

**RING NODE FRAME/CABINET  
DESCRIPTION  
NO. 1A AND 1B NETWORK CONTROL POINT  
COMMON CHANNEL SIGNALING SYSTEMS**

CONTENTS	PAGE	CONTENTS	PAGE
1. GENERAL . . . . .	2	D. Ring Peripheral Controller Node . . .	13
A. Introduction . . . . .	2	E. Fuse Panel Unit . . . . .	15
B. Purpose . . . . .	2	F. Fan Unit . . . . .	15
2. PHYSICAL DESCRIPTION . . . . .	2	G. Filter Unit . . . . .	15
RING NODE FRAME (J3F011B) . . . . .	2	H. Fuse Panel and Alarm Control Unit . .	15
A. Link Node Unit B . . . . .	3	I. Cooling Unit . . . . .	16
B. Control Panel Unit . . . . .	3	4. GLOSSARY . . . . .	17
C. 3B Interface Unit . . . . .	3	Figures	
D. Fan Unit . . . . .	5	1. Ring Node Frame (J3F011B) . . . . .	3
E. Fuse Panel Unit . . . . .	6	2. Link Node Unit . . . . .	4
F. Filter Unit . . . . .	6	3. Link Node Unit (Fully Equipped) . . . . .	4
RING NODE CABINET (J3F011D) . . . . .	6	4. Control Panel Unit . . . . .	5
A. Fuse Panel and Alarm Control Unit . .	7	5. 3B Interface Unit . . . . .	5
B. Link Node Unit B . . . . .	7	6. Fan Unit . . . . .	6
C. 3B Interface Unit . . . . .	8	7. Fuse Panel Unit . . . . .	6
D. Cooling Unit . . . . .	8	8. Ring Node Cabinet . . . . .	7
3. FUNCTIONAL DESCRIPTION . . . . .	8	9. Fuse Panel and Alarm Control Unit . .	8
A. Link Node . . . . .	10	10. Cooling Unit . . . . .	9
B. Interframe Buffer . . . . .	11	11. Ring Node Circuit Relationships . . . . .	9
C. Control Panel Unit . . . . .	12	12. Simplified Ring . . . . .	10

	CONTENTS	PAGE
13.	Simplified NCP Ring . . . . .	11
14.	NCP Link Node . . . . .	12
15.	Interframe Buffer—Padded . . . . .	13
16.	NCP Ring Peripheral Controller Node . . . . .	14

**1. GENERAL**

**A. Introduction**

**1.01** This AT&T Practice provides a physical and functional description of a J3F011B ring node frame (SD-3F018-01) and a J3F011D ring node cabinet (SD-3F022-01). A J3F011D ring node cabinet is used in a 1BNCP (No. 1B network control point) office. A J3F011B ring node frame or a J3F011D ring node cabinet is used in a 1ANCP (No. 1A network control point) office. The 1ANCPs equipped with an AT&T 3B20D model 1 computer use the J3F011B ring node frame. The 1ANCPs equipped with an AT&T 3B20D model 3 computer use the J3F011D ring node cabinet. The 1ANCPs and 1BNCPs are hereafter referred to in this practice as NCPs (network control points).

**1.02** This AT&T Practice is a general revision, and as such, no revision arrows have been used to denote changes.

**1.03** An NCP is an office used in a CCS (common channel signaling) network that contains hardware, software, and data base information used to provide a variety of custom routing and billing services. Service-related queries from offices in a CCS network are routed using the CCS packet switching technique to an NCP where replies are formulated and returned to the originating offices.

**1.04** An NCP interfaces with a CCS network via 56-kbps (kilobits per second) digital A-links (access signaling links) and a ring architecture. The ring architecture is based on the CNI (common network interface) and IMS (interprocess message switch) subsystems consisting of link nodes and ring peripheral controller nodes.

**B. Purpose**

**1.05** The purpose of a ring node frame/cabinet is to provide an environment for units associated with the CNI ring node circuit. A ring node frame/cabinet provides two ring peripheral controller nodes and a maximum of eight link nodes (two link nodes minimum). A ring node frame/cabinet also provides the following:

- (a) —48 Vdc power to all ring node frame/cabinet units
- (b) An alarm circuit for monitoring frame/cabinet power
- (c) Scan point indications to the AT&T 3B20D computer to report power status
- (d) Signals to the NCP office alarm unit indicating a power problem
- (e) A fan unit to cool ring node frame/cabinet units.

**2. PHYSICAL DESCRIPTION**

**RING NODE FRAME (J3F011B)**

**2.01** The ring node frame (J3F011B), used in 1ANCPs equipped with a 3B20D model 1 computer, is shown in Fig. 1. A ring node frame is a 26-inch wide single bay, 18-inch deep, 7-foot high standard framework assembly (ED-5A001-70, G4). It operates on —48 Vdc as provided by the power distribution frame. A typical ring node frame houses the following units:

- (a) Link node unit B (two units)
- (b) Control panel unit
- (c) 3B interface unit (two units)
- (d) Plenum cover assembly
- (e) Fan unit
- (f) Fuse panel unit
- (g) Filter unit.

A plenum cover assembly is used to help force air from the fan unit through to the top of a ring node frame.

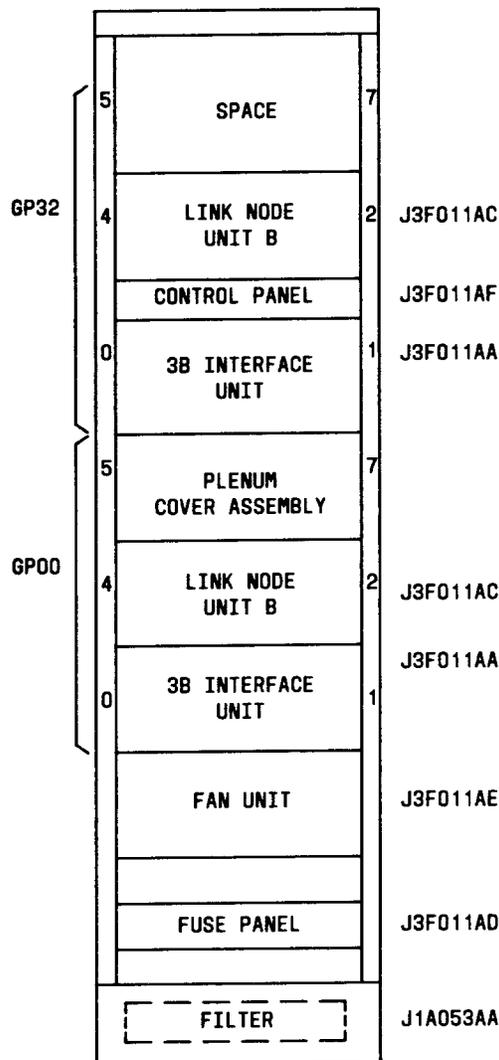


Fig. 1—Ring Node Frame (J3F011B)

#### A. Link Node Unit B

**2.02** A ring node frame may be equipped with two B-type link node units. Each link node unit B (Fig. 2) is a 132B apparatus mounting arranged to hold one dc-dc power converter, one interframe buffer, circuit packs for one link node minimum, and the required backplane wiring connections. The dc-dc power converter converts  $-48$  Vdc from the fuse

panel unit to 5 Vdc and distributes it to circuit packs housed in the unit.

**2.03** Each link node has an unequipped circuit pack position labeled "spare." This location has all the backplane wiring necessary to accommodate a second link interface for a future application.

**2.04** A B-type link node unit may expand to meet growing digital A-link traffic requirements. A fully equipped link node unit B holds a maximum of two dc-dc power converters, two interframe buffers, circuit packs for three link nodes, and the required backplane wiring connections (Fig. 3).

**2.05** The link node unit near the top of the frame may house link nodes 32-2, 32-3, and 32-4. The remaining link node unit may house link nodes 00-2, 00-3, and 00-4.

#### B. Control Panel Unit

**2.06** The control panel unit (Fig. 4) provides the following:

- (a) Three sets of 238AM-type jacks for two portable data terminals (TTY A A1 and TTY B B1) and a spare (SPARE 1 and 2)
- (b) One set of 223AM-type jacks for an office telephone circuit (TEL OFFICE)
- (c) A 234C- and 361C-type jack for a 660-type telephone circuit (TEL 660 PANEL)
- (d) A 624C4-type alarm cutoff key (ALARM CUTOFF)
- (e) A 624M4-type lamp test key (LAMP TEST)
- (f) An M1-type power alarm lamp (PWR ALM) mounted in a 624C4-type power alarm reset key (PWR ALM RESET)
- (g) Terminal strips (AFA, AFB, and AFC) located on the rear of the unit (not shown in Fig. 4).

The jack circuits are currently not used in an NCP.

#### C. 3B Interface Unit

**2.07** A ring node frame contains two 3B interface units. Each 3B interface unit (Fig. 5) is a 132B

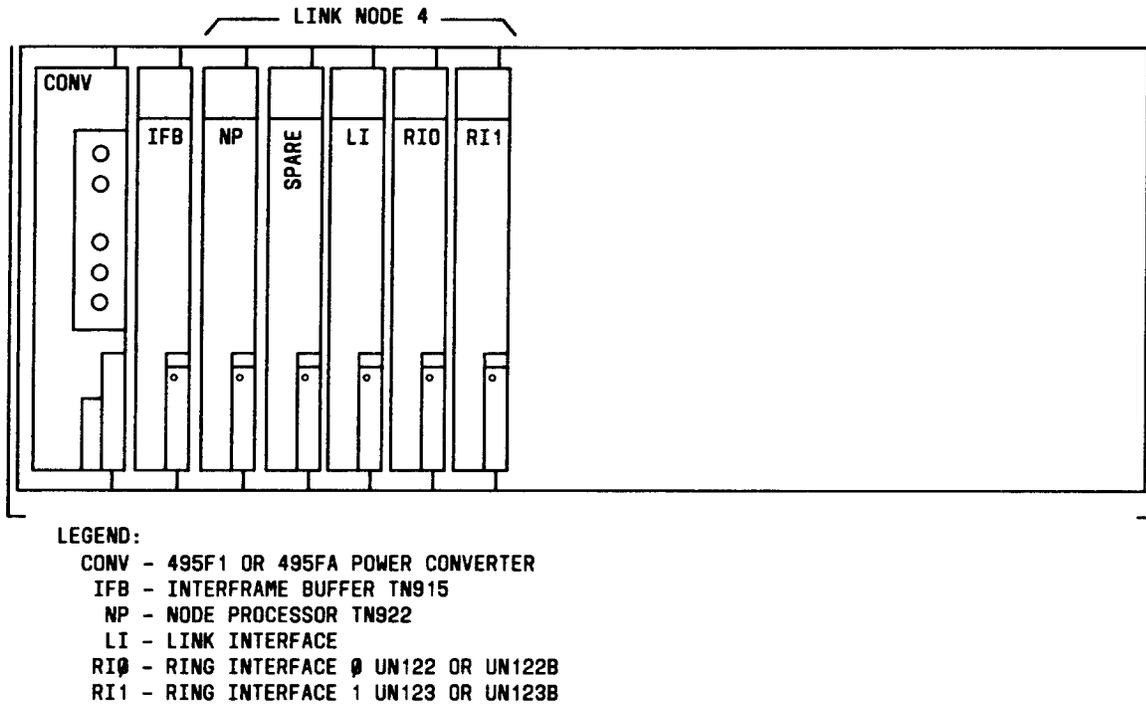


Fig. 2—Link Node Unit

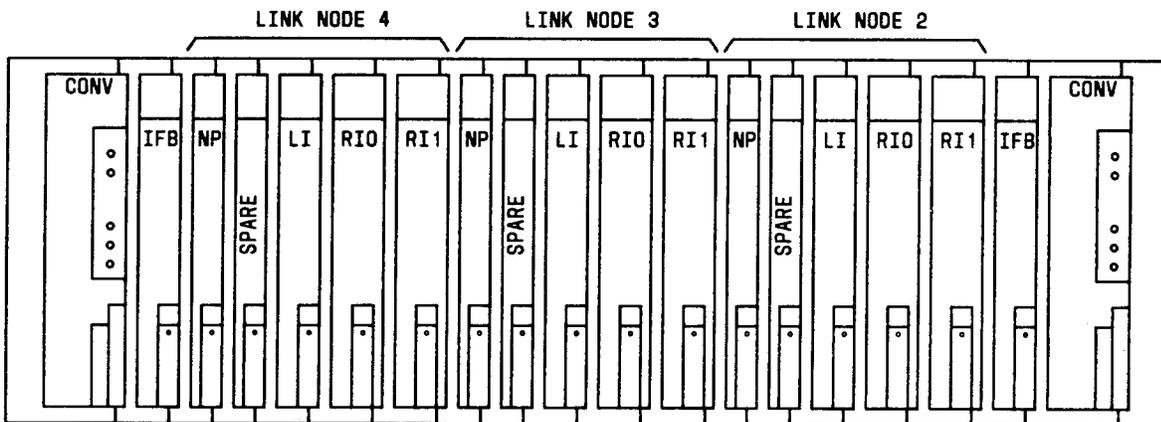


Fig. 3—Link Node Unit (Fully Equipped)

apparatus mounting arranged to hold two dc-dc power converters, two interframe buffers, circuit packs for one ring peripheral controller node, circuit packs for one link node, and the required backplane wiring connections. A dc-dc power converter converts -48 Vdc from the fuse panel unit to 5 Vdc and distributes it to circuit packs housed in the unit.

**2.08** Each ring peripheral controller node has one or two unequipped circuit pack positions. These locations have all the backplane wiring necessary to accommodate additional circuit packs for future applications.

**2.09** Each link node has one unequipped circuit pack position labeled "spare." This circuit

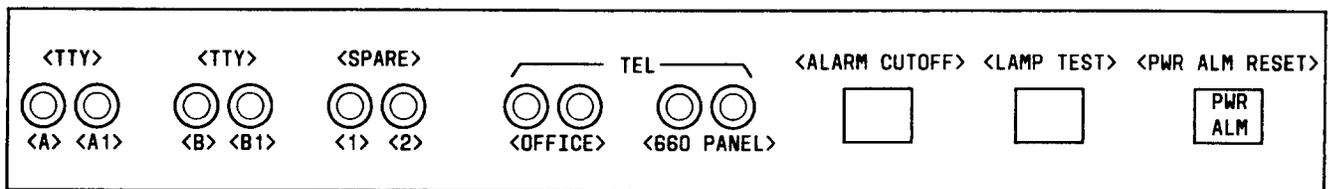


Fig. 4—Control Panel Unit

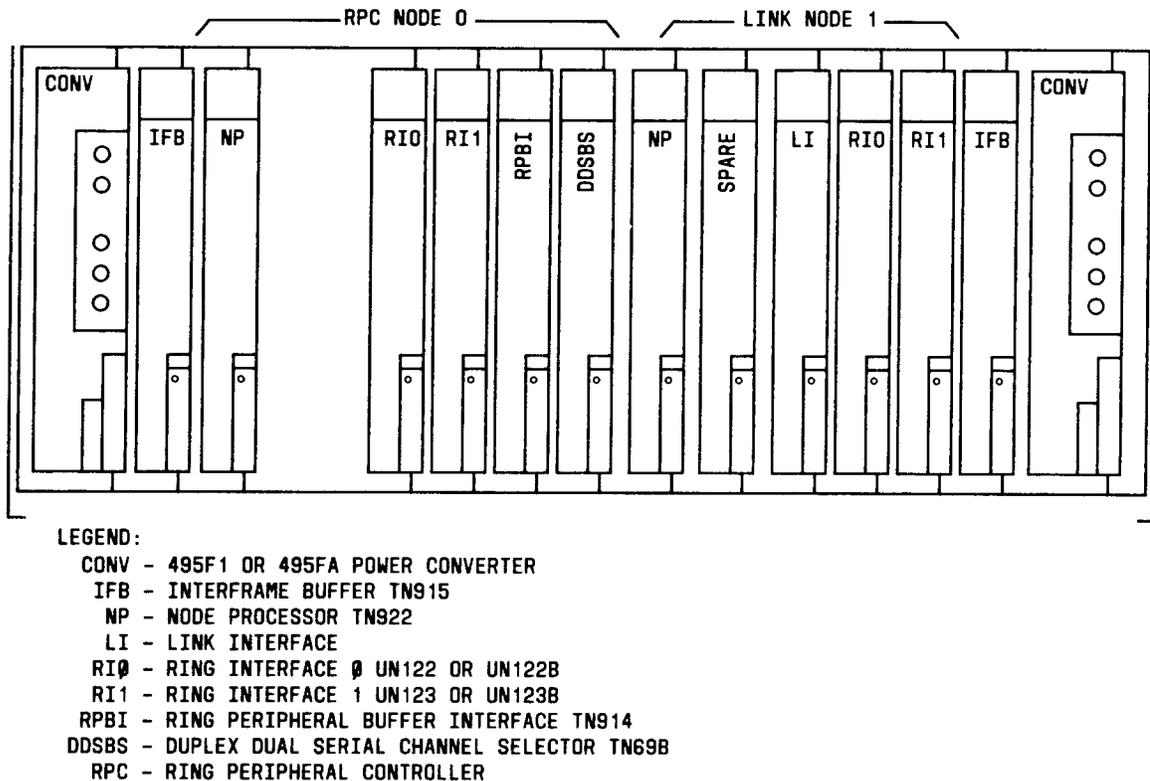


Fig. 5—3B Interface Unit

pack location has all the backplane wiring necessary to accommodate an additional circuit pack for future applications.

**2.10** The 3B interface unit near the top of the frame houses ring peripheral controller node 32-0 and link node 32-1. The remaining 3B interface unit houses ring peripheral controller node 00-0 and link node 00-1.

#### D. Fan Unit

**2.11** The fan unit (Fig. 6) consists of a mesh air filter to trap dust particles, three —48 Vdc powered fans, and a fan failure detection circuit. Each fan is equipped with a connector (P1 through P3) to facilitate quick replacement if a fan fails. The fan unit also provides three fan failure LED indicators (FAN 0 ALM through FAN 2 ALM) and a common fan alarm reset switch (FAN ALM RST) located along the front of the fan unit.

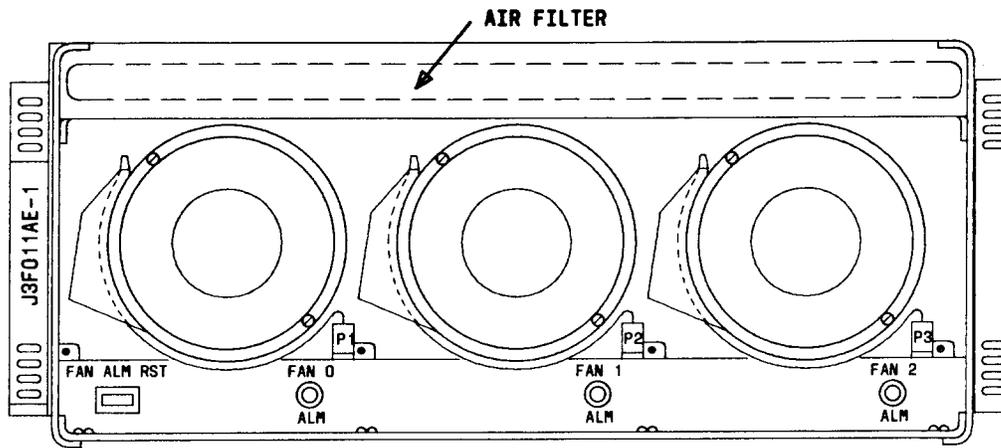


Fig. 6—Fan Unit

**E. Fuse Panel Unit**

2.12 The fuse panel unit (Fig. 7) consists of the following:

- (a) Four AJ63-type alarm relays (MJ1, MJ2, MN1, and MN2)
- (b) Three 30B fuse blocks and three 24C fuse blocks
- (c) One M1-type fuse alarm lamp (FA)
- (d) Terminal strips AD-A and AD-B located on the rear of the unit (not shown in Fig. 7).

2.13 The six —48 Vdc frame power feeders from the filter unit terminate on the rear of the fuse panel unit. The —48 Vdc frame power feeders are hardwired through the fuse blocks to the terminal strips at the rear of the unit. Connectorized cables are used to connect the terminal strips to the link

node units, 3B interface units, and the fan unit. The alarm relays are connected to the NCP office scanner circuit, via the control panel unit.

**F. Filter Unit**

2.14 The filter unit, located in the base of a ring node frame (Fig. 1), contains a maximum of six separate —48 Vdc filter capacitors. The six frame power feeders (ED-5A079-30, G4) from the power distribution frame terminate on the filter capacitors. The frame power feeders are hard wired from the filter capacitors to the fuse panel unit.

**RING NODE CABINET (J3F011D)**

2.15 The ring node cabinet (J3F011D), used in 1ANCPs equipped with a 3B20D model 3 computer and 1BNCPs, is shown in Fig. 8. A ring node cabinet is a 26-inch wide single bay, 30-inch deep, 6-foot high cabinet enclosure (ED-4C270-71, G4). It operates on —48 Vdc as provided by the power distri-

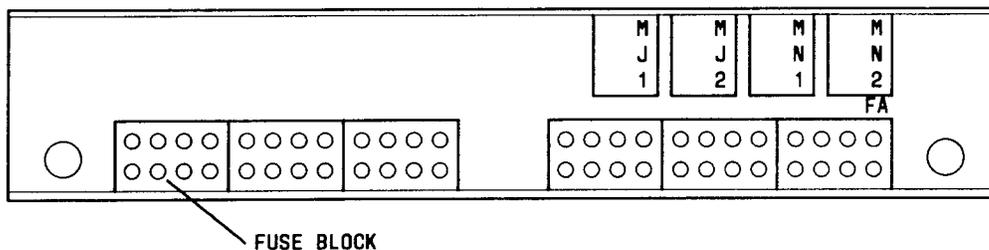


Fig. 7—Fuse Panel Unit

bution cabinet. A typical ring node cabinet houses the following units:

- (a) Fuse panel and alarm control unit
- (b) Plenum cover assembly (two units)
- (c) Link node unit B (two units)
- (d) 3B interface unit (two units)
- (e) Cooling unit.

The two plenum cover assemblies are used to force air from the cooling unit through to the top of a ring node cabinet. A ring node cabinet is also equipped with doors front and back, casters, and insulating, nylon-tipped, adjustable leveling feet.

#### A. Fuse Panel and Alarm Control Unit

**2.16** The fuse panel and alarm control unit (Fig. 9) consists of the following:

- (a) A 624B4-type alarm cutoff key (ALARM CUTOFF)
- (b) A 624B4-type lamp test key (LAMP TEST)
- (c) An M1-type power alarm lamp mounted in a 624C4-type alarm reset key (ALARM RESET)
- (d) One set of 223CM-type jacks for an office telephone (TEL)
- (e) Two sets of 238CM-type jacks for one portable data terminal (TTY) and a spare (SPARE)
- (f) Six 30D fuse blocks
- (g) Two AK4-type alarm relays (MJA mounted with MNA, and MJB mounted with MNB) (not shown in Fig. 9)
- (h) Terminal strips (DA-A, DA-B, and DA-C) located on the rear of the unit (not shown in Fig. 9).

The jack circuits are currently not used in an NCP.

**2.17** The six cabinet power feeders (ED-5A079-30, G15) from the power distribution cabinet terminate on the rear of the fuse panel and alarm con-

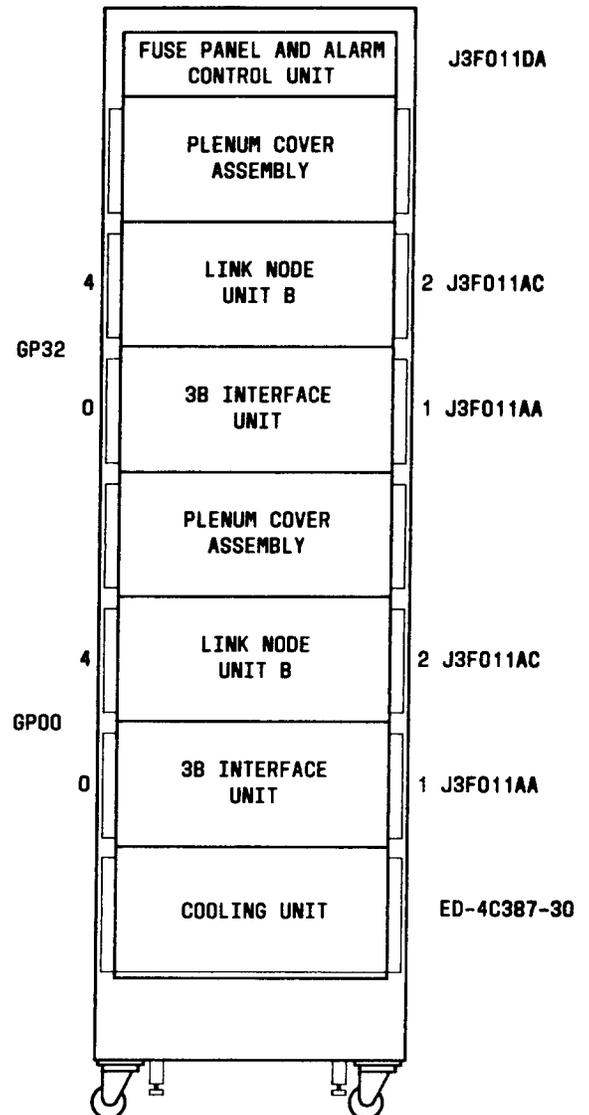


Fig. 8—Ring Node Cabinet

trol unit. The  $-48$  Vdc power feeders are hardwired through the fuse blocks to the terminal strips DA-A and DA-B located on the rear of the unit.

#### B. Link Node Unit B

**2.18** A ring node cabinet may be equipped with two B-type link node units. Each link node unit B (Fig. 2) is a 132B apparatus mounting arranged to hold one dc-dc power converter, one interframe buffer, circuit packs for one link node minimum, and the required backplane wiring connections. The dc-dc power converter converts  $-48$  Vdc from the fuse

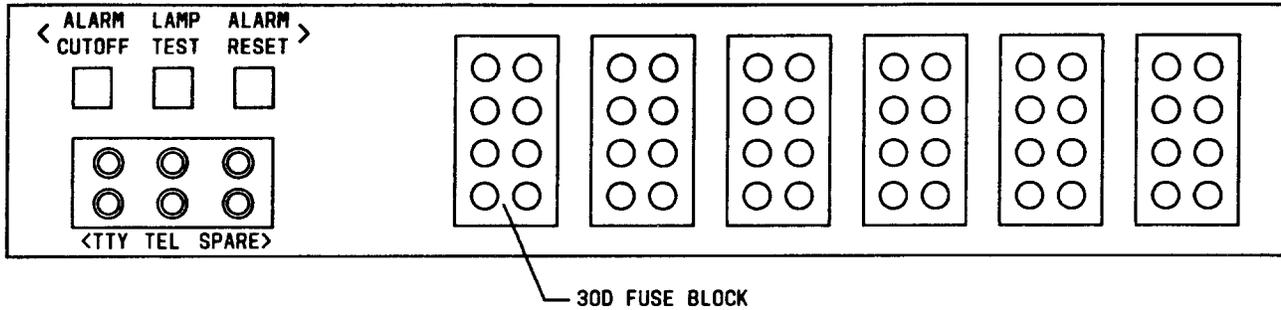


Fig. 9—Fuse Panel and Alarm Control Unit

panel and alarm control unit to 5 Vdc and distributes it to circuit packs housed in the unit.

**2.19** Each link node has an unequipped circuit pack position labeled “spare.” This location has all the backplane wiring necessary to accommodate a second link interface for a future application.

**2.20** A B-type link node unit may expand to meet growing digital A-link traffic requirements. A fully equipped link node unit B holds a maximum of two dc-dc power converters, two interframe buffers, circuit packs for three link nodes, and the required backplane wiring connections (Fig. 3).

**2.21** The link node unit near the top of the cabinet may house link nodes 32-2, 32-3, and 32-4. The remaining link node unit may house link nodes 00-2, 00-3, and 00-4.

**C. 3B Interface Unit**

**2.22** A ring node frame contains two 3B interface units. Each 3B interface unit (Fig. 5) is a 132B apparatus mounting arranged to hold two dc-dc power converters, two interframe buffers, circuit packs for one ring peripheral controller node, circuit packs for one link node, and the required backplane wiring connections. A dc-dc power converter converts -48 Vdc from the fuse panel and alarm control unit to 5 Vdc and distributes it to circuit packs housed in the unit.

**2.23** Each ring peripheral controller node has one or two unequipped circuit pack positions. These locations have all the backplane wiring necessary to accommodate additional circuit packs for future applications.

**2.24** Each link node has one unequipped circuit pack position labeled “spare.” This circuit pack location has all the backplane wiring necessary to accommodate an additional circuit pack for future applications.

**2.25** The 3B interface unit near the top of the cabinet houses ring peripheral controller node 32-0 and link node 32-1. The remaining 3B interface unit houses ring peripheral controller node 00-0 and link node 00-1.

**D. Cooling Unit**

**2.26** The cooling unit (Fig. 10) consists of two fan tray assemblies. Each fan tray assembly is equipped with two -48 Vdc powered fans, a mesh air filter to trap dust particles, and a fan failure detector circuit. Each fan tray assembly also provides two fan failure LED indicators (FAN A and B), a red off switch (OFF), and a green on/reset switch (ON/RESET).

**3. FUNCTIONAL DESCRIPTION**

**3.01** The CNI ring node circuits interface the AT&T 3B20D computer of an NCP with digital facility access circuits as shown in Fig. 11. The ring node circuits and the digital facility access circuits terminate digital A-links (access signaling links) at an NCP. An NCP uses digital A-links to communicate with a No. 2 signal transfer point office or a No. 2A signal transfer point office. For a description of the digital facility access frame/cabinet, see AT&T Practice 256-100-107.

**3.02** The ring node circuits use the ring concept to transmit and receive messages to and from

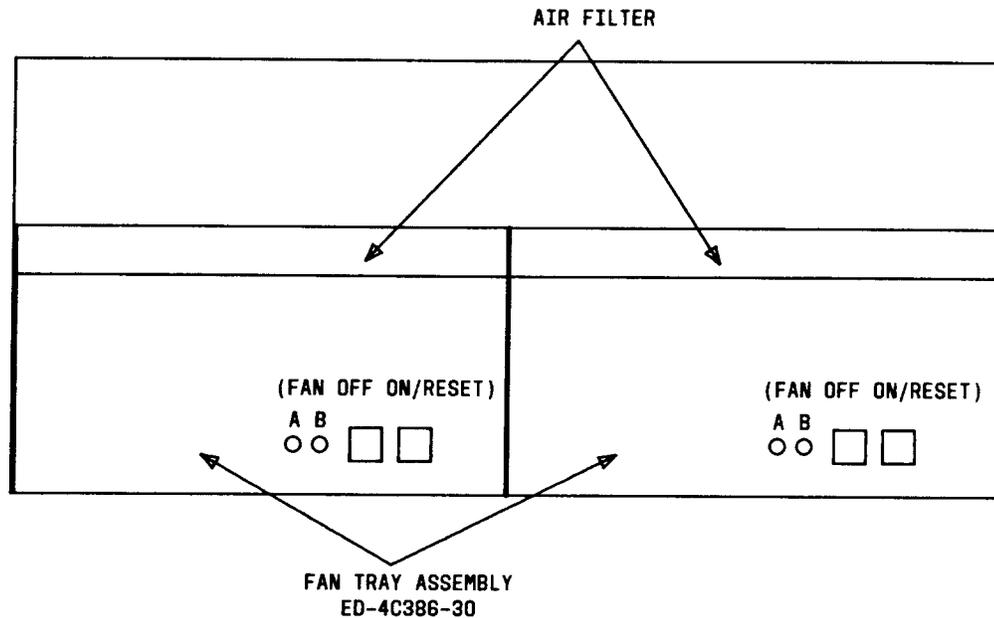


Fig. 10—Cooling Unit

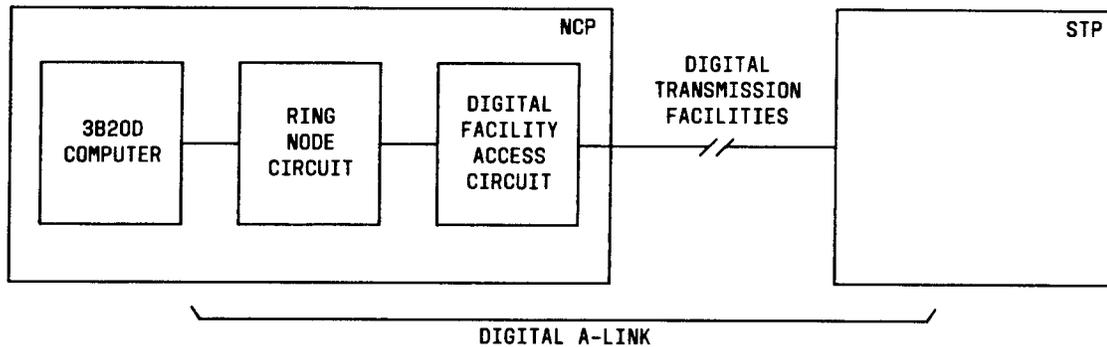


Fig. 11—Ring Node Circuit Relationships

digital facility access circuits. Physically the ring is an electrical loop where two 10-bit ring buses (ring bus 0 and ring bus 1) interconnect circuits known as ring nodes (Fig. 12). The data is propagated in one direction on ring bus 0 and in the opposite direction on ring bus 1. The data is passed from one ring node to the next ring node, one byte of data at a time, at a minimum rate of 4-megahertz.

**3.03** Messages, which contain the address of both the source and destination ring nodes, are placed on the ring by a ring node. When the ring

nodes between the source and destination see an address that is not their own, they allow the message to pass to the next ring node. The ring node designated as the destination, upon detecting its address, removes the message from the ring. The messages may be inserted onto the ring or removed from the ring by any ring node.

**3.04** A special message called a token continually circulates around the ring and permits messages to be placed on the ring without causing a loss of control or confusion. When a ring node is ready to

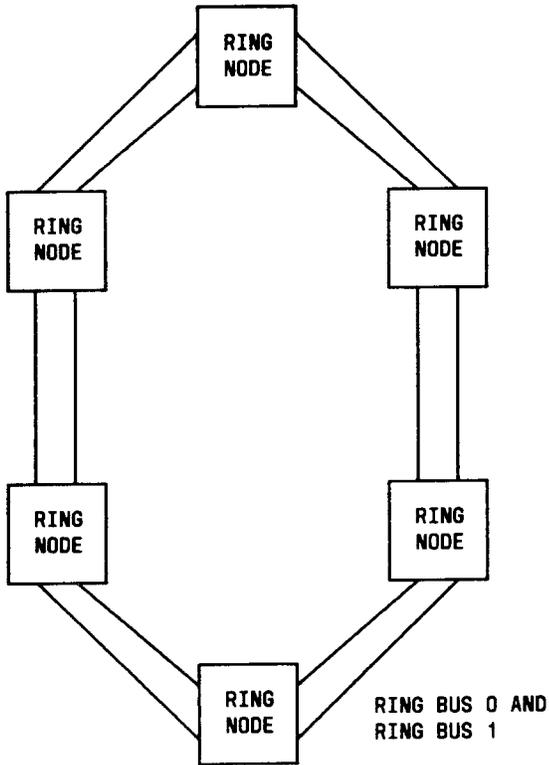


Fig. 12—Simplified Ring

place a message on the ring, it must wait for the arrival of the token message at the output of the previous ring node. The ring node detains the token message at the output of the previous ring node and allows the message to be placed on the ring. When the transfer is complete, the token message is allowed to proceed. The ring node is also capable of placing messages on the ring after the last byte of any message has passed through its input. This capability is not used except for the token or special maintenance messages.

**3.05** There are two types of ring nodes; ring peripheral controller nodes and link nodes (Fig. 13). Ring peripheral controller nodes act as an interface between the ring and the AT&T 3B20D computer. An NCP is equipped with two ring peripheral controller nodes (00-0 and 32-0). Link nodes act as an interface between the ring and the digital facility access circuits. An NCP may be equipped with a minimum of two link nodes (00-1 and 32-1) or up to a maximum of eight (00-1 through 00-4 and 32-1 through 32-4).

**A. Link Node**

**3.06** A link node acts as an interface between the ring and a digital facility access circuit. The purpose of a link node is to transfer and control the flow of messages between the ring and a digital facility access circuit. A link node consists of the following as shown functionally in Fig. 14:

- (a) NP (node processor)
- (b) RI0 (ring interface 0)
- (c) RI1 (ring interface 1)
- (d) LI (link interface)
- (e) Node processor bus.

**Node Processor**

**3.07** The node processor provides message handling and control functions. Messages from the ring are relayed by the node processor to the link interface for transmission to a digital facility access circuit. The node processor also accepts messages from the link interface and provides temporary storage before moving them to the ring at the appropriate time. Maintenance functions as well as data messages are handled by the node processor.

**3.08** The node processor is a single board micro-computer that contains an 8086 central processing unit with 32K bytes of program memory (read-only memory), 512K bytes of data memory (random-access memory), timers, interrupt controllers, and direct memory access channels for communications with the ring interfaces and the link interface.

**Ring Interface 0 and 1**

**3.09** The ring interface 0 and ring interface 1 provide the interface between the node processor and the ring bus 0 and ring bus 1, respectively. The ring interface 0 and ring interface 1 provide the circuitry required to interface the 16-bit node processor bus to the 10-bit ring bus 0 and ring bus 1 when messages pass between the node processor and either ring bus. The ring interface 0 and ring interface 1 insert messages on the ring, extract messages from the ring, pass messages along the ring, perform error

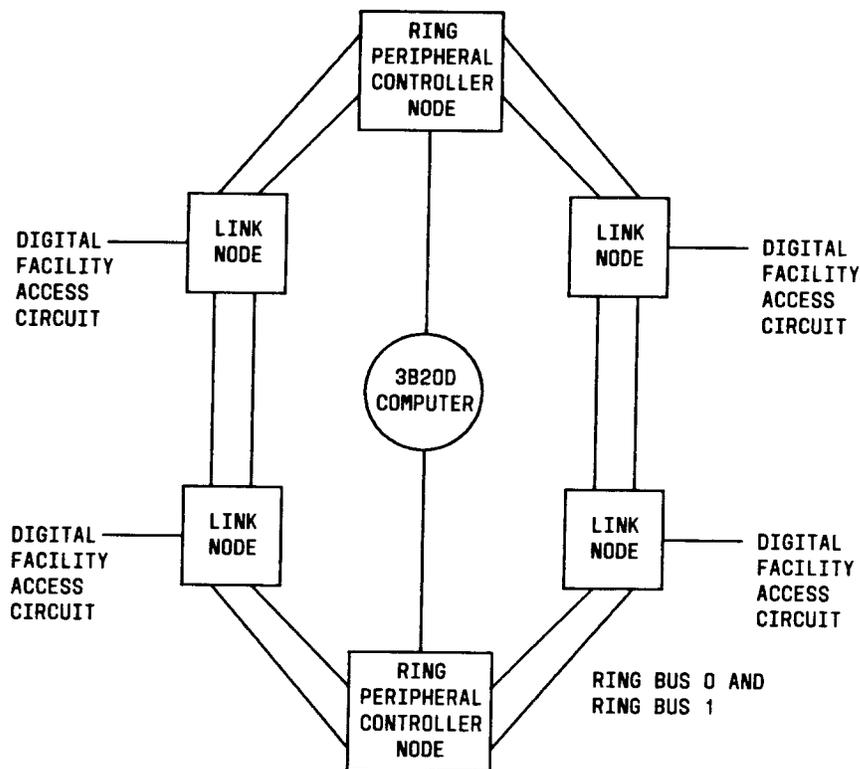


Fig. 13—Simplified NCP Ring

checks, perform ring reconfigurations to isolate faulty ring nodes, and other maintenance functions.

**3.10** Neither ring interface 0 or ring interface 1 can function without the other. A node processor logic circuit is split between RI0 and RI1 and determines which ring interface will be used for each transaction.

#### Link Interface

**3.11** The link interface controls the transfer of messages between the node processor and a digital facility access circuit. The link interface provides control and lower levels of signaling link protocol. The link interface converts the TTL (transistor-transistor) logic to a RS422/RS423 signal (or vice versa) that is compatible with a digital facility access circuit. The data rate is 56 kilobits per second.

**3.12** The link interface has two ports (A and B) which connect to a digital facility access frame circuit. Port A connects to a digital service

adapter on the digital facility access frame/cabinet. Port B is not used.

**3.13** The link interface circuit consists of an 8086 central processing unit, 32K bytes of program memory (read-only memory), 32K bytes of data memory (random-access memory), and circuitry to interface with a digital facility access circuit.

#### Node Processor Bus

**3.14** The node processor bus provides communications between circuit packs within a link node over a common group of leads. The node processor bus is a 16-bit bidirectional data path with parity similar to many microcomputer buses.

#### B. Interframe Buffer

**3.15** The interframe buffer padded is a circuit which extends the ring from one ring node to the next ring node on the ring as shown in Fig. 15. The interframe buffer padded provides balanced drivers and receivers to overcome electrical problems

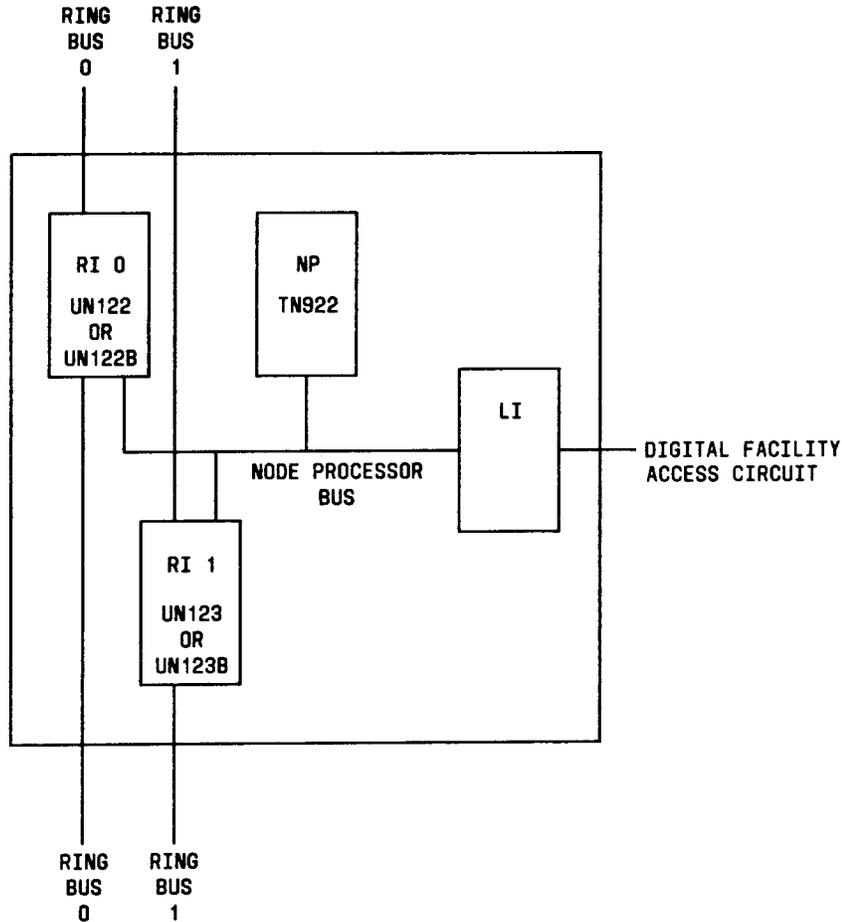


Fig. 14—NCP Link Node

associated with lengths of cable between the ring nodes. The interframe buffer padded provides 256K bytes of storage to provide enough buffering for long messages.

**C. Control Panel Unit**

**3.16** The control panel unit on a ring node frame provides various communications, alarm, and control functions. The control panel unit (Fig. 4) provides jacks for the following: two portable data terminals (TTY A A1 and TTY B B1); a spare (SPARE 1 and 2); an office telephone (TEL OFFICE); and a 660-type telephone circuit (TEL 660 PANEL). The jack circuits are currently not used in an NCP.

**3.17** The alarm cutoff (ALARM CUTOFF) key, lamp test (LAMP TEST) key, and the power alarm reset (PWR ALM RESET) key which contains

the power alarm (PWR ALM) lamp are associated with the frame power and alarm circuitry.

- (a) The ALARM CUTOFF key momentarily closes the scan circuit signaling the central processor to cut off the present audible alarm. Subsequent alarms are not inhibited by this action.
- (b) The LAMP TEST key activates the FA (fuse alarm) lamp on the fuse panel unit and the PWR ALM lamp on the control panel unit.
- (c) The PWR ALM RESET key is used to release activated alarm relays after all power trouble has been cleared. However, if the alarm was due to a voltage problem in the fan system, the problem must be corrected and the alarm reset switch must be operated on the fan failure

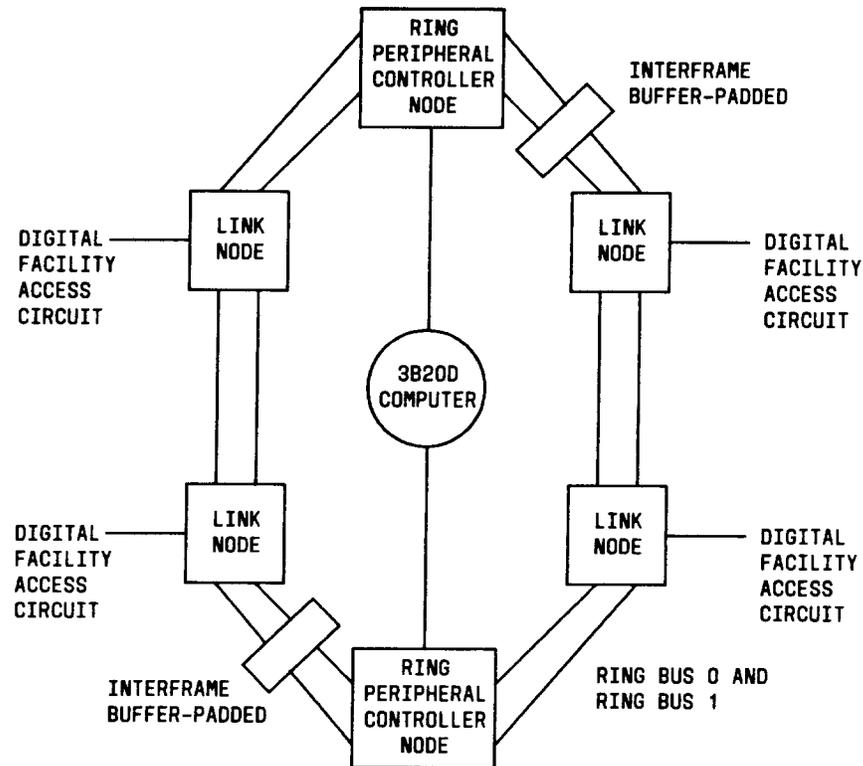


Fig. 15—Interframe Buffer—Padded

detector circuit pack prior to operating the PWR ALM RESET key.

(d) The PWR ALM lamp indicates a power alarm on the ring node frame.

#### D. Ring Peripheral Controller Node

**3.18** A ring peripheral controller node acts as an interface between the ring and the 3B20D computer. The purpose of a ring peripheral controller node is to transfer and control the flow of messages between the ring and the 3B20D computer. A ring peripheral controller node consists of the following as shown functionally in Fig. 16:

- (a) NP (node processor)
- (b) RI0 (ring interface 0)
- (c) RI1 (ring interface 1)
- (d) RPBI (ring peripheral bus interface)

(e) DDSBS (duplex dual serial channel bus selector)

(f) Node processor bus.

#### Node Processor

**3.19** The node processor provides message handling and control functions for the ring peripheral controller node. Messages from the ring are relayed by the node processor to the ring peripheral bus interface and the duplex dual serial channel bus selector for transmission to the 3B20D computer. The node processor also accepts messages from the ring peripheral bus interface and provides temporary storage before moving them to the ring at the appropriate time. Maintenance functions as well as data messages are handled by the node processor.

**3.20** The node processor is a single board micro-computer that contains an 8086 central processing unit with 32K bytes of program memory (read-only memory), 512K bytes of data memory (random-access memory), timers, interrupt control-

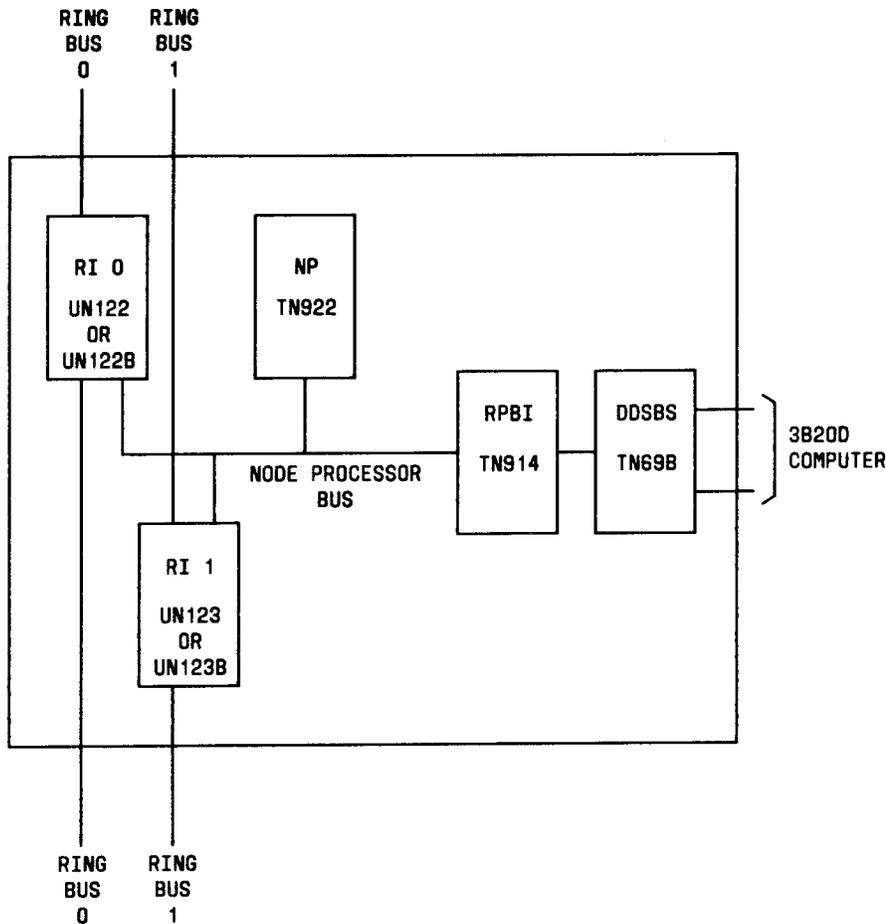


Fig. 16—NCP Ring Peripheral Controller Node

lers, and direct memory access channels for communications with the ring interfaces and the ring peripheral bus interface.

**Ring Interface 0 and 1**

**3.21** The ring interface 0 and ring interface 1 provide the interface between the node processor and the ring bus 0 and ring bus 1, respectively. The ring interface 0 and ring interface 1 provide the circuitry required to interface the 16-bit node processor bus to the 10-bit ring bus 0 and ring bus 1 when messages pass between the node processor and either ring bus. The ring interface 0 and ring interface 1 insert messages on the ring, extract messages from the ring, pass messages along the ring, perform error checks, perform ring reconfigurations to isolate faulty ring nodes, and other maintenance functions.

**3.22** Neither ring interface 0 or ring interface 1 can function without the other. A node processor logic circuit is split between RI0 and RI1 and determines which ring interface will be used for each transaction.

**Ring Peripheral Bus Interface**

**3.23** The ring peripheral bus interface interfaces the node processor to the duplex dual serial bus selector. The ring peripheral bus interface performs protocol conversion between the node processor and the duplex dual serial bus selector, and converts the 16-bit node processor data to 32-bit duplex dual serial bus selector data (and vice versa). The ring peripheral bus interface also provides various maintenance and diagnostic capabilities.

### Duplex Dual Serial Bus Selector

**3.24** The duplex dual serial bus selector interfaces the ring peripheral bus interface with the 3B20D computer. The duplex dual serial bus selector converts parallel format data (used by the ring peripheral bus interface) to serial format data used by the dual serial channel of the 3B20D computer.

### E. Fuse Panel Unit

**3.25** The fuse panel unit distributes —48 Vdc from the filter unit to each unit on a ring node frame. The fuse panel unit also contains frame alarm relays and monitors power on the ring node frame.

**3.26** A maximum of six fuse blocks provide overcurrent protection and distribute —48 Vdc to each unit on the ring node frame. Two sets of fuses are provided for each ring node frame unit, one for each dc-dc power converter. The remaining fuses are used for frame alarm relays and lamps.

**3.27** All fuse and dc-dc power converter alarms are collected at the fuse panel unit. The two categories of alarms are major and minor. The major and minor alarms are activated by alarm relay contact closures. The following conditions activate a major alarm.

- (a) Failure of a dc-dc power converter.
- (b) Failure of a fuse serving a dc-dc power converter.

All other fuse failures and fan failures result in a minor alarm.

**3.28** Failure of a dc-dc power converter activates alarm relay MJ2. Alarm relay MJ2 signals the central processor of a major alarm via a scan point indication, signals the office alarm frame, and lights the PWR ALM lamp on the control panel unit.

**3.29** Failure of a fuse serving a dc-dc power converter activates alarm relay MJ1. Alarm relay MJ1 lights the FA lamp on the fuse panel unit and activates alarm relay MJ2. Alarm relays MJ1 and MJ2 signal the central processor of a major alarm via scan point indications and signal the office alarm unit. Alarm relay MJ2 also lights the PWR ALM lamp on the control panel unit.

**3.30** Failure of a fan activates alarm relay MN2.

Alarm relay MN2 signals the central processor of a minor alarm via a scan point indication, signals the office alarm unit, and lights the PWR ALM lamp on the control panel unit.

**3.31** Failure of any minor fuse activates alarm relay MN1. Alarm relay MN1 lights the FA lamp on the fuse panel unit and activates alarm relay MN2. Alarm relays MN1 and MN2 signal the central processor of a minor alarm via scan point indications and signal the office alarm unit. Alarm relay MN2 also lights the PWR ALM lamp on the control panel unit.

### F. Fan Unit

**3.32** The three —48 Vdc powered fans blow air upward through the equipment mounted on the ring node frame. The covers on the front of the fans help to prevent air leaks. Each fan also has an air filter which must be cleaned or replaced periodically. The fan unit has a common RESET switch and three FAN ALM (0-2) lamps which signal power problems. A minimum spacing of 1 inch between circuit packs should be maintained to provide adequate channels for cooling.

**3.33** A fan alarm will light one of the three FAN ALM (0-2) lamps indicating which fan has failed. A fan alarm will also activate alarm relays MN1 and MN2 on the fuse panel unit. To reset a fan alarm, a new fan and/or fuse must be installed. Once the fan is operational, the fan alarm RESET key on the fan unit must be operated. Next, the power alarm reset (PWR ALM RESET) key on the control panel unit must be operated to release the alarm relays MN1 and MN2.

### G. Filter Unit

**3.34** The filter unit on a ring node frame consists of a maximum of six —48 Vdc filter capacitors used for decoupling power surges and to provide energy storage for clearing fuses when they blow. The six frame power feeders terminate on the capacitors.

### H. Fuse Panel and Alarm Control Unit

**3.35** The fuse panel and alarm control unit on a ring node cabinet provides various communications, control, power distribution, and alarm functions. The fuse panel and alarm control unit provides

jacks for one portable data terminal (TTY), an office telephone (TEL), and a spare (SPARE). The jack circuits are currently not used in an NCP.

**3.36** The alarm cutoff (ALARM CUTOFF) key, lamp test (LAMP TEST) key, and the power alarm reset (ALARM RESET) key which contains the power alarm lamp are associated with the cabinet power and alarm circuitry.

- (a) The ALARM CUTOFF key momentarily closes the scan circuit signaling the central processor to cut off the present audible alarm. Subsequent alarms are not inhibited by this action.
- (b) The LAMP TEST key activates the power alarm lamp.
- (c) The ALARM RESET key is used to release activated alarm relays after all power trouble has been cleared. However, if the alarm was due to a voltage problem in the fan system, the problem must be corrected, and the ON/RESET switch must be operated on the cooling unit prior to operating the ALARM RESET key.
- (d) The power alarm lamp visually indicates a power alarm on the ring node cabinet.

**3.37** The fuse panel and alarm control unit distributes -48 Vdc to each unit on the ring node cabinet. A maximum of six fuse blocks provide overcurrent protection and distribute -48 Vdc to each unit on the ring node cabinet. Two sets of fuses are provided for each ring node cabinet unit, one for each dc-dc power converter. The remaining fuses are used for alarm relays and lamps.

**3.38** The fuse panel and alarm control unit also contains alarm relays and monitors power on the ring node cabinet. All fuse and dc-dc power converter alarms are collected at the fuse panel and alarm control unit. The two categories of alarms are major and minor. The major and minor alarms are activated by alarm relay contact closures. The following conditions activate a major alarm.

- (a) Failure of a dc-dc power converter.
- (b) Failure of a fuse serving a dc-dc power converter.

- (c) Failure of two fans in a tray assembly.

All other fuse failures and fan failures result in a minor alarm.

**3.39** Failure of a dc-dc power converter activates alarm relay MJB. Alarm relay MJB signals the central processor of a major alarm via a scan point indication, signals the office alarm unit, and lights the power alarm lamp.

**3.40** Failure of a fuse serving a dc-dc power converter activates alarm relay MJA. Alarm relay MJA activates alarm relay MJB. Alarm relays MJA and MJB signal the central processor of a major alarm via scan point indications and signal the office alarm unit. Alarm relay MJB also lights the power alarm lamp.

**3.41** Failure of two fans in a fan tray assembly activates alarm relay MJB. Alarm relay MJB signals the central processor of a major alarm via a scan point indication, signals the office alarm unit, and lights the power alarm lamp.

**3.42** Failure of one fan activates alarm relay MNB. Alarm relay MNB signals the central processor of a minor alarm via a scan point indication, signals the office alarm unit, and lights the power alarm lamp.

**3.43** Failure of any minor fuse activates alarm relay MNA. Alarm relay MNA activates alarm relay MNB. Alarm relays MNA and MNB signal the central processor of a minor alarm via scan point indications and signal the office alarm unit. Alarm relay MNB also lights the power alarm lamp.

#### I. Cooling Unit

**3.44** The four -48 Vdc powered fans blow air upward through the equipment mounted on the ring node cabinet. The cooling unit has two fan tray assemblies. Each fan tray assembly houses two fans, a common off (OFF) and on/reset (ON/RESET) switches, and two fan alarm (FAN A B) lamps which signal power problems.

**3.45** In the event of a fan failure, a fan alarm will light one of the two fan alarm lamps (FAN A B) indicating which fan has failed. A fan alarm will also activate alarm relays MNA and MNB and light the power alarm lamp on the fuse panel and alarm

control unit. To reset a fan alarm, a new fan and/or fuse must be installed. Once the fan is operational, the fan ON/RESET switch on the fan tray assembly must be depressed. Next, the alarm reset (ALARM RESET) key on the fuse panel and alarm control unit must be operated to release the activated alarm relays MNA and MNB.

#### 4. GLOSSARY

**4.01** The following list of acronyms and abbreviations are the most commonly used when referring to the ring node frame/cabinet used in an NCP.

ACO	alarm cutoff	DFAF	digital facility access frame
A-link	access signaling link	IFB	interframe buffer
bps	bits per second	IFBP	interframe buffer-padded
CCS	common channel signaling	LED	light-emitting diode
CCSS	Common Channel Signaling Systems	LI	link interface
DDSBS	duplex dual serial bus selector	LN	link node
DFA	digital facility access	NCP	network control point
		NP	node processor
		RI	ring interface
		RPBI	ring peripheral bus interface
		RPCN	ring peripheral controller node
		1ANCP	No. 1A network control point
		1BNCP	No. 1B network control point