

10A DATA LINE CONCENTRATOR SUMMARIZING SPECIFICATION

1. GENERAL

Scope and Purpose of Practice

1.01 This practice provides a listing of all apparatus which may be specified to provide a 10 Data Line Concentrator. In addition, a list of associated drawings, BSPs, test specifications, and other documents covering this product is provided. This practice does not supply ordering information on other associated apparatus used in a data line concentrator system such as computer port or station data sets.

1.02 The designation "10A Data Line Concentrator" is an *identification code only* and cannot be used to order or specify any of the component apparatus associated with the 10A Data Line Concentrator.

Description

1.03 The 10A Data Line Concentrator is designed to provide concentration of 2-wire station lines accessing computer ports in private line, multiaccess computer applications. A nonblocking ferreed switching matrix is used to provide metallic interconnections between lines and trunks.

1.04 The concentrator will recognize only supervisory signals generated by the data set 109 series. Only station-originated calls to computer ports are permitted; computer-originated calls and station-to-station calls cannot be serviced.

1.05 At a local station a request for service is made by depressing a key which applies the station data set's voltage generator across the line tip and ring. The associated concentrator line circuit recognizes the presence of this voltage. The line scanner sequentially scans all lines and stops on a line requesting service. The data set located at the computer port, in the normal idle state, has its voltage generator applied across the trunk tip and ring. The associated concentrator trunk circuit recognizes this voltage, causing the

trunk scanner to stop on the idle trunk. With both scanners stopped, the line requesting service is connected to the idle trunk. If all trunks are busy, the line scanner remains on the line requesting service and the concentrator's camp-on signal generator transmits a periodic signal to the station requesting service. This station is camp-on and will be the first served when a trunk becomes available. Subsequent stations requesting service are camped-on, but order of arrival is not noted. The operation of the control circuit assures that each station awaiting service will be served once before any station is served twice. Once a connection is established, the trunk circuit reverts to a current detection mode and opens the connection when loop current ceases because of a port or station originated disconnect.

1.06 The concentrator is modularity constructed to be flexible in the number of lines and trunks that may be served, up to the full capacity of 128 lines and 32 trunks. The following paragraphs describe each of the required modules.

1.07 Power Module: Two power options are available; one utilizes commercial ac power and the other utilizes a negative 48 VDC source, normally found in central offices.

(a) **AC source**—This module consists of a 71A Apparatus Mounting which may be equipped with up to four KS-20575 Rectifiers.

(b) **DC source**—This module consists of a 71B apparatus mounting which may be equipped with up to four J87308B Converters.

Both the rectifier and the converter provide positive and negative 24 VDC. When required, the rectifier can be arranged to provide negative or positive 48 VDC instead of positive and negative 24 VDC.

1.08 Control Module: The control module consists of a 23A1 Data Mounting equipped with

circuit packs for concentrator control, alarm, and test functions:

(a) **Clock and Pulser:** This circuit pack (AR370) contains the system clock and the pulse generator which controls the ferreed network driver (part of the 23A1 Data Mounting).

(b) **Trunk or Line Scanner:** This circuit pack (AR374) contains a counter capable of scanning a maximum of 32 nodes under control of the system clock. One AR374 circuit pack is used for the trunk scanning function; another is used for the line scanning function for up to 32 lines.

(c) **Addition to Line Scanner:** If the number of lines exceeds 32, the line scanning function must be augmented with one AR375 Circuit Pack.

(d) **Camp-On Signal Generator:** This circuit pack (AR375) generates a periodic signal to a camp-on bus common to all line circuits. The signal is passed to stations awaiting service as a camp-on indication. A screw type strap option permits tailoring the signal for 75-, 150-, or 300-baud operation. The 150-baud option is connected at the factory.

(e) **Alarms and Registers:** This circuit pack (AR371) detects malfunctions in the following key operating points in the concentrator: line and trunk scanner, system clock, ferreed pulser and the DC voltage supply. Lamps on the card-face are provided for the line scanner, trunk scanner, clock, and pulser alarms. The alarms collectively control a master alarm relay which makes two sets of transfer contacts available for remote alarm indications. The card also contains logic for driving two associated traffic registers (part of the 23A1 Data Mounting). One records call completions; the other records the number of times an all-trunks-busy condition occurs.

(f) **Local Test:** This circuit pack (AR464), along with an associated control box (Data Auxiliary Set 803E1), permits connections to be forced between any desired line and trunk for test purposes. Tip and ring of both line and trunk are available for continuity checks on jacks on the Data Auxiliary Set 803E1.

(g) Card slots designated AR372 and AR373 (unused at present) are provided for future addition of optional features.

1.09 The control module is connected to each line and switch module with M50H Cords or double-ended A25D Connector Cables. The mounting is 11 inches high and weighs 36 pounds.

1.10 Trunk Module: The trunk module consists of a data mounting (21A1 or 22A1) and plug-in trunk circuit packs (AR368). The data mounting comes in two sizes: The 21A1 Data Mounting accepts up to 16 trunk circuits for use with the 8 or 16 trunk-group line and switch module; the 22A1 data mounting accepts up to 32 trunk circuits and is used with the 32 trunk-group line and switch module. Trunk circuit packs need only be supplied as required according to the number of trunks to be served. Each trunk circuit pack contains a single trunk circuit. The trunk module interconnects with the control module with an M50H Cord or a double-ended A25D Connector Cable. Interconnections between the trunk module and a line and switch module require 198B Adapters or, when not vertically adjacent 198B Adapters and M40A Cords. The height and weight of the 21A1 and 22A1 data mountings are 8 and 16 inches, and 23 and 42 pounds, respectively.

1.11 Line and Switch Module: The line and switch module consists of a data mounting (18A1, 19A1 or 20A1) equipped with ferreed switches that make up the switching matrix and up to 16 line circuit packs (AR365). The number of line circuit packs required is determined by the number of lines to be served; each line circuit pack accommodates two lines. The data mounting comes in three sizes: 32 lines/8 trunks (18A1); 32 lines/16 trunks (19A1); and 32 lines/32 trunks (20A1). Line and switch modules of the same trunk size can be connected together to obtain larger line groups. For example, two 32 line/8 trunk modules when joined will serve up to 64 lines on 8 trunks. A maximum of four such modules can be interconnected to serve up to 128 lines. Interconnection is made with 198B Adapters when the modules are vertically adjacent and with 198B Adapters and M40A Cords when not vertically adjacent. (See note 3.)

1.12 It must be emphasized that line and switch modules of dissimilar trunk-group size cannot be interconnected. That is, a 32/8 is incompatible with a 32/16 or 32/32. Having selected a trunk-group

size (8, 16, or 32), the line-side capacity can be increased by adding similar line and switch modules, but to increase the trunk-group (eg, from 16 to 32) the existing line and switch modules must be exchanged for units with larger capacity. The height and weight of the 18A1, 19A1, and 20A1 data mountings are 9, 15, and 22 inches and 42, 73, and 128 pounds, respectively. To make installation easier, the 19A1 and 20A1 data mountings are equipped with handles and mounting lugs are provided to support and align the mounting while the hardware is applied.

1.13 KS-20093L1 Cabinet: The concentrator modules are designed to be mounted on 23 or 25 inch standard central office frames or in a cabinet such as the KS-20093L1.

1.14 The KS-20093L1 cabinet provides front and rear mounting in a back-to-back arrangement of 25-inch relay rack equipment. A vertical mounting space of 68 inches is available, both front and rear. The cabinet is designed to be free standing on four adjustable levelers. Typical installation is on a false floor, such as found at a computation center where all cables are brought in through the open bottom of the cabinet. In the absence of a false floor, provision has been made to bring the cables along and through the top of the cabinet. This is accomplished by removing either one or both cover plates and installing duct assembly, per KS-20093L2, across the top of the cabinet. To complete the cabinet a full door panel, KS-20093L5, is required.

1.15 The data mountings are arranged for installation on 25-inch relay racks when shipped from the factory. By reorienting the mounting brackets on the data mountings, 23-inch racks may be used.

1.16 Power Requirements: Each concentrator module requires positive and negative 24 \pm 2 VDC. In addition, when the number of lines exceeds 64, the control module requires negative 48 VDC (see Note 1). The current requirements are as follows.

TABLE A

MODULE	CURRENT (ma)	
	+24 VDC	-24 VDC
Control Module (See Note 1)		
AR370 Circuit Pack	40	5
AR371 Circuit Pack	40	5
AR374 Circuit Pack	25	7
AR375 Circuit Pack	10	5
AR384 Circuit Pack	45	10
AR464 Circuit Pack	400	100
Line Module		
AR365 Circuit Pack	45	5
Trunk Module		
AR368 Circuit Pack	45	10

The KS-20575 rectifier provides positive and negative 24 VDC and has a combined output capacity of 4.0 amperes. The input requires 115 watts of ac power held to 60 \pm 3 Hz at 105 to 129 VAC. The J87308B converter has an output capacity of 2.0 amperes at both positive and negative 24 VDC. The input voltage must be maintained between -44 and -50 VDC to keep the output within 2 volts of \pm 24 VDC. The number of converters or rectifiers required for each installation is given in Table C. A KS-20129 power strip may be installed in the KS-20093L1 cabinet to provide multiple ac duplex receptacles.

Note 1: When more than 64 lines are required, negative 48 VDC must be applied to the control unit in addition to negative and positive 24 VDC. The negative 48 VDC serves only to charge a 6500-UF capacitor in series with a 10-ohm resistor each time a connection is made.

1.17 Environment: The concentrator is designed to operate in an ambient temperature from 30 to 120°F with a relative humidity from 10 to 90 percent. Where the KS-20093L1 cabinet is used with natural convection the interior temperature

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of the cabinet will rise about 4.0°F above ambient per 100 watts of interior power dissipation.

2. SUPPLEMENTARY INFORMATION

KS-Specification

KS-20093—Cabinet and Accessories

KS-20129—Power Strip

KS-20575—Rectifier

Manufacturing Test Requirements Specifications

X-78030—10A Data Line Concentrator

Bell System Practices

590-102-110—Identification—18A1 Data Mounting

590-102-111—Identification—19A1 Data Mounting

590-102-112—Identification—20A1 Data Mounting

590-102-113—Identification—21A1 Data Mounting

590-102-114—Identification—22A1 Data Mounting

590-102-119—Identification—23A1 Data Mounting

591-810-100—Description—10A Data Line Concentrator System

591-810-300—Maintenance—10A Data Line Concentrator System

591-811-100—Description—10A Data Line Concentrator

591-811-200—Installation—10A Data Line Concentrator

591-811-300—Maintenance—10A Data Line Concentrator

591-811-500—Testing—10A Data Line Concentrator

598-075-100—Identification—Data Auxiliary Set 803E1

591-810-series—10A Data Line Concentrator System

802-218-154—Power Systems, DC to DC Converter

AB27.426—Transmission Engineering Considerations—10A Data Line Concentrator.

3. DRAWINGS, CIRCUIT SCHEMATICS

SD-73055-01—No. 10A Data Line Concentrator and Data Auxiliary Set 803E1

4. PRODUCT

4.01 Summary of orderable apparatus and equipment to provide a 10A data line concentrator. See Table B for codes.

18A1 Data Mounting—Wired assembly; capacity for 32 lines and 8 trunks;

accommodates up to sixteen AR365 Circuit Packs (line circuit), per SD-73055-01, APP FIG. 8.

19A1 Data Mounting—Wired assembly; capacity for 32 lines and 16 trunks; accommodates up to sixteen AR365 Circuit Packs, per SD-73055-01, APP FIG. 9.

20A1 Data Mounting—Wired assembly; capacity for 32 lines and 32 trunks; accommodates up to sixteen AR365 Circuit Packs, per SD-73055-01, APP FIG. 10.

21A1 Data Mounting—Wired assembly; capacity for 16 trunks; accommodates up to sixteen AR365 Circuit Packs, per SD-73055-01, APP FIG. 5; compatible with 18A1 or 19A1 data mounting.

22A1 Data Mounting—Wired assembly; capacity for 32 trunks; accommodates up to thirty-two AR368 Circuit Packs; per SD-73055-01, APP FIG. 6; compatible with 20A1 data mounting.

23A1 Data Mounting—Wired assembly; accommodates control circuit packs AR370, AR371, two AR374, AR375, AR3w4, and AR464; per SD-73055-01, APP FIG. 1.

71A Apparatus Mounting—Mounting assembly; accommodates up to four KS-20575 Rectifiers; per SD-73055-01, APP FIG. 12.

71B Apparatus Mounting—Mounting assembly; accommodates up to four J87308B Converters; per SD-73055-01, APP FIG. 14.

Data Auxiliary Set 803E1—Provides manual test features; used with AR464 Circuit Pack; per SD-73055-01, APP FIG. 18.

AR365 Circuit Pack—Provides two-line circuits; used in 18A1, 19A1, or 20A1 Data Mountings; per SD-73055-01, APP FIG. 11.

AR368 Circuit Pack—Provides one trunk circuit; used in 21A1 or 22A1 Data Mounting; per SD-73055-01, APP FIG. 7.

- AR370 Circuit Pack—Provides clock and pulsing features; used in 23A1 Data Mounting; per SD-73055-01, APP FIG. 1.
- AR371 Circuit Pack—Provides alarm and traffic register features; used in 23A1 Data Mounting; per SD-73055-01, APP FIG. 4.
- AR374 Circuit Pack—Provides line or trunk scanner; used in 23A1 Data Mounting; per SD-73055-01, APP FIG. 1.
- AR375 Circuit Pack—Augments AR374 circuit pack when concentrator must accommodate more than 32 lines; used in 23A1 Data Mounting; per SD-73055-01, APP FIG. 2.
- AR384 Circuit Pack—Provides camp-on signal; used in 23A1 Data Mounting; per SD-73055-01, APP FIG. 3.
- AR464 Circuit Pack—Provides manual test features in combination with Data Auxiliary Set 803E1; used in 23A1 Data Mounting; per SD-73055-01, APP FIG. 18.
- 198A Adapter—Terminates last line and switch module; per SD-73055-01, APP FIG. 5 and 6.
- 198B Adapter—Required to interconnect line and switch modules and trunk module to first line and switch module, per SD-73055-01, APP FIG. 8, 9, and 10.
- J87308B Converter—Converts negative 48 VDC to positive and negative 24 VDC; mounts on 71B apparatus mounting; per SD-73055-01, APP FIG. 15.
- KS-20575 Rectifier—Converts commercial 60 Hz 115 VAC power to positive and negative 24 VDC; mounts on 71A apparatus mounting; per SD-73055-01, APP FIG. 13.
- M50H Cord—Used to interconnect control module with trunk module and with each line and switch module; equipped with KS-16785L8 plug (center fed) at both ends; stocked in 3-, 6-, 9-, and 12-foot lengths; per SD-73055-01, APP FIG. 1, 8, 9, 10.
- A25D Connector Cable—Equipped with KS-16689L3 Plug (end fed) available single ended to provide connections from line and switch module and trunk module to line and trunk loop circuits at distribution frames stocked in 13-, 20-, 22-, 24-, and 26-foot lengths, but available in any length specified, per SD-75055-01, App Fig. 5, 6, 8, 9, and 10; available double ended to interconnect control module with trunk module and with each line and switch module; stocked in 3-, 6-, and 9-foot lengths; per SD-73055-01, APP FIG. 1, 8, 9, and 10.
- A25C Connector Cable—Equipped with KS-16785L8 plug (center fed) available single ended to provide connections from line and switch module and trunk module to line loop circuits at distribution frames; available in any length specified; per SD-73055-01, APP FIG. 5, 6, 8, 9, and 10.
- M40A Cord—Used with 198B adapters to interconnect vertically nonadjacent line and switch modules or a trunk module with a vertically nonadjacent line and switch module; per SD-73055-01, App Fig. 16.

4.02 KS-20093 Cabinet and Accessories.

List 1—Cabinet.

List 2—Duct Assembly; used when cables must be brought in through top of cabinet.

List 5—Door panel, full.

KS-20129—Power Strip, mounts vertically inside KS-20093L1 cabinet; provides multiple ac duplex receptacles.

TABLE B

CODE	RATING	NO. REQD
18A1 Data Mounting 19A1 Data Mounting 20A1 Data Mounting	AT&TCo Std AT&TCo Std AT&TCo Std	Up to 4 of one type; see Table C
21A1 Data Mounting 22A1 Data Mounting	AT&TCo Std AT&TCo Std	1 of one type; see Table C
23A1 Data Mounting	AT&TCo Std	1
71A Apparatus Mounting 71B Apparatus Mounting	AT&TCo Std AT&TCo Std	1 of one type
AR365 Circuit Pack	AT&TCo Std	1 per 2 lines
AR368 Circuit Pack	AT&TCo Std	1 per trunk
AR370 Circuit Pack	AT&TCo Std	1
AR371 Circuit Pack	AT&TCo Std	1
AR374 Circuit Pack	AT&TCo Std	2
AR375 Circuit Pack	AT&TCo Std	See Table C
AR384 Circuit Pack	AT&TCo Std	1
AR464 Circuit Pack	AT&TCo Std	See Note 2
Data Auxiliary Set 803E1	AT&TCo Std	See Note 2
198A Adapter	AT&TCo Std	See Table C
198B Adapter	AT&TCo Std	See Table C
A25D Connector Cable (double ended) or M50H Cord	AT&TCo Std	One type as reqd; see Table C
M40A Cord	AT&TCo Std	See Note 3
A25C Connector Cable (single ended) or A25D Connector Cable (single ended)	AT&TCo Std	One type as reqd
J87308B Converter or KS-20575 Rectifier	AT&TCo Std	One type as reqd; see table C

Note 2: One set (AR 464 circuit pack plus Data Auxiliary Set 803E1) can be shared among concentrators installed at the same site, otherwise one set required per concentrator.

Note 3: If the trunk module is not vertically adjacent to a line and switch module or if line

and switch modules are not vertically adjacent to each other then interconnection is made using M40A cords and additional 198B adapters. The number of cords and additional 198B adapters required for each vertically nonadjacent arrangement is equal to the number of 198A adapters used. (See Table C.)

TABLE C

Lines Served (up to):	Trunks Served (up to):	Total Vertical Rackspace Reqd (inches) (Note 4)	Data Mounting Req'd for Line and Switch Module	(No. Req'd)	Data Mounting Req'd for Trunk Module	198A Adapters Req'd	198B Adapters Req'd	M50H Cords or A25D Conn Cables Req'd	AR365 Circuit Packs (Line Ckts) (up to):	AR368 Circuit Packs (Trunk Ckts) (up to):	AR375 Circuit Pack (Add to Line Scanner) Req'd	KS-20575 Rectifier/or J87308 Converters Req'd
32	8	34	18A1	(1)	21A1	1	1	2	16	8	no	1/1
64	8	43	18A1	(2)	21A1	1	2	3	32	8	yes	1/1
96	8	52	18A1	(3)	21A1	1	3	4	48	8	yes	3/2
128	8	61	18A1	(4)	21A1	1	4	5	64	8	yes	3/2
32	16	40	19A1	(1)	21A1	2	2	2	16	16	no	1/1
64	16	55	19A1	(2)	21A1	2	4	3	32	16	yes	1/1
96	16	70	19A1	(3)	21A1	2	6	4	48	16	yes	3/2
128	16	85	19A1	(4)	21A1	2	8	5	64	16	yes	3/2
32	32	55	20A1	(1)	22A1	4	4	2	16	32	no	1/1
64	32	77	20A1	(2)	22A1	4	8	3	32	32	yes	1/1
96	32	99	20A1	(3)	22A1	4	12	4	48	32	yes	3/2
128	32	121	20A1	(4)	22A1	4	16	5	64	32	yes	3/2

Note 4: Does not include clearance allowances for: guide pins (1 inch), 198A Adapters (2 inches), or M40A Cords (4 inches).