COMMON SYSTEMS
AT&T 3B20D MODELS 1, 2 AND 3 COMPUTER
AC & DC POWER DISTRIBUTION CIRCUIT

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This circuit provides:

(a) DC connections from 3B20D frames to a local dc power distributing frame.

(b) AC connections from 3B20D frame to a local ac distribution panel.

(c) Grounding of 3B20D to a single-point ground.

1.02 This document also provides electrical load data for individual frames to allow central office planners to estimate future electrical loads.

2. GENERAL DESCRIPTION OF OPERATION

2.01 The 3B20D is organized by frame. Each frame requires a specific number of ac and dc current-carrying circuits. AC circuits originate at the local ac distribution panel. DC circuits originate at the assigned dc power distributing frame.

2.02 Each frame is grounded to a single-point grounding system.

2.03 DC power is provided by a 48V dc system which generally consists of dc batteries which are kept continually charged by rectifying commercial ac power. The dc power is delivered to individual frames via a dc power distributing frame. This power is further converted to logic level voltages within the processor frames by individual dc-to-dc converters.

2.04 AC power is provided by either a commercial source of ac or a standby engine-generator system. Power is distributed to individual frames, via the ac house service panel, a feeder, and a local ac distribution panel.

2.05 The system derives a ground reference, via a single-point ground system. This ground reference is used to ground the positive side of the 48V dc, the ac equipment ground (green wire and conduit), and the 3B20D equipment frames.

SECTION II - DETAILED DESCRIPTION

1. AC CIRCUITS

1.01 AC branch circuits connect ac-powered equipment to a local ac panelboard. Circuits are individually protected by circuit breakers or fuses as specified in the tables.

2. DC CIRCUITS

2.01 DC branch circuits connect dc-operated equipment to a local power distributing frame. Circuits are individually protected by fuses or circuit breakers.

2.02 DC circuits are organized such that the three major functional units of the processor: the control unit(CU), the input-output processor controller unit (IOP), and the disk file controller unit (DFC) are powered independently. Similarly, fan units and peripheral frames are powered using independent branch circuits. This allows most fault conditions to have minimal impact on system operation.

3. GROUNDING

3.01 The 3B20D is grounded using a single-point ground (SPG) system. A single-point ground system provides that the processor system connects to the building ground at one and only one point, and that all system grounds be bonded to this point.

3.02 A single-point ground system eliminates ground loops and guarantees that voltage disturbances to the building or to the building electrical system caused by stray currents through them do not affect the processor.

3.03 Generally, the -48V return splice plate, located above power distributing frame No. 0 serves as the single-point ground interface between the system and the local building ground point. In order of preference, the local building ground point is:

(a) A ground riser (i.e. vertical equalizer)

(b) Building steel

(c) A major cold water pipe.

3.04 To protect the integrity of the single-point ground, wherever an electrical conductor extends beyond the SPG, it is insulated from all building grounds.

3.05 The -48V return splice plate above the local power distributing frame generally provides a convenient point for grounding the 3B20D.

3.06 Equipment frames and cabinets are insulated from the floor, air conditioning ductwork, suspended cable trays, lighting fixtures, etc. Likewise, customer-supplied cabinets (such as data sets) which interface with the 3B20D are also insulated from the floor and building grounds.

3.07 This requirement also dictates the use of isolated-ground receptacles. With nonisolated-ground receptacles, the conduit itself must be insulated from building grounds, wherever it extends beyond the SPG.

3.08 The 3B20D is also grounded to adjacent frames, via a continuous safety ground wire which in turn is connected to a local splice plate.

3.09 Small table-top peripherals, such as printers and video terminals are adequately grounded using their ACEG (green wire) only.

4. FRAME LABELING

4.01 Frames selected for a particular application depend on vintage of processor (Model 1, 2 or 3) and application (Common or 5ESS™).

4.02 To distinguish frames in one system from the frames in another, a J-code label is used. However, the assignment of J-code is inconsistent, and therefore, tends to be confusing. Frames can be distinguished by:

(a) Different J-code (e.g. J1C130A versus J1C168A)

(b) Different J-code suffix (e.g. J1C134A versus J1C134B)

(c) Different list number within same J-Code (e.g. J1C129A-List 1 versus J1C129A-List 37)

5. POWER DISTRIBUTING FRAMES

5.01 Power distributing frames (PDF) provide a convenient, local source of protected dc power. These frames are essentially identical, but have the following subtle differences:

(a) J86334A - battery PDF (manufacturer discontinued)

(b) J86334B - battery PDF

(c) J86334C - converter-supplied PDF (includes capacitors for additional filtering)

(d) J86334D - battery PDF mounted in 6 ft high cabinet for 5ESS applications

SECTION III - REFERENCE LIMITS

1. WORKING LIMITS

1.01 The working limits for these circuits greatly exceed the limits for the bulk of the equipment used in the 3B20D.

(a) -48V voltage range:

Normal:	-50.8 to -52.3V
Emergency:	-42.25 to -53.50
Transient:	-41 to -60V

(b) Ambient Temperature:

Normal operating:	4°C to 38°C
Extreme operating:	2°C to 50°C

(c) Humidity:

Normal operating:	20% to 55%
Short term:	20% to 80%

(d) Insulation: 600V

(e) Current: Not to exceed limits given in National Electrical Code

(f) Circuit Breakers: Not to exceed limits given in National Electrical Code

(g) Wire Distances: Voltage drop determines maximum length

1.02 Allowable voltage drop:

(a) DC: Not to exceed 1 volt
(b) AC: Not to exceed 2% of nominal voltage

1.03 AC voltage range:

Normal operating: ±10% of nominal
Emergency: ±20% of nominal

2. FUNCTIONAL DESIGNATIONS

2.01 Devices and Miscellaneous

Designation	Meaning
AC	Alternating current
BAT	Battery
CB RK	Cable rack
C.O.	Central office
CKT	Circuit
CONV	Converter
DC	Direct current
DISC	Discontinued
GEN	Standby AC generator
GND	Ground
GRD	Ground
MFR	Manufacturer

RECT	Rectifier
REF	Reference
RTN	Return wire
SPG	Single-point ground
SW	Switch
TYP	Typical

2.02 Engineering Units

Designation	Meaning
A	Amperes
AWG	American wire gauge
HZ	Hertz
MBYTE	Megabyte
MCM	Million circular mils
ø	Phase
V	Volts

2.03 Frames

Designation	Meaning
CU	Control unit
DFC	Disk file controller
DFI	Disk file inverter
DPWRC	Disk power cabinet
IOP	Input output processor
IOPB	IOP basic
IOPG	IOP growth
MHD	Moving head disk
MMD	Mini-module (160Mb) disk
PC	Peripheral controller
PCC	Processor control cabinet
PCF	Peripheral controller frame (Model 1) Processor control frame (Model 2)
PCU	Power control unit
PDF	Power distributing frame
PDO	Power distributing frame No. 0
PSC	Power service cabinet
PWRC	Power cabinet
TDC	Tape/Disk cabinet
TU	Tape unit

3. FUNCTIONS

3.01 Provides dc power connections from power distributing frame to 3B20D frames.

3.02 Provides ac power connections from local ac distribution panels to 3B20D frames.

3.03 Provides grounding connections to single-point ground system.

4. CONNECTING CIRCUITS

4.01 The following drawings provide connecting circuits for 3B20D Model 1 frames:

(a) Control Unit Frame Circuit - SD-4C050-01

(b) Disk File Controller Growth Frame Circuit - SD-4C063-01

(c) Peripheral Control Frame Circuit, Common - SD-4C059-02

(d) Peripheral Control Frame Circuit, 5ESS - SD-4C106-01

(e) Moving Head Disk Frame Circuit, Common - SD-4C056-02

(f) Moving Head Disk Frame Circuit, 5ESS - SD-4C107-01

(g) Tape Unit Frame Circuit - SD-4C058-01

(h) Input-Output Processor Growth Frame Circuit - SD-4C062-01

4.02 The following drawings provide connecting circuits for 3B20D Model 2 frames:

(a) Processor Control Frame Circuit - SD-4C100-01

(b) Mini-Module Disk Frame Circuit - SD-4C104-01

(c) High Speed Tape Frame Circuit - SD-4C058-02

(d) Tape Unit Cabinet Circuit, 5ESS - SD-4C120-01

(e) Processor Control Cabinet Circuit, 5ESS - SD-4C119-01

(f) Disk Power Cabinet Circuit, 5ESS - SD-4C121-01

4.03 The following drawings provide connecting circuits for 3B20D Model 3 cabinets:

(a) Processor Frame Circuit - included in System Drawing SD-4C127-01

(b) Tape Disk Cabinet - SD-4C126-01

(c) Power Cabinet - included in System Drawing SD-4C127-01

(d) Peripheral Interface Cabinet - included in System Drawing SD-4C127-01

4.04 The following drawings provide connecting circuits for power distributing frames:

(a) J86334A DC Power Distributing Frame - SD-82518-01

(b) J86334B & J86334C DC Power Distributing Frames - SD-82518-02

(c) J86334D DC Power Distributing Frame - SD-82518-03

5. MANUFACTURING TESTING REQUIREMENTS

5.01 None. Items installed in field.

6. VARIATIONS

6.01 Because of the wide variety of 3B20D applications, the drawings do not depict every conceivable installation. Common sense dictates that the circuits can be modified where conditions encourage it, provided the intent of the drawings is met.

SECTION IV - REASONS FOR REISSUE

CHANGES AUTHORIZED BY DRAWING ISSUE 4B

D. Description of Changes

D.1 Provided power distribution for new tape/disk (340 Mb) cabinets.

D.2 Changed title on SD, including addition of "model 3" to title.

D.3 Provided additional power distribution information for the model 3 computer, including ac and dc power distribution from the power distribution cabinet, ac load data, grounding data, and cabling diagrams (CADs) for the model 3 cabinets.

CHANGES AUTHORIZED BY DRAWING ISSUE 5A

D. Description of Changes

D.1 Reconnected -48V(J) and RTN(J) pair to connect processor frame (or cabinet) 0 to bus B of power distribution frame (or cabinet). This places processor 1 and the port switch on the same bus. This change prevents loss of communication between the port switch and the maintenance TTY and read-only printer (ROP) during certain dc outages. (See FS 3, 4, 11, 15 and CAD 7,13.)

AT&T BELL LABORATORIES

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