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CD- 10295-C
Issue 2A
Appendix 3B
DWG. Issue 5B
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N O T I C E

THE CIRCUIT DESCRIPTION ASSOCIATED WITH THIS DRAWING

WILL BE DISTRIBUTED AT A LATER DATE.

HOLMDEL ENGINEERING RECORDS

CD- 1A295-01
Issue 2A
Appendix 2A
DWG. Issue 4A
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N O T I C E

THE CIRCUIT DESCRIPTION ASSOCIATED WITH THIS DRAWING

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HOLMDEL ENGINEERING RECORDS

DATA SYSTEMS STATION 63 AND 64 TYPE DATA MOUNTINGS

CHANGES

D. Description of Changes

D.1 The changes for this issue were included in the previous issue of the circuit description.

F. Changes in CD Sections

F.1 Insert the following after the fourth sentence of 2.07 of Sect II: "The ALM relay contacts need to be protected with a 458A diode (or equivalent) connected across the ALM terminals when a slave relay is being used".

F.2 Add to 5.07 of Sect II: These terminals can safely handle a load of 100 ma up to 50 volts. For inductive or greater loads, a slave relay or similar external circuit is required. The alarm relay contacts need to be protected with a 458A diode (or equivalent) connected across the alarm terminals when a slave relay is being used.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 43424-GJE-FPS

DATA SYSTEMS STATION 63 AND 64 TYPE DATA MOUNTINGS

TABLE OF CONTENTS

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 The 63A-, 64A-, and 64C-type data mountings provide housings and electrical interfaces for data sets used in DATAPHONE® II data communications service. The 63A-type mountings accommodate single data sets; 64A- and 64C-type mountings can house up to eight data sets. All types serve private line data sets.

1.02 the electrical interfaces provided by the mountings furnish power to the data set power supplies that are on each data set, and data set interfacing to transmission facilities, diagnostic control units, and diagnostic channels.

2. GENERAL DESCRIPTION OF OPERATION

2.01 Individual data sets are housed in 63A1 or 63A2 data mountings. Each mounting contains a power transformer, cooling fan, and backplane that provides connection to the data set housed in the mounting. The 63A2 also has a power line-conducted emission filter.

2.02 The backplane couples the ac power transformer to the data set, that has its own power supply. The backplane also connects the data set to the transmission facilities, control channels, and diagnostic channels through separate connectors located on the backplane.

2.03 The local address of the data set is selected by binary-coded address switches located on the backplane.

2.04 Power brownout protection circuitry to signal the data set of impending power failure senses line voltage and is part of the backplane.

2.05 One to eight data sets may be housed in 64A- and 64C-type mountings, referred to as "multiple mountings." Each mounting has eight positions. Each mounting contains cooling fans, backplanes and connectors for transmission facilities and diagnostics, and a control channel circuit pack common to all eight positions. This circuit pack also contains the brownout detector and, for the 64C2, fan failure detectors.

2.06 AC power is supplied to the 64A-type mountings from a 290-type power unit. DC power is used with the 64C-type mounting. The dc power is derived from central office battery by using a 65A-type data mounting that contains dc-to-dc converters.

2.07 Local address switches are on the backplane of the 64A- and 64C-type mountings.

SECTION II - DETAILED DESCRIPTION

1. 63A1 MOUNTINGS - FS3

1.01 The 63A1 mountings house single private line data sets. Each mounting includes a power cord, cooling fan, power transformer, fuse, backplane, and housing.

1.02 the power transformer, T1, is a 36-volt center-tapped transformer with thermal overload protection. The transformer is connected to the backplane, circuit pack CP1, that passes the 36-volt power to the data set connector P3 (pins 111, 113, 118, and 018). Each data set has its own independent power supply driven from 36 volts, center-tapped.

1.03 The 36 volts is sensed by the brownout circuit on CP1. Power is rectified with diodes CR5 and CR6, regulated to +12 volts by integrated

circuit IC4, and compared against a reference voltage developed across resistor R9, that is selected at time of manufacture. Comparator IC5 makes the comparison and detects a lowered output from the power transformer corresponding to a drop in power line voltage to below 100 volts. The threshold is set at the factory to about 98 volts. After this drop occurs, transistor Q1 is turned on by the resultant high output of pin 4 of IC5. Q1 drives Q2 on resulting in a low signal on the PD lead (pin 008 of P3). When the line voltage rises above the threshold voltage, the PD lead goes high after a delay of 340 +75 ms controlled by IC5, initializing the data set.

1.04 Control channel signals are exchanged between data sets and the diagnostic console and between data set mountings. These exchanges take place through backplane connectors CC-IN and CC-OUT, also identified as P2 and J2, respectively. CP1 contains drivers (IC1), terminators (IC3), and logic NAND gates (IC2) to permit this exchange and to communicate with the data set in the mounting.

1.05 Local address switch S1, on CP1, consists of eight rocker switches that ground the binary-coded selected local address leads of the data set in the mounting. The data set local address consists of three digits. Switches 1 through 5 control the hundreds and tens positions; switches 6 through 8 control the units position. The data set adds one to each grouping of digits. If all switches were closed (binary 0s), grounding the data set leads, the local address would be 011. If all switches were open (binary 1s), the local address would be 328 (31 +1, 7 +1). Switch 1 corresponds to a 1; switch 2 to a 2; 3 to a 4; 4 to an 8; and 5 to a 16. switch 6 corresponds to a 1; 7 to a 2; and 8 to a 4.

1.06 The CIU/DBU connector J3 on CP1 provides transmission connections for the data set plugged into P3. Four dial backup (DBU) leads, a transmit pair, a receive pair, and a control pair are included.

1.07 The diagnostic channel connectors DC-OUT (J1) and DC-IN (P1) are interconnected for daisy-chaining and connect to P3 to access the data set. The diagnostic channel is used with extended circuits, multiplexed circuits, or concentrator circuits.

1.08 the frame ground is tied to the signal (D) ground through a 100-ohm (R17) resistor shunted with a 0.047 mF (C9) capacitor to reduce longitudinal noise on the transmission pairs. The frame ground is, in turn, tied to green wire ground through an inductor. The dc power (+5 and -5 volts) to power CP1 is derived from the data sets (pins 108 and 109 of P3).

2. 64A1 AND 64C1 MOUNTINGS FS4

2.01 The 64A1 and 64C1 mountings house up to eight private line data sets. Except where noted, the 64A1 refers to both the 64A1 and 64C1 mountings.

2.02 The 64A1 differs from the 64C1 in power source and cooling fans only. The 64A1 power unit consists of two power transformers in power unit PS1. Each transformer powers four data sets: one powers the odd-numbered positions, the other the even-numbered positions. Thirty-six volts center-tapped is furnished. The three cooling fans are powered from 117 volts ac. The 64C-type mounting is intended for central office use. It is powered from a 65A-type data unit that converts -48 volt central office battery to +18 and -24 volts. The 65A-type data unit consists of two power units: one supplying the odd-numbered sets, and the other the even-numbered sets. A current of -48 volts is connected through the 65A-type data unit to the 64C1 mounting to power the dc fans.

2.03 The 64A1 mounting has eight data set connectors (P1-P8) mounted on the backplane identified as circuit pack CP1. All connections to the data sets, with the exception of the customer interfaces, are made through P1-P8. The power cable CA19 connects to CP1 and the power supply.

2.04 The local address switch S1 consists of five rocker switches that provide the mounting with a local address code for use with control channels. The last three bits of the address code are wired into the backplane (pins 110, 112, 114 of P1-P8) such that the last digit of the local address corresponds to the data set slot number of the mounting. Local addressing was discussed in paragraph 1.05.

2.05 Interconnection to transmission facilities is accomplished through the channel interface unit (CIU) connector J9 and the DBU connector J17. These connectors, found on the backplane identified as CP2, are connected through cabling to the rear of connectors P1-P8 of CP1. Similar connections are made for the DC-IN, DC-OUT (diagnostic channel) connectors (one of each per data set) located on the rear of the mounting. The diagnostic channel is used with extended circuits, multiplexer circuits, or concentrator circuits.

2.06 Circuit pack CP3 plugs into the backplane, CP1, next to data set position 8 through connector P11. The brownout and control channel circuits were discussed in paragraphs 1.03 and 1.04 of this section. The brownout circuit senses the 36-volt center-tapped supply that serves the even-numbered data sets. Additional rectifiers and regulators provide the +5 and -5 volts dc necessary

for CP3 to function. Regulators IC1P and IC2P are connected as current limiters. They drive IC3P and IC4P, respectively, that serve as the +5 and -5 volt regulators. Two 3-ampere fuses, F1P and F2P, are found in the ac power leads of CP3.

2.07 An alarm circuit is also part of CP3. An alarm signal (TTL low) received on the ALM lead (pin 102 of J11) causes relay K3 to operate which in turn causes a contact closure to appear across the ALM terminals of TB1. these terminals can safely handle a load of 100 ma up to 50 volts. For inductive or greater loads, a slave relay or similar external circuit is required. The $\overline{\text{ALM}}$ signal (that originated in one of the eight data sets) is also passed on to the control channel through the CC-IN connector (P19 - pin 2). In the event of a mounting power failure, the $\overline{\text{ALM}}$ signal is passed from the CC-IN connector (P19 - pin 2) to the CC-OUT connector (J19 - pin 2 through relay K2). RDHS and SDHS are looped similarly by relay K1 to provide continuity in the control channel during a power failure.

3. 63A2 MOUNTINGS -FS13

3.01 The 63A2 is identical to the 63A1 mounting described in Section II, Part 1., except for the conducted emission filter.

3.02 The conducted emission filter reduces power line-conducted radio frequency emissions. The filter consists of inductors L2 and L3 and capacitors C10 and C11. The inductors are wired in series with the 36-volt leads of the power transformer. The capacitors are connected across the 36-volt leads to the transformer center tap. The conducted emission filter is mounted on the transformer.

4. 64A2 MOUNTINGS - FS5, FS6, FS8, FS9

4.01 The 64A2 is similar to the 64A1. the differences are described in the following paragraphs.

4.02 The 64A2 is equipped with the 290B1 power unit. This unit includes a power line-conducted emission filter to reduce rf radiation.

4.03 the circuit pack CP3 is nearly identical to the CP3 of the 64A1 described in paragraphs 2.06 and 2.07 in this section. Additional circuits monitor the control channel for steady-space data signals originating either from data set mountings connected to the CC-OUT connector or from data sets within the mounting. Time delay IC6B senses the signal on RD_{HS} of the CC-OUT connector. A steady-space signal of 24 ms or greater causes the time delay to time out with a resulting logical 0 applied to NAND gate IC7C. This gate produces a steady 1 (mark), effectively blocking data mountings connected to CC-OUT. A red LED, CC BLK, lights during this condition. Time delay IC6A senses the data signals in the mounting. When a steady space is received, relays K1 and K2 release, bypassing the control channel around the mounting. A green LED, CC BYP, is extinguished when the mounting is bypassed. Removal of the steady-space condition allows the time delays to reset and the mounting resumes normal control channel operation.

4.04 Power failure of either the -5 or +5 volt supplies results in the mounting control channel being bypassed. The -5 volt supply is sensed by a comparator in IC3. Failure of the +5 volt supply removes the drive signal from the transistor of IC8A. In either case, relays K1 and K2 release.

5. 64C2 MOUNTINGS - FS5, FS7, FS11, FS12

5.01 The 64C2 is similar to the 64C1. The differences are described in the following paragraphs.

5.02 The circuit pack CP3 control channel circuits are identical to the 64A2 described in paragraphs 4.03 and 4.04.

5.03 Fan speed failure detectors are part of CP3 for the 64C2. These detectors sense when the speed of one or more of the dc-powered fans falls below 60 percent of rated speed. Failures cause the central office (CO) alarm to sound. Each fan has a sense lead that gives one pulse per revolution. The signals are used to drive time delay circuits. When the pulse rate falls below 60 percent of rated speed, the time delay (IC10A, IC10B, IC11A) gives an output. The three time delays (one for each fan) drive a common time delay, IC13B, that requires that the failure exist for approximately 100 ms. A latching flip-flop is operated that in turn operates alarm relays K4 and K5.

5.04 A three-position paddle switch on the front of CP3 controls the CO alarm and provides resetting of the alarm circuit. In the down (RST) position (momentary contact), the detector and alarm circuits are reset. In the up (ON) position, the alarm circuits are enabled. In the center position, the CO alarm contacts are opened. Since a failure in the center position will not sound the CO alarm, a yellow LED indicator (OFF) will be lit. This off feature permits disabling the CO alarm while a fault is being cleared. A red LED indicator (FAIL) will be lit whenever one or more fans fail, regardless of the switch position.

5.05 The alarm contact closures are brought out on screw terminals on CP4. One pair, CO, brings out the contact closure for the central office alarm. This circuit is always open when the alarm switch is in the OFF position. A second pair of terminals, labeled PROC, brings out a contact closure whenever there is an alarm indication. It is not interrupted by

the switch. A third pair of terminals brings out the control channel alarm contacts.

5.06 The fan panel is factory-wired for -48 volt operation. It may be rewired in the field to accommodate -140 volts.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 Environment

(a) Ambient temperature range: +40° to +120°F.

(b) Relative humidity range: 20 to 95 percent.

1.02 Power Supply: 100 to 129 volts, 60 ±3 Hz. (0.5A for 63A-type, 5A for 64A-type.

1.03 Output Specifications

(a) PD - 0.0 to +0.4 volts low level; > 5 volts high level.

(b) CC-IN and CC-OUT connectors: low level < -4.0 volts; high level > +4.0

(c) ALM terminals: 100 ma, 50 volts maximum ratings.

(d) CO and PROC terminals: 100 ma, 60 volts maximum ratings.

1.04 Input Specifications

(a) CC-IN and CC-OUT connectors: low level ≤ -1.75 volts; high level ≥ +1.75 volts.

2. FUNCTIONAL DESIGNATIONS

2.01 Switches

Designation	Meaning
LOC ADRS	Local address, a selectable code to identify data sets in a data system

2.02 Connectors

Designation	Meaning
CC-IN	Control channel input - input to control channel.
CC-OUT	Control channel output - output of the control channel.
CIU/DBU	Channel interface unit/ dial backup - connects to channel interface unit which connects to private line transmission facilities or dial backup equipment.
CIU	Channel interface unit - connects to channel interface units which connect to private line transmission facilities.
DBU	Dial backup - connects to dial backup equipment.
DC-IN	Diagnostic channel input - data set output to diagnostic channel.
DC-OUT	Diagnostic channel output - output of diagnostic channel to data set.

2.03 Terminals

Designation	Meaning
18VAC()	18 volts, alternating current. Where parentheses are used around a O or E, the O designates odd-numbered data set positions and the E designates even-numbered positions.
ALM	Alarm.
CO	Fan alarm contact closure brought out on these terminals, interruptible with alarm switch.
CT	Center-tapped.
FG	Frame ground.
PROC	Fan alarm contact closure brought out on these terminals, interruptible with alarm switch.

2.04 Leads

Designation	Meaning
ALMHS	Alarm high speed - control channel trouble indication.
CS	Clear to send.
CSHS	Clear to send high-speed control channel.
D (GRD)	Signal ground.
DBU1,2,3,4	Dial backup control leads.
DT,DR	Private line receive pair.
DT1,DR1	Private line transmit pair.

Designation	Meaning
RC	Receive common.
RDHS	Receive data high speed - control channel.
RSHS	Request to send high speed - control channel.
SC	Send common.
SD	Send data - diagnostic channel.
SDHS	Send data high speed - control channel.
TEK5,6	CIU test indication to the data set.

2.05 Indicators

Designation	Meaning
CC BLK	Control Channel Block - Data sets connected to the mounting control channel are blocked when this indicator is lit.
CC BYP	Control Channel Bypass - Normal mounting operation is indicated when the indicator is lit. When extinguished, the control channel is bypassed around the mounting.
FAIL	Indicates a fan failure in 64C2 mounting.
OFF	Indicates that the CO alarm is opened by the alarm switch.

3. FUNCTIONS

3.01 Refer to Section I, 1. PURPOSE OF CIRCUIT.

4. CONNECTING CIRCUITS

None.

5. MANUFACTURING TESTING REQUIREMENTS

5.01 The manufacturing testing requirements are specified in X-18504 for 63-type data mountings and in X-18505 for 64-type data mountings.

SECTION IV - REASONS FOR REISSUE

A. Changed and Added Functions

A.1 A new single-set data mounting, 63A2, replaces the 63A1. The 63A2 is identical to the 63A1 except that it has a conducted-emissions filter to reduce power line radio frequency radiation.

A.2 A new multiple mounting, 64A2, replaces the 64A1. The principal features of the new mounting are a power line conducted emissions filter and steady-space detectors for the control channel.

A.3 A new multiple mounting for central office use, 64C2, replaces the 64C1. The principal features of the mounting are steady-space detectors for the control channel and a fan failure detector to detect when the speed of one or more of the dc-powered fans falls below 60 percent of rated speed.

B. Changes in Apparatus (Components)

B.1 Added

App Fig 7

App Fig 8

App Fig 9

App Fig 10

App Fig 11

App Fig 12

App Fig 13

App Fig 14

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