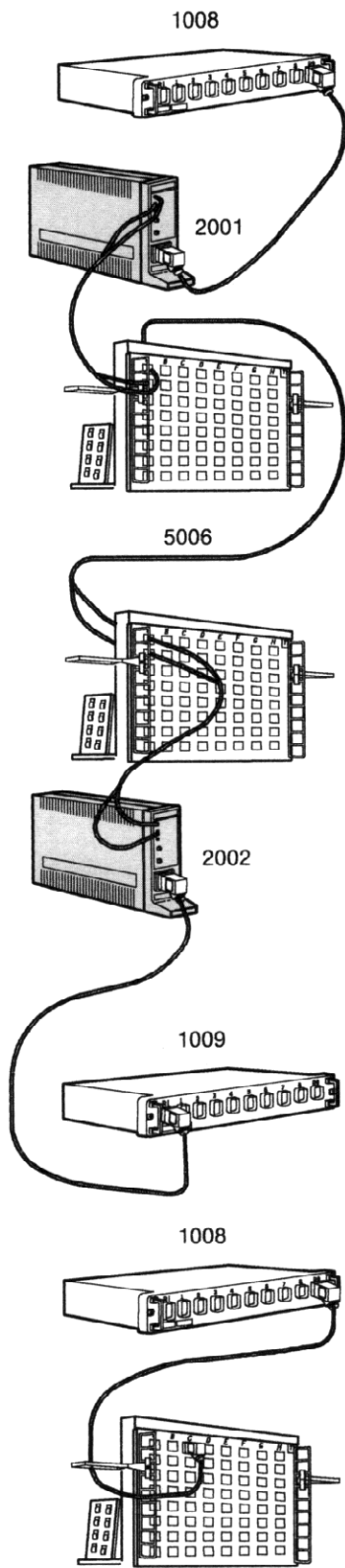


Figure 6-6. Removing 8219s from a Ring

Removing 8220s from a Ring

Before removing a pair of 8220s from a ring, use the information in Chapter 2 to ensure that the ring will operate without the 8220s you will be removing. Generally, 8220s should be removed only when the number of wiring closets in the ring has been reduced.

1. Find the 8220s you wish to remove on both the Ring Sequence Chart and the Rack Inventory Chart.
2. Prepare a new Ring Sequence Chart showing the ring without the 8220s. Update the information on the IBM 8228, 8218, 8219, 8220, or 8230 Cabling Charts for the component that is immediately upstream and the one immediately downstream from the units you want to remove.
3. Disconnect all of the cables from the 8220s.
4. Reconnect the network according to the new Ring Sequence Chart. Mark the changes on the Rack Inventory Chart. Be sure to discard the old Ring Sequence Charts and the old IBM 8220 Cabling Chart.

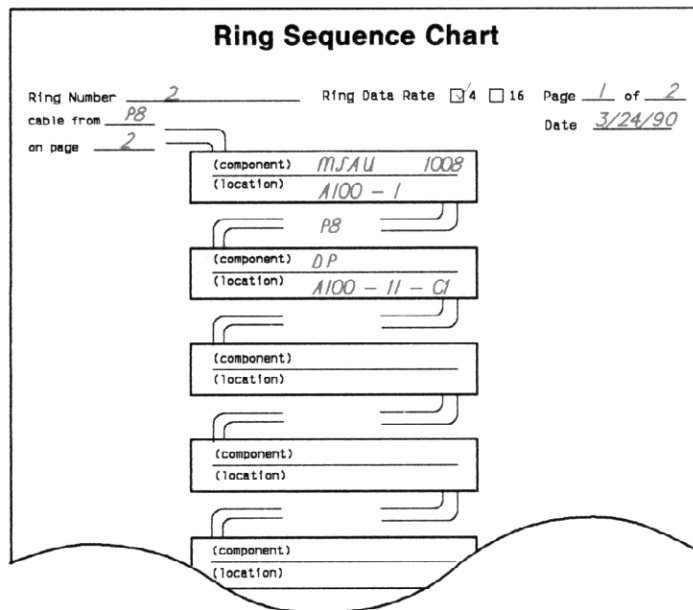
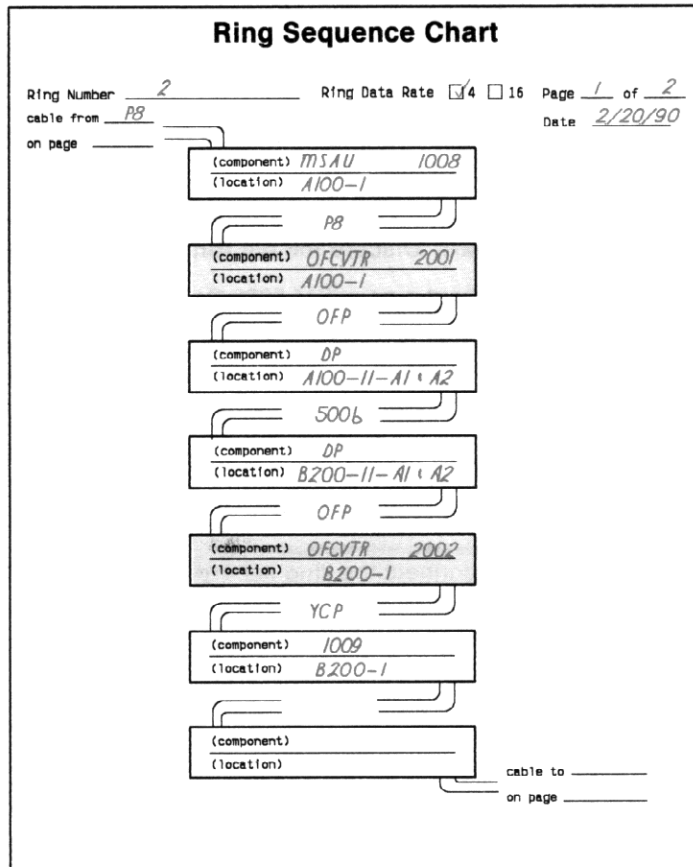
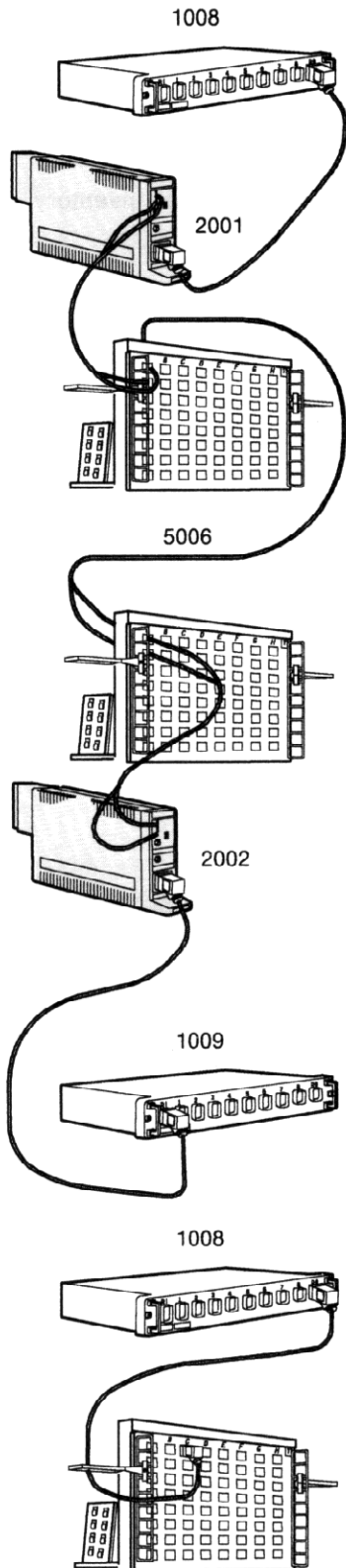


Figure 6-7. Removing 8220s from a Ring

Adding an 8230 to a Ring

1. Reassess the ring's size according to the rules in Chapter 2 to ensure that adding an 8230 will not affect ring operation.
2. Check the Ring Sequence Chart to determine the best place to connect the new 8230 in the ring.
3. Prepare a new Ring Sequence Chart. Update the appropriate Rack Inventory Chart. Discard the old Ring Sequence Chart.
4. Fill out a new IBM 8230 Cabling Chart.
5. Update the information on the 8230, 8228, 8218, 8219, or 8220 Cabling Charts for the devices upstream and downstream from the 8230 you are adding to the ring.
6. Follow the instructions in the *IBM Token-Ring Network Installation Guide* to connect the cables between the 8230 lobe receptacles and the distribution panel receptacles indicated on the IBM 8230 Cabling Chart.
7. Reconnect the ring according to the new Ring Sequence Chart. Check out the operation by running a network application program or the IBM 8230 Controlled Access Unit Diagnostic on an attaching device connected to the new 8230.

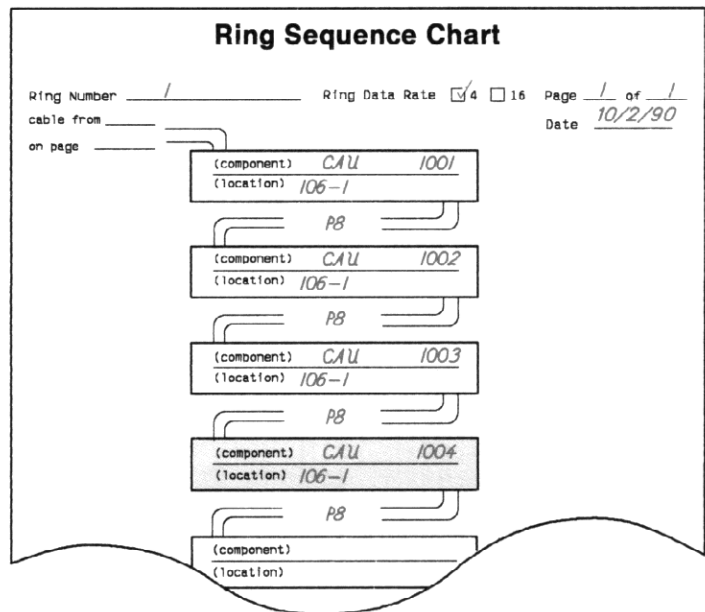
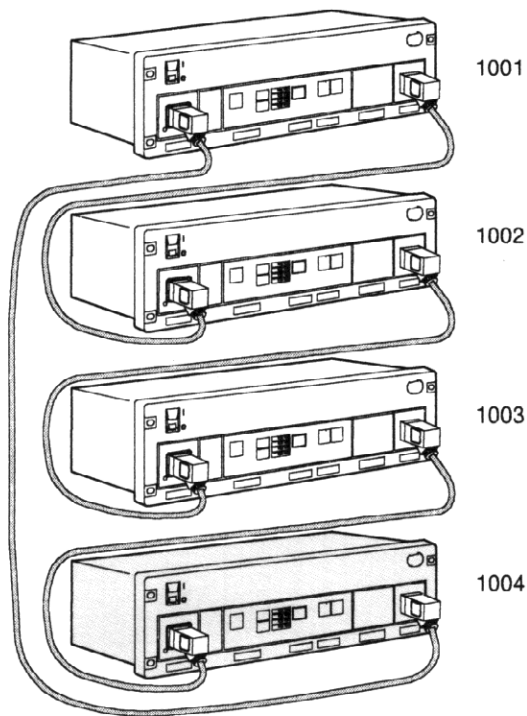
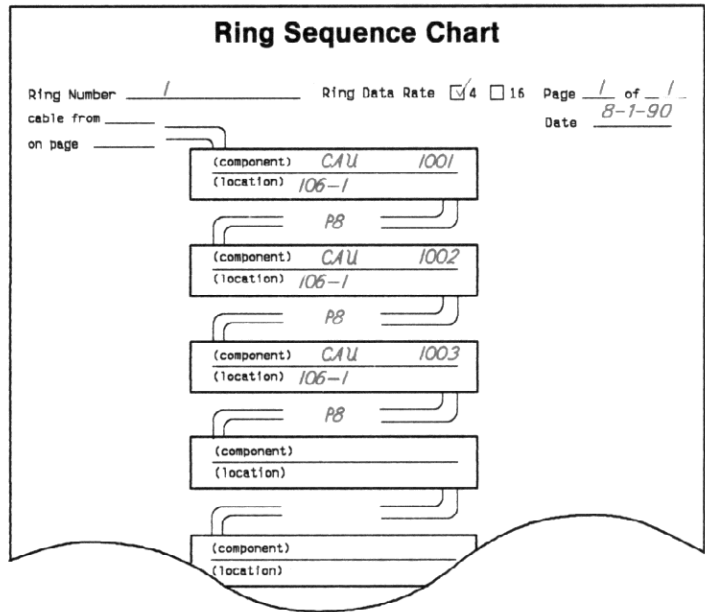
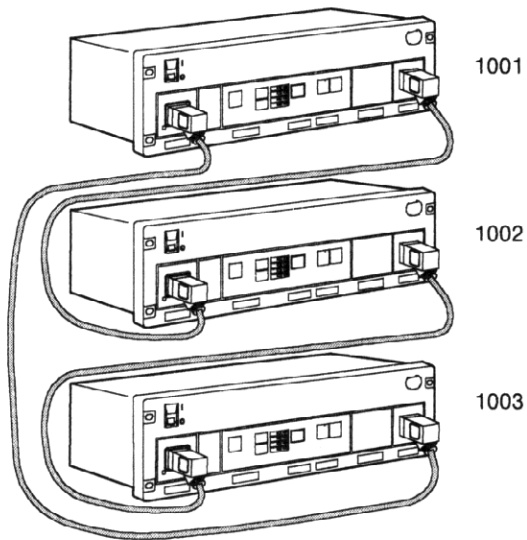


Figure 6-8. Adding an 8230 to a Ring

Adding an IBM 8228 to a Ring

1. Reassess the ring's size according to the rules in Chapter 2 to ensure that adding an 8228 will not affect ring operation.
2. Fill out Sections 1 and 2 of a new IBM 8228 Cabling Chart.
3. Check the Ring Sequence Chart to determine the best place to connect the new 8228 in the ring.
4. Prepare a new Ring Sequence Chart. Update the appropriate Rack Inventory Chart. Discard the old Ring Sequence Chart.
5. Fill out Section 3 of the IBM 8228 Cabling Chart and update the information on the 8228, 8218, 8219, 8220, or 8230 Cabling Charts for the devices upstream and downstream from the 8228 you are adding to the ring.
6. Follow the instructions in the *IBM Token-Ring Network Installation Guide* to connect the cables between the 8228 lobe receptacles and the distribution panel receptacles indicated on the IBM 8228 Cabling Chart.
7. Reconnect the ring according to the new Ring Sequence Chart. Check out the operation by running a network application program on an attaching device connected to the new 8228.

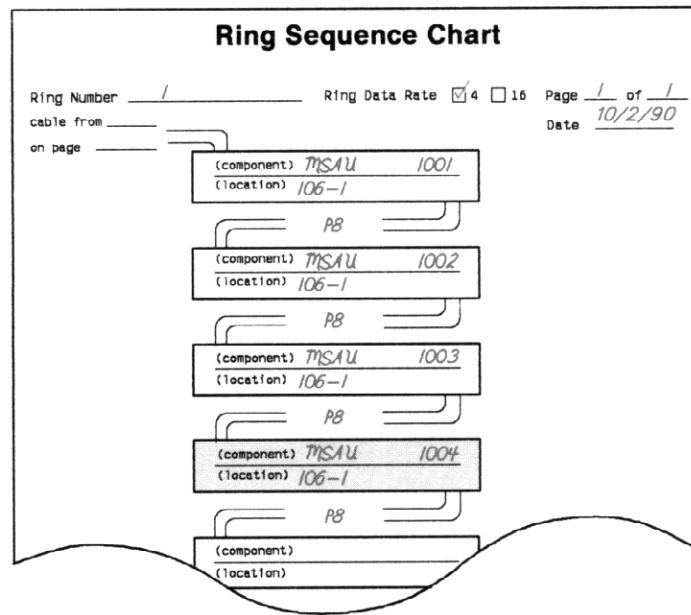
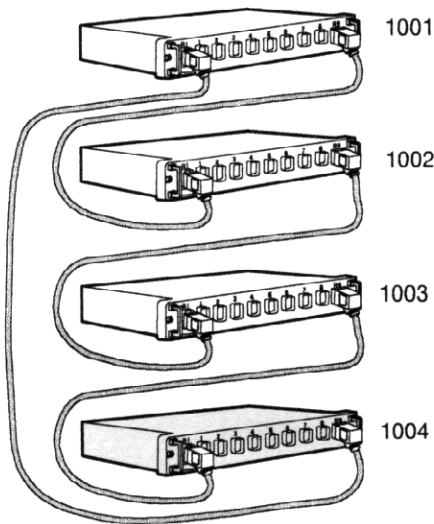
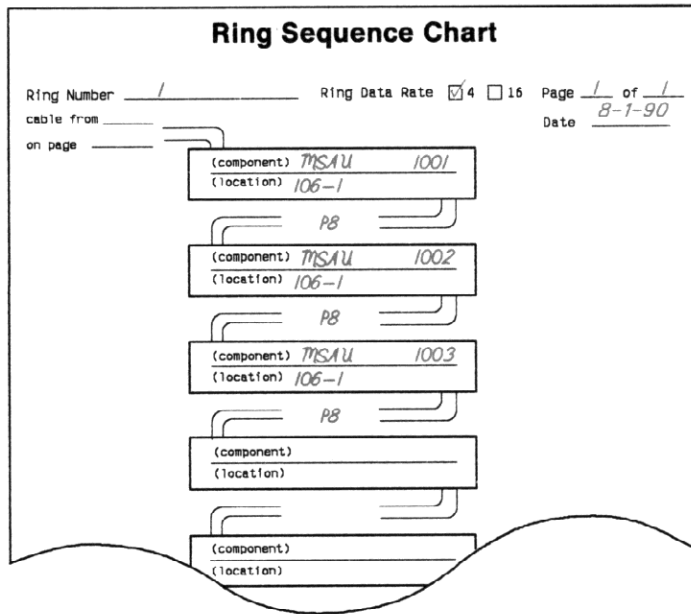
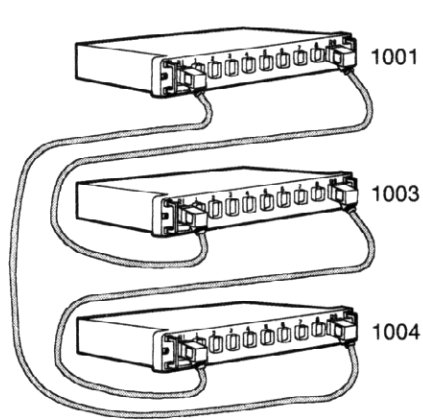


Figure 6-9. Adding an 8228 to a Ring

Adding 8218s to a Ring

1. Reassess the ring's size according to the rules in Chapter 2.
2. Fill out Section 1 of a new IBM 8218 Cabling Chart.
3. Check the Ring Sequence Chart to determine the best place to connect the new 8218s in the ring.
4. Prepare a new Ring Sequence Chart. Update the appropriate Rack Inventory Chart. Discard the old Ring Sequence Chart.
5. Fill out Section 2 of the IBM 8218 Cabling Chart, and update the information on the 8228, 8218, 8219, 8220, or 8230 Cabling Charts for the devices upstream and downstream from the 8218 you are adding to the ring.
6. Follow the instructions in the *IBM Token-Ring Network Installation Guide* to connect the cables to the 8218s.
7. Reconnect the ring according to the new Ring Sequence Chart. Check out the operation of the network by running a network application program.

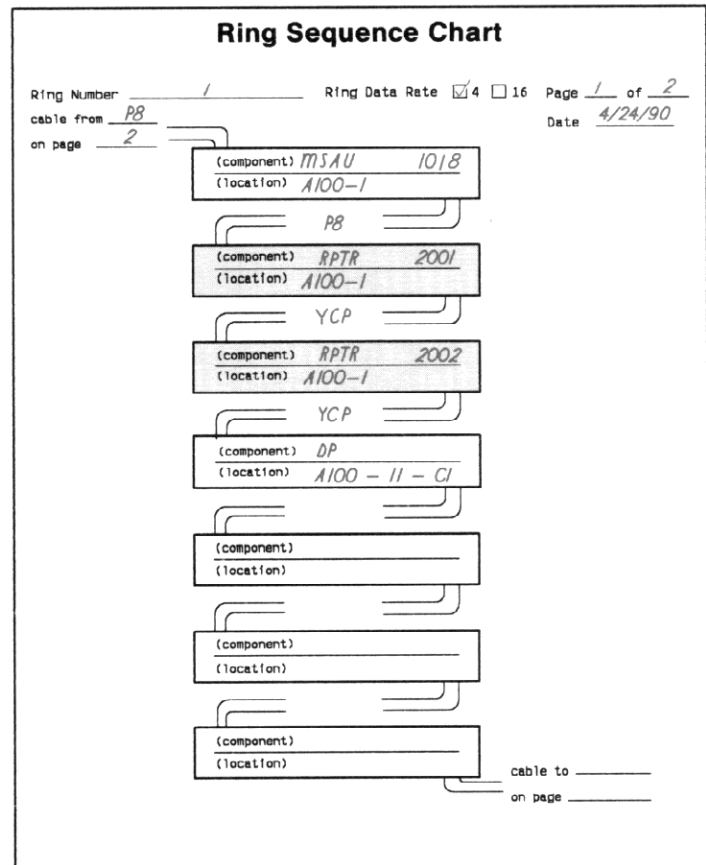
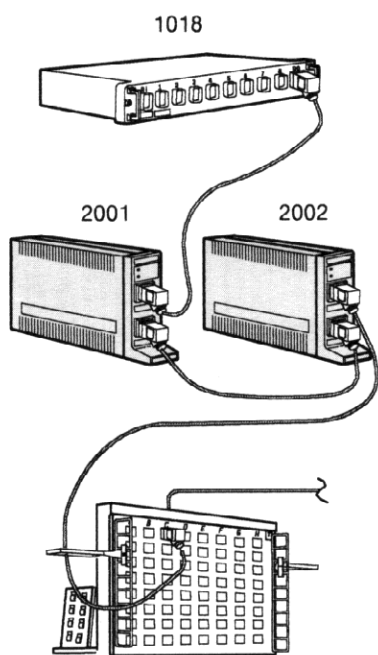
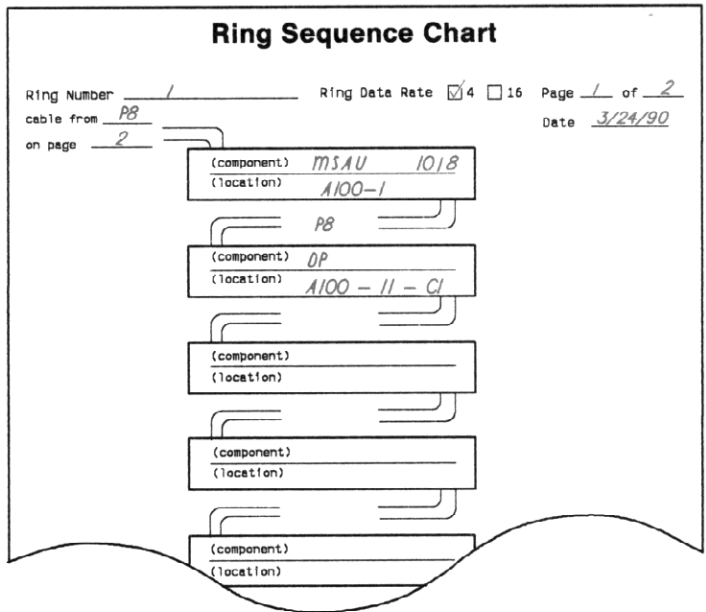
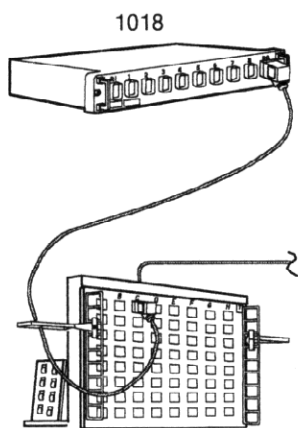


Figure 6-10. Adding 8218s to a Ring

Adding 8219s to a Ring

1. Reassess the ring's size according to the rules in Chapter 2.
2. Fill out Section 1 of a new IBM 8219 Cabling Chart.
3. Check the Ring Sequence Chart to determine the best place to connect the new 8219s in the ring.
4. Prepare a new Ring Sequence Chart. Update the appropriate Rack Inventory Chart. Discard the old Ring Sequence Chart.
5. Fill out Section 2 of the IBM 8219 Cabling Chart, and update the information on the 8228, 8218, 8219, 8220, or 8230 Cabling Charts for the devices upstream and downstream from the 8219 you are adding to the ring.
6. Follow the instructions in the *IBM Token-Ring Network Installation Guide* to connect the cables to the 8219s.
7. Reconnect the ring according to the new Ring Sequence Chart. Check out the operation of the network by running a network application program.

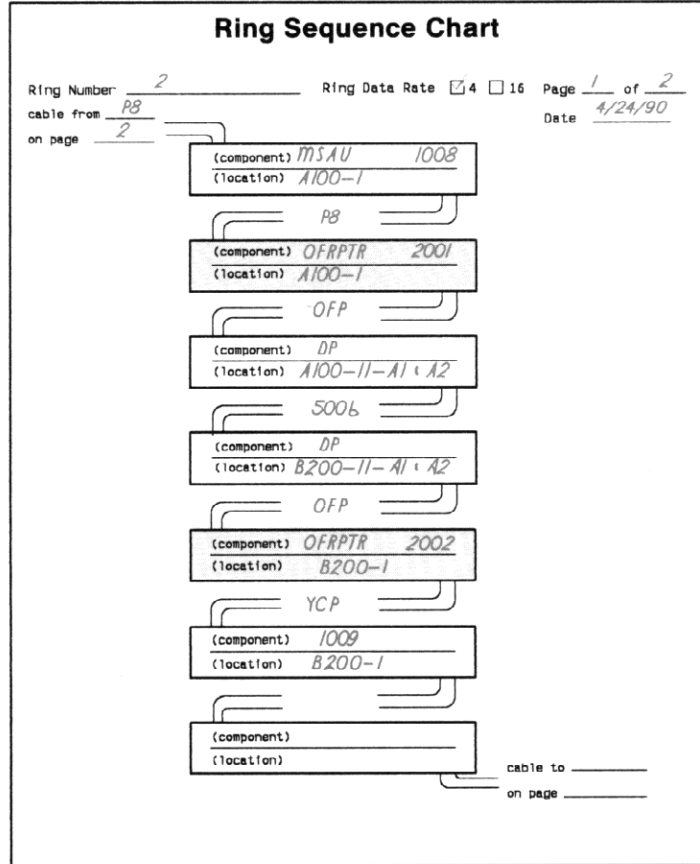
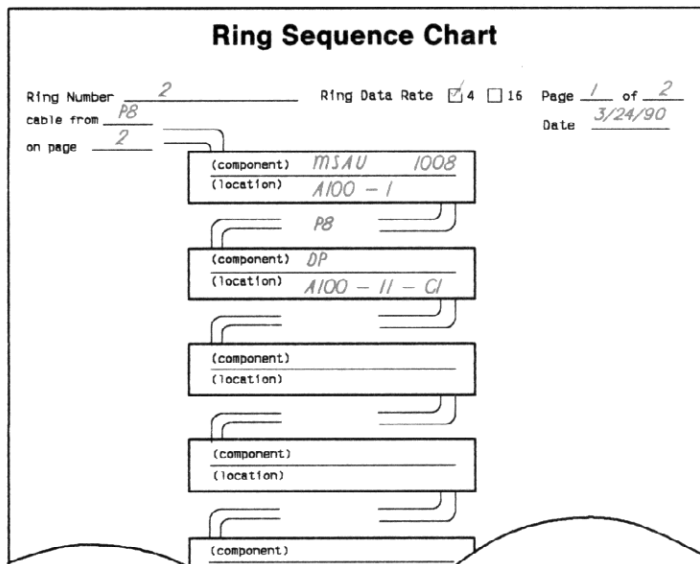
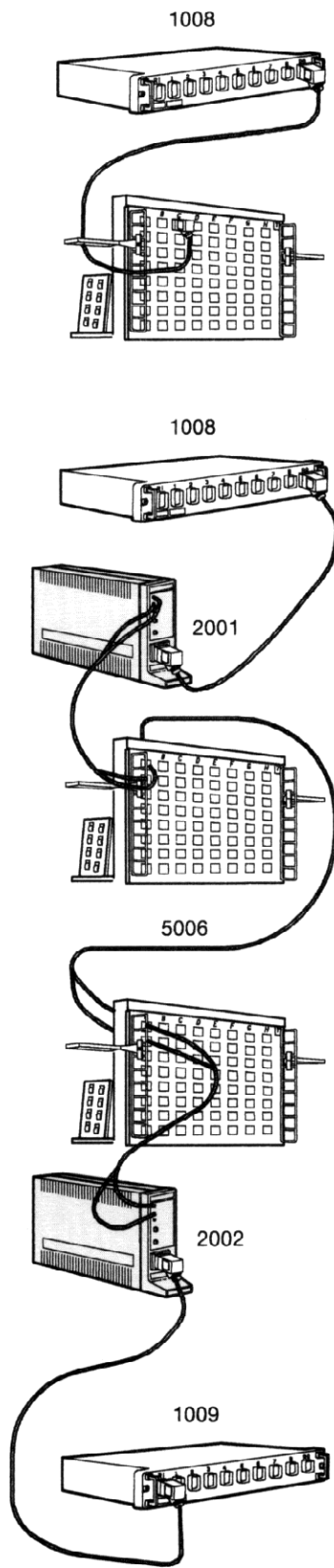


Figure 6-11. Adding 8219s to a Ring

Adding 8220s to a Ring

1. Reassess the ring's size according to the rules in Chapter 2.
2. Fill out Section 1 of a new IBM 8220 Cabling Chart.
3. Check the Ring Sequence Chart to determine the best place to connect the new 8220s in the ring.
4. Prepare a new Ring Sequence Chart. Update the appropriate Rack Inventory Chart. Discard the old Ring Sequence Chart.
5. Fill out Section 2 of the IBM 8220 Cabling Chart, and update the information on the 8228, 8218, 8219, 8220, or 8230 Cabling Charts for the devices upstream and downstream from the 8220 you are adding to the ring.
6. Follow the instructions in the *IBM Token-Ring Network Installation Guide* to connect the cables to the 8220s.
7. Reconnect the ring according to the new Ring Sequence Chart. Check out the operation of the network by running a network application program.

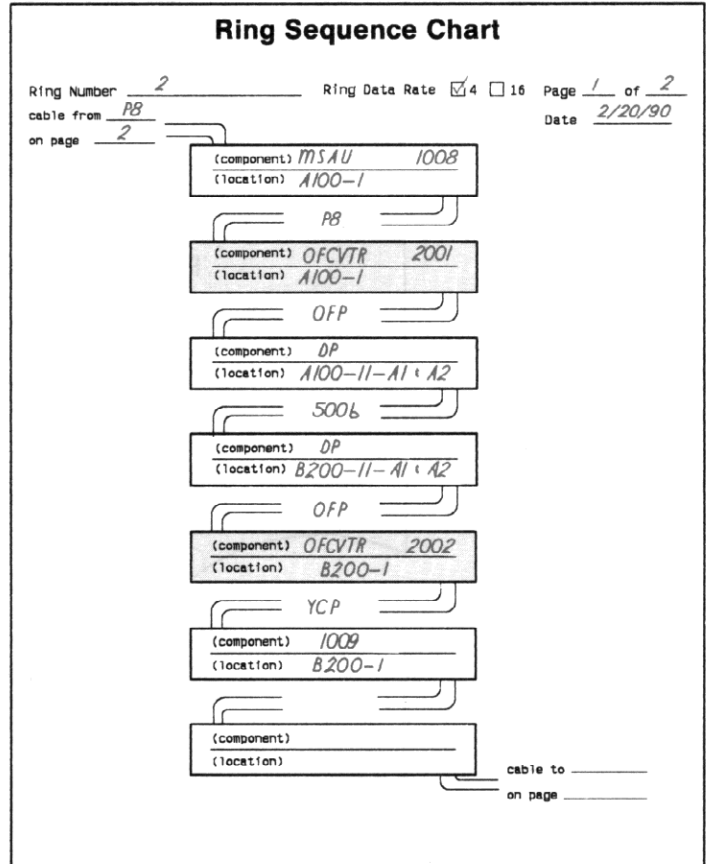
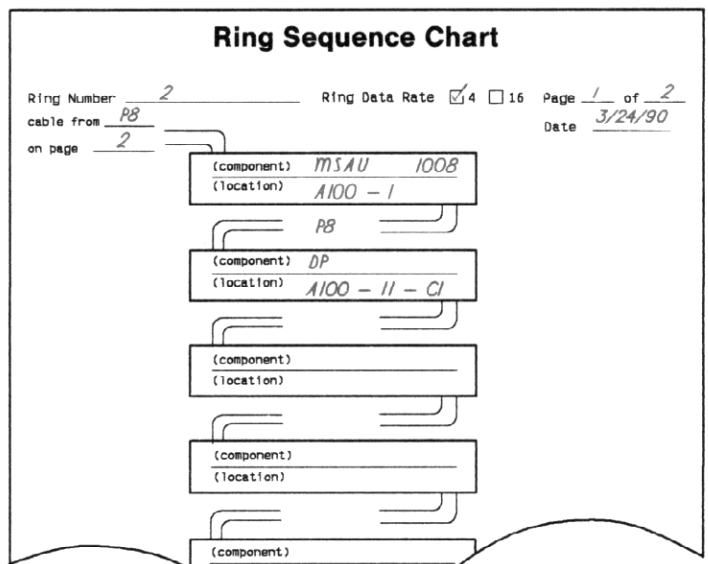
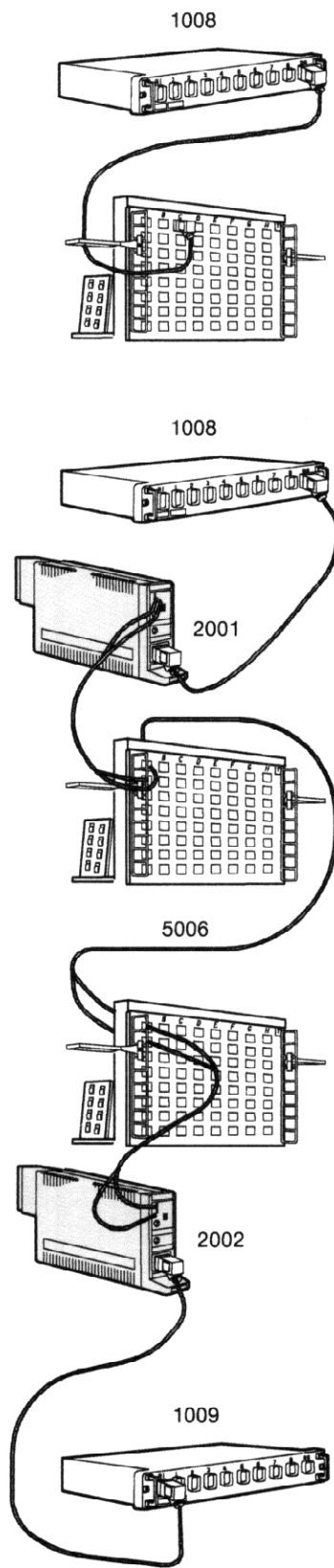


Figure 6-12. Adding 8220s to a Ring

Dividing a Ring

1. Look at the Ring Sequence Chart to determine the points where you want to divide the ring and form two rings.
2. Prepare new Ring Sequence Charts describing the new ring configurations. Discard the old Ring Sequence Chart.
3. Update the ring number information on all IBM 8230, 8228, 8218, 8219, and 8220 Cabling Charts and on both Locator Charts.
4. Be sure that each of the new rings has a ring completion path by indicating a cable from the last RO receptacle on the ring to the first RI receptacle on the Ring Sequence Charts for each of the new rings.
5. Using a network application program, check out the operation of each of the new rings.

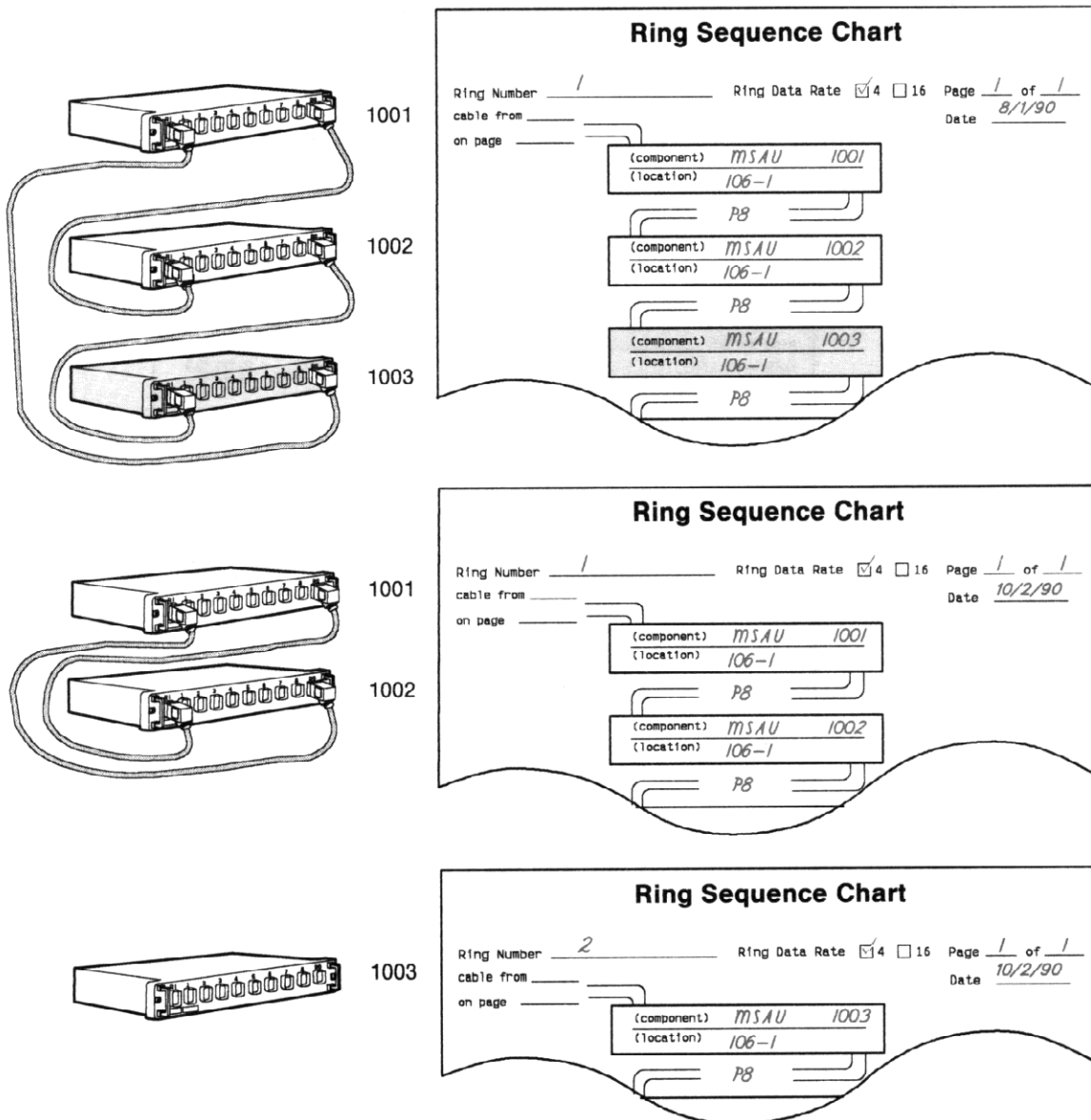


Figure 6-13. Dividing a Ring

Joining Two Rings without a Bridge

1. Be sure that both rings operate at the same ring data rate.
2. Assemble all of the Ring Sequence Charts for the two rings you want to join together.
3. Reassess the ring's size according to the rules in Chapter 2 to be sure that the new ring will operate.
4. Prepare a new Ring Sequence Chart for the new ring. Check the old Ring Sequence Charts for the best place to join the two rings together. The best place to join two rings is in a wiring closet in which both rings have components. Prepare a new Ring Sequence Chart for the new ring.
5. Connect the two rings together to form one ring according to the new Ring Sequence Chart. Discard the old Ring Sequence Charts.
6. Update the ring number on all IBM 8230, 8228, 8218, 8219, or 8220 Cabling Charts and both Locator Charts.
7. Ensure that the new ring has a ring completion path by indicating a cable on the Ring Sequence Chart from the RO receptacle of the last 8228 to the RI receptacle of the first 8228.
8. Using a network application program, check out the operation of each of the new rings.

Note: See Chapter 4 of this manual for information on planning multiple-ring networks using bridges.

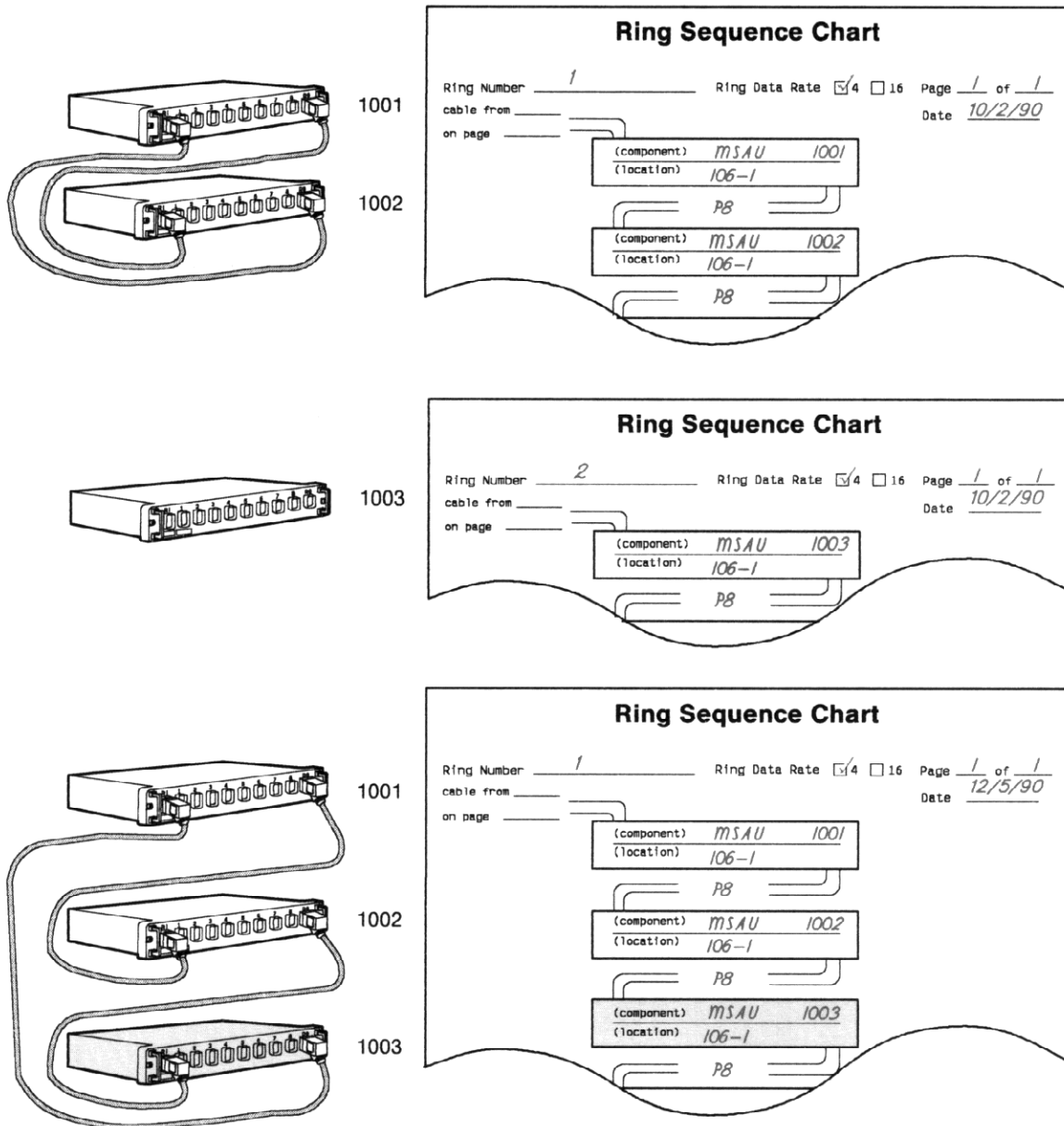


Figure 6-14. Joining Two Rings without a Bridge

Migrating from a 4 Mbps Ring to a 16 Mbps Ring

If you choose to convert a 4 Mbps network to operate at 16 Mbps, you will need the following information:

- All existing network planning charts and, if available, your working sketch of the network
- Building plans showing existing wiring and locations of devices
- Cable Schedules (IBM Cabling System records).

Planning Tasks

Most migrations will be completed effectively if you perform the following steps in the order they are listed below:

1. Determine if the existing ring contains lobes using telephone twisted-pair cabling. If so, plan to replace those cables with IBM types 1, 2, 8, or 9 according to the recommendations in Chapter 2 and Appendix A of this manual.
2. If you are planning to add additional IBM 8230 Controlled Access Units or 8228 Multistation Access Units to the ring at the same time that you are migrating to a ring data rate of 16 Mbps, you should fill out IBM 8230 or 8228 Cabling Charts for each additional 8230 or 8228 before you check the ring's drive distance.
3. If your existing ring uses IBM 8218 Copper Repeaters, mark them out on the Ring Sequence Chart and the rough sketch. IBM 8218s cannot operate at a ring data rate of 16 Mbps.
4. If your existing ring uses IBM 8219 Optical Fiber Repeaters, you must replace them with IBM 8220 Optical Fiber Converters or IBM 8230 Controlled Access Units. If additional lobes are also required on this ring, the 8230 is the preferred solution as it can support up to 80 attaching devices as well as serve as either a copper repeater or optical fiber converter.
5. Modify your old rough sketch of your ring, or prepare a new one, indicating the locations of all 8230s or 8228s and the types of cabling available between them.
6. Using the methods described in Chapter 2, determine whether or not your ring will need 8220s. Any 4 Mbps ring that had 8218s or 8219s in its main ring path will need 8220s or 8230s in the main ring path to operate at 16 Mbps. In addition, some configurations that did not require repeaters at a data rate of 4 Mbps will require 8220s or 8230s to operate at 16 Mbps.
 - a. If your ring does not require 8220s or 8230s, complete a new Ring Sequence Chart according to the instructions in Chapter 3.
 - b. If your ring does require 8220s or 8230s, use your rough sketch to determine where optical fiber cable is already in place between wiring closets. Place 8220s or 8230s on the sketch at each end of each optical fiber cable run. Remember that the maximum drive distance for an 8220 or 8230 operating on 62.5/125-micron optical fiber cable is 2000 m (6560 ft). See Chapter 2 for more information about using 8220s and 8230s.
 - 1) Calculate the ring segment drive distances (as described in Chapter 2) for the copper-wired ring segments between 8220s or 8230s. You may have to plan to replace some additional copper cables between wiring closets with optical fiber cable or some 8228s with 8230s, which also act as copper repeaters at both 4 and 16 Mbps.

- 2) When all of the ring segment drive distances are within the limits found in the appropriate tables, prepare a new Ring Sequence Chart as described in Chapter 3.

Installation Tasks

When you have completed planning for the migration from 4 to 16 Mbps operation, you should prepare for installation by doing the following:

1. Make sure that all of your attaching devices are equipped with adapters capable of 16 Mbps transmission.
2. Alert users that the network will be inoperable until the conversion is made. Instruct them to either power off the attaching device or to disconnect the cable between the attaching device and the network if the attaching device is a standalone workstation that must be used for non-network tasks.
3. Remove all 8218s from the main ring path.
4. Add any additional 8230s or 8228s in the main ring path as indicated on the IBM 8230 or 8228 Cabling Charts prepared in the planning stage.
5. Set all 8230s and 8220s in the ring to operate at 16 Mbps.
6. Remove all 8219s from the main ring path.
7. Install 8220s in the main ring path as indicated on the IBM 8220 Cabling Charts prepared in the planning stage.
8. *Make sure that all adapters in attaching devices have been completely prepared for operation at 16 Mbps.*
9. Bring the network back up, one attaching device at a time, to ensure that the migration has been completed successfully.