DRAWINGS

PRINTED WIRING AND CIRCUITS

CONTENTS

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1. GENERAL

1.1 Scope of Section

1.11 This section explains and illustrates Circuit Schematics, Equipment Drawings and Wiring Diagrams associated with printed wire circuits.

2. PRINTED WIRING

2.1 Application

2.11 Printed wiring is a means of making electrical connections without the use of individually insulated wires.

2.12 It is used on apparatus which can be divided electrically and physically into small units. These divisions are most commonly made by stages such as amplifier, multivibrator, oscillator, networks, etc.

2.13 Printed wire may also be used to multiple units together.

2.2 Construction

2.21 Printed wiring consists of a conductor pattern on an insulating base. The insulating base is generally a panel of plastic or of laminated sheets.

2.22 The conductors are usually strips of solid or reconstituted metal bonded in a prescribed pattern to the surface of one or both sides of the panel. Panels constructed in this manner are called "Printed Wiring Boards."

2.23 The components of the board are joined to the conductors by soldering directly on to the conductors or to eyelets or binding posts connected to the conductors. Circuit components to which the conductors connect are frequently mounted directly on the board.

3. PRINTED CIRCUITS

3.1 The terms "Printed Circuits" and "Printed Wiring" are frequently used interchangeably. Strictly speaking, "Printed Circuit" implies that in addition to conductors, there are present other circuit elements such as resistors and inductors produced by similar means.

4. SPECIFICATION DRAWINGS FOR PRINTED WIRING ASSEMBLIES

4.1 Specification drawings for printed wiring assemblies convey information on small packaged units and illustrate the assembly of components and details on the associated printed wiring board.

4.2 Drawings for printed wiring assemblies are assigned in the "J," "ED" or "H" series.

5. FUNCTION OF PRINTED WIRING SPECIFICATION

5.1 The printed wiring specification is a combination wiring diagram and assembly drawing in the "J", "ED" or "H" series and is restricted to the manufacture of one basic list or group. As a new list or group becomes "ready-to-order" the existing list or group is rated "MFR. DISC." (Manufacture Discontinued).

5.2 Each printed wiring assembly is assigned a name in accordance with its electrical function, e.g., "Gate," "Timer," "Amplifier," "Flip-Flop," "Filter," etc.

5.21 The title of the specification is given in terms of equipment rather than circuit, e.g., "Timer Unit" instead of "Timer Circuit."

5.3 A printed wiring specification consists of one complete circuit package schematic (CPS) figure. Only those components and connections indicated within the circuit package schematic figure are included in the printed wiring specification.

6. SPECIFICATION DRAWING FORMAT

6.1 General Format

6.11 The general arrangement of a new "J," "ED" or "H" specification conforms to the format shown on Supplement "A." This format will also apply to existing drawings raised to a higher dash number. Supplement "A" illustrates a complete specification.

6.2 Assembly Figure

6.21 The assembly figure represents the latest unaltered vintage of product. Modifications or added features which are to be incorporated on existing products are depicted as modification figures or supplemental lettered figures. In each instance, modification or supplementary figures specify the assembly figure they modify or supplement.

6.211 The assembly figure is numbered in accordance with the associated list or group number.

6.212 New features added to existing products require a figure to indicate how the feature is to be applied. These figures are alphabetical in sequence, e.g., Figure A, Figure B, etc.

6.213 Modification views are also identified alphabetically, e.g., mod view A, mod view B, etc.

6.3 Component Designation Table

6.31 The "Component Designation Table" is provided on multisheet specifications when the stock list and assembly figures are not located on the same sheet.

6.311 On single sheet specifications, component functional designations are indicated in the stock list. Component mounting modules are omitted in these cases.

6.312 The component mounting module which is the distance between component lead insertion points is specified in even tenths of an inch, e.g., 0.6, 0.8, 1.0, etc.

6.4 Hole Data Table

6.41 The component "Hole Data Table" is only included on a specification when a common piece part drawing can be utilized, otherwise, the table is located on the individual piece part drawings.

6.5 Modification Table

6.51 The "Modification Table" is only used to indicate Class "A" changes incorporated into the board assembly.

6.511 Information listed in the "Modification Table" briefly indicates changes brought about by a Class "A" change. This table is not in lieu of a Note 76 which indicates deviations between the assembly circuitry and the Labotatories Schematic.

6.6 Component Mounting Views

6.61 Component mounting views are provided when the method of mounting components deviates from those specified in the Bell Systems Practices for printed wiring assemblies.

6.62 All dimensions listed in a component mounting view are indicated as a reference dimension. Dimensions indicated on the assembly drawing are to aid in the use of the drawing and should not be considered as a set requirement on the field unless so specified in an associated document.

7. WIRING DIAGRAM SHEETS

7.1 Requirements

7.11 Wiring diagram sheets are used to indicate wiring external to the printed Wiring Board but which are also part of the basic assembly package. (See Paragraph 8.2.)

7.12 When wiring diagram information is provided, a multisheet format is used. This format is composed of three groups of sheets, each numbered from one up.

7.121 The first group of sheets are information and stock list sheets and are designated "A".

7.122 The second group of sheets consist of wiring diagrams and illustrations and are designated "B".

7.123 The third group of sheets are the equipment portions and the assembly figures and are designated "C".

7.2 Wiring

7.21 Wiring diagram figures are used in lieu of wiring diagram drawings and indicate wiring that is not part of the printed wiring paths, but which is part of the assembly and circuit package schematic (CPS). The use of wiring diagram figures is restricted to those conditions where visual inspection of the assembly will not permit identification of the terminating points. Wiring to test points, connectors, straps, etc., shown within the assembly figure are not depicted as part of the wiring diagram figure.

7.22 The wiring diagram figure is designated as a continuation of the associated assembly figure.

8. PRODUCT VINTAGE IDENTIFICATION

8.1 Class "A" Change

8.11 On printed wiring assemblies all Class "A" changes applied to a manufactured assembly or an assembly in the stages of manufacture will have product identification.

8.2 Drawing Records for Class "A" Changes

8.21 The assembly sheets will contain a "Modification Table" and "Mod" notes assigned in alphabetical sequence to each Class "A" change affecting products in the process of manufacture, shipment, installation, or cutover to the customer.

8.22 Modification views are provided when changes modify existing products by the addition, removal or relocation of components, terminals, printed paths or regular insulated wire.

8.23 Modification views are cross referenced in the modification notes.

8.24 Modification views serve only to indicate how changes or modifications are applied to existing products. They modify the product to agree with the current assembly figure.

8.3 Product Identification

8.31 "Modification Notes" also identify the product vintage. "G1, Mod A" would identify the second vintage, "GI, Mod A, B" indicates three vintages and "G1, Mod A, B, C" would be used to indicate four vintages. The first vintage is the initial product before any changes have been applied.

8.32 The addition of a new numerical list or group eliminates previously designated "Mod" notes on the new product. The alphabetical sequence of notes is retained for Class "A" changes on the new list or group, e.g., "G2, Mod D." A third vintage of Group 2 would be indicated as "G2, Mod D, E."

8.33 Changes or modifications that do not affect the master drawing are assigned a "Mod" note and are stamped on the printed wiring side.

8.34 Changes or modifications that require a change in the master drawing will, when changed, include all "Mod" notes assigned for that list or group.

8.35 The equipment specification code and list number appears on the front (face) plate of products so equipped provided sufficient space was available.

8.36 Modification notes assigned to the product are also identified on the front (face) plate if sufficient space is available.

8.361 When sufficient space is available all "Mod" notes assigned to a specific base list or group will also appear front (face) plate of the product.

8.362 When sufficient space is not available only the latest "Mod" note will appear on the front (face) plate, e.g., Mod C instead of Mod A, B, C.

8.3621 The printed wiring board will designate through either the etch process or a stamping operation all "Mods" applied to the product.

9. ADDITION OF LISTS OR GROUPS

9.1 Minor "B" or "D" changes involving improvements and new features are usually applied on a lettered list basis.

9.11 Lettered lists or groups are provided to apply new features to numbered lists or groups of earlier vintages for field modification purposes and are assigned as indicated in the following examples.

J12345AA-1 or ED-54321-30	List 1 Group 1	Original circuit
	List 2 or Group 2	Original circuit and improvement Feature A
	List A or Group A	Wiring and apparatus required to modify list or group 1 to provide Feature A
	List 3 or Group 3	Original circuit and improvement Feature A and B
	List B or Group B	Wiring and apparatus required to modify list or group 1 to provide Feature B
	List C or Group C	Wiring and apparatus required to modify list or group 2 to provide Geature B

9.12 Lettered lists or groups may also be provided to apply circuit improvements. These improvements relate to the component codes and values. Path configuration is not affected. Typical examples are as follows:

J12345AA-1 or ED-54321-30	List 1 or Group 1	Original circuit
	List A or Group A	Component value change
	List B or Group B	Component code change

9.13 In addition to the foregoing, lettered or numbered groups are also used to provide field modification kits or additional printed wiring assembly (Slave board) connections to an original assembly. See the following examples:

J12345AA-1 or ED-54321-30	List 1 or Group 1	Original circuit
	List 2 or Group 2	Original circuit and improvement Feature A
	List 3 or Group 3	Field modification kit or "slave board assembly"

9.14 Lettered lists or groups are only assigned to provide optional features if the features are of a plug-in variety. Examples of this type of assignment are illustrated below:

ED-54321-30 G1 Basic Unit
GA Plug-in crystal for 10,000 cycles
GB Plug-in crystal for 20,000 cycles
GC Plug-in crystal for 30,000 cycles

9.141 A note on the assembly drawing will indicate that Group 1 must be ordered equipped with GA, GB, or GC.

9.2 When printed wiring assemblies are used on station equipment, e.g., PBX, Data Sets, etc., and office records are not maintained on the unit equipment, all changes regardless of classification will be provided by a new list or group.

9.3 Options or New Features

9.31 Options or new features that affect the operation, components or path configurations may be added at any time, provided the new product is electrically and mechanically interchangeable with the replaced product.

9.311 When complete interchangeability is not possible a new specification will be originated.

9.312 Optional features will be avoided unless they involve, a plug-in type of option.

9.313 Options involving wiring path, strap wires or "wired-in" components will be provided on separate specifications.

9.32 Component feature lists or groups may be added to the specification if the same piece part board was used on all lists or groups and the optional features pertain only to the addition or substitution of components.

9.33 Minor Class "B" or "D" changes will be provided by the addition of a lettered list or group on the printed wiring specification. These lettered lists or groups will be incorporated on ordering specifications by means of a stock list line-out, e.g., ED-54321-30, G1, A.

9.331 The "line-out" of lists or groups in the stock list of a specification ordering printed wiring boards may appear under the following conditions:

(a) Lists or groups are both electrically and mechanically interchangeable.

(b) No new feature or option is incorporated by the design change.

(c) No replacement record is required.

9.332 The "line-out" of lists or groups in the stock list of a specification ordering printed wiring boards will not be used under the following conditions:

(a) A new option or circuit feature is added.

(b) A new mechanical feature is added.

(c) Changes in material require documentation, e.g., amplas changed printed wiring.

(d) Changes in the manufacturing process change the physical aspect of the product, e.g., fabricated parts converted to die cast parts.

10. DOUBLE SIDED PRINTED WIRING ASSEMBLIES

10.1 Printed wiring assemblies utilizing printed paths on both sides of the board are illustrated in two views; component side view and noncomponent side view. These views are designated as parts of the same figure number.

10.11 The component side view consists of components, terminals, strap wires and wiring paths physically located on that side of the board.

10.12 The noncomponent side indicates terminal designations, piece part numbers, "Mod" notes and wiring paths physically located on that side of the board

10.13 Assembly views are indicated as "Top View," "Side View," etc., and the title of the view specifies the associated list or group number.

Manager, Engineering Practices

ATTACHMENT
Figures 1 and 2 on Pages 5 and 7.

Reason for Reissue:
To update entire section and rearrange format.

Replaces Section 6 dated 3-3-55.

STOCK LIST

AB GROUP	AC QUAN PER GROUP	AD CODE	AE DESCRIPTION	AF NOTE	AG	COL LINE
1	1	P-43R695	PRINTED WIRING BOARD			101
1	1	P-43R795-	FRAME			
1	1	P-43R723	FACE PLATE			
1	1	P-43R759	KNOB			
1	1	P-43R792	TEST POINT BLOCK ASSEMBLY			105
1	1	601A	CAPACITOR 5 UF			110
1	8	KS-14056	L-7 CAPACITOR 470 UUF			115
1	8	432A	DIODE			
1	13	16C	TRANSISTOR			
1	2	12D				120
1	6	221A	RESISTOR 133 OHMS			
1	6		178			
1	8		2370			
1	2		2670			125
1	8		4640			
1	8		10,000			
						130
						135
						140
1	2		28520-4A FASTNER (CAMLOC)			
1	6		AD (32) ABS RIVET			
1	2		AD (34) ABS RIVET			145
			(UNITED SHOE MACHINERY SHELTON, CONN OR EQUIV)			
						150
						155
						160
						165
						170
						175

MOD	MODIFICATION NOTES
A	MOD VIEW "A" ADDED FOR GRP 1
B	RESISTOR R9 & R16 CHANGED FROM 140Ω TO READ 133Ω FOR GRP 1

TABLE A

COL A EQUIPMENT	B RATING	C GRP	D NO.	E CKT	F FIG	G WRG	H APP
FRAMEWORK, ASSEMBLY & EQUIPMENT FOR ONE SUPERVISORY SIGNALING DEMULTIPLEXER CIRCUIT PACKAGE		1	1	ED-12345-30	1		

SHOP	INST	MANUFACTURING NOTES
		1-SHADED AREA INDICATES CIRCUIT PATH LOCATED ON OPPOSITE SIDE OF THE PRINTED WIRING BOARD
X	X	2-ALL PARTS SHALL BE ASSEMBLED FOR SHIPMENT.
X	X	3-< > INDICATES DESIGNATIONS WHICH ARE PROVIDED IN ACCORDANCE WITH OTHER INFORMATION.
X	X	4-ALL WIRING TO BE D3, 24AWG COLORED GREEN UNLESS OTHERWISE SPECIFIED AND RUN IN GENERAL PATH SHOWN IN FIG 1.
X	X	5- —o|— ARROW INDICATES THE DIRECTION OF LOW RESISTANCE TO POSITIVE CURRENT FLOW.

1-18-63

SDK	JBB	LAH	1

MOD VIEW A & MOD NOTE A ADDED. 2-6-63 AT&T CL "A" WE CL "A"

SDK	JBB	LAH	2

MOD NOTE B ADDED. 3-8-63 AT&T CL "A" WE CL "A"

SDK	JBB	LAH	3

HOLE & TERMINAL DATA TABLE RMVD. 6-11-63 WE CL "A"

SDK	JBB	LAH	4

ENGINEERING NOTES.

51-

THIS DRAWING AGREES WITH	ISSUE	1	2	3	4		
BSP AA620.014	ISS	1	1	1	1		
	APPX						
SD-73017-01	ISS	1	2	3	3		

52-THIS PRINTED WIRING BOARD IS USED ON J70001A-1.

1	CPS 16		1			
COL LINE	A FIG	B OPT	C FIG	D WRG	E APP	F REMARKS
	SD-73017-01		ED-12345-30			

ITEMS IN PARENTHESES ARE FOR INFORMATION ONLY AND ARE NOT TO BE RECORDED ON JOB WIRING LIST.

SD-73017-01 DWG CROSS REFERENCE

TABLE C

SHEET	1	2	3	4		
	1	2	3	4		
ISSUE						

SHEET INDEX

4

ED-12345-30

DATA SYSTEMS
CENTRAL OFFICE
SPECIFICATION FOR
B1 CARRIER DATA TERMINAL
SUPERVISORY SIGNALING DEMULTIPLEXER
CIRCUIT PACKAGE 16
PRINTED WIRING BOARD UNIT

A.T.&T. CO. RATING
A.T.&T. CO. STANDARD

W.E. CO. RATING
STANDARD

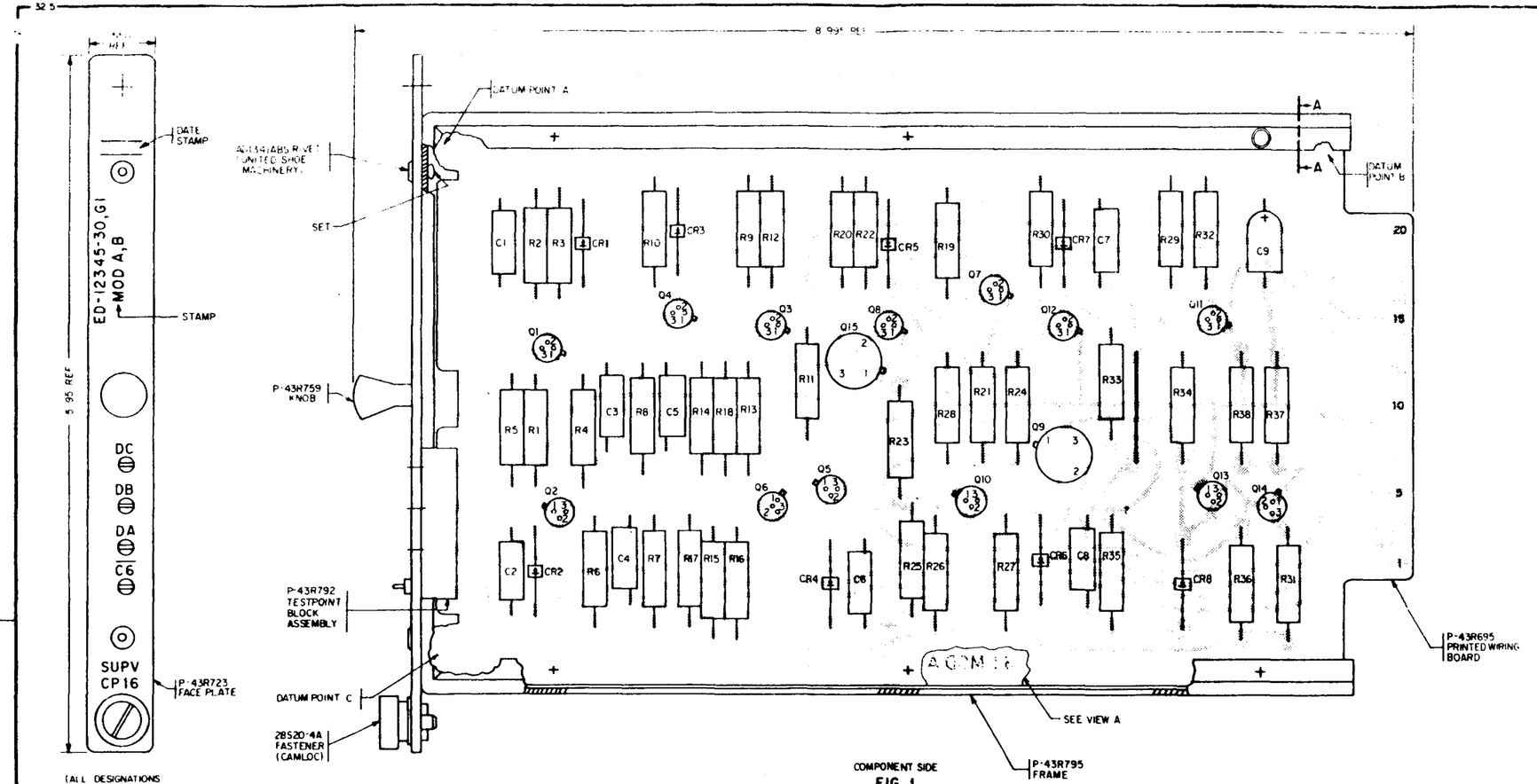
ED-12345-30
2 SHEETS, SHEET 1

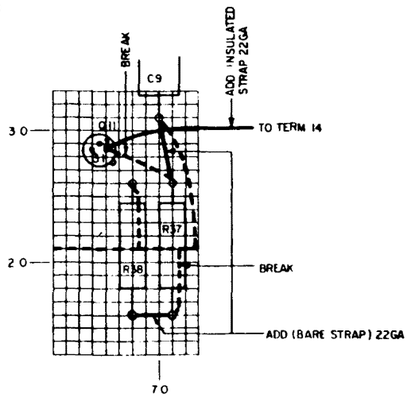
WESTERN ELECTRIC COMPANY, INC

Dwg size 6S

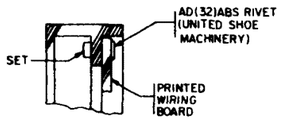
ED-12345-30

FIGURE 1A

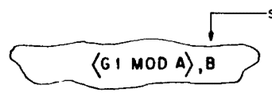




MODIFICATION VIEW A
FOR GROUP 1



SECT A-A



VINTAGE INDENTIFICATION AS SHOWN ON WIRING SIDE
VIEW A

TABLE D

COMPONENT DESIGNATION TABLE

DESIG	CODE	VALUE	MTG MOD
CAPACITORS			
C2, C4, C6, C7, C8	KS-14058, L7	470 MMF	H
C9	601A	.5UF	
DIODE			
CR1, CR2, CR3, CR4, CR5, CR6, CR7, CR8	432A		B
RESISTORS			
R1, R8	221A	2670 OHMS	10
R2, R7, R10, R15, R20, R26, R30, R36		2370	
R3, R6, R12, R17, R22, R25, R32, R35		10,000	
R4, R5, R13, R14, R23, R24, R33, R34		4640	
R9, R16, R19, R27, R29, R37		133	
R11, R16, R21, R28, R31, R38		178	
TRANSISTORS			
Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q10, Q11, Q12, Q13, Q14	16C		
Q9, Q15	12D		

SHEET ISSUE
1 18
2
3
4

4

ED-12345-30 DATA SYSTEMS CENTRAL OFFICE SPECIFICATION FOR B1 CARRIER DATA TERMINAL CIRCUIT PACKAGE 16 PRINTED WIRING BOARD UNIT

ED-12345-30
2 SHEETS, SHEET 2

SCALE 2:1 UNLESS OTHERWISE SPECIFIED

WESTERN ELECTRIC COMPANY, INC

DWG SIZE 6S

PRINTED IN U.S.A.

ED-12345-30

FIGURE 1B