BASIC SWITCHBOARD CABLE WIRING INFORMATION

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1. GENERAL

1.1 Scope of Section

1.11 This section covers basic information pertaining to the switchboard cabling layouts for the terminating assignments and other general information affecting this operation.

1.12 The following drawings can be used to assist in the performance of the layout and wiring operations:

H582-225 - Arbitrary Designations for Various Apparatus Used in Connection With Detail Change Sheets
H915-200 - Component Terminal Numbering Assignment and Arbitrary Location Numbering Plan for Use With Machine Aids Drawing

1.13 The requirements covered in this section shall be followed except as modified by applicable specifications and drawings.

1.2 Verification

1.21 Items for the verification of the equipment installed by the operations covered in this section are listed in Paragraph 6.

1.211 The items in Paragraph 6 may also be used as a self-check guide when performing operations covered in this section.

2. USE OF COLOR COMBINATIONS

2.1 Switchboard Cables

NOTE: The color makeup of cables extends to cables generally having conductor pair colors 181-200, 1C-20C, and 26C-45C. These paired colors are applied in the examples of this section except as noted.

2.11 When a switchboard cable carries a group of like circuits, the circuits shall be connected in numerical sequence, where practicable, in accordance with the numerical sequence of the color combinations. Cables are made using color combinations especially adapted to 1 wire, 2 wire and 3 wire circuits, etc., and are selected to suit the needs of the circuits which they carry.

2.12 When a switchboard cable carries a group of functional leads (some of which may be in numerical sequence and some of which may be random functionals) that comprise an inter-connecting path for circuit or equipment operations, the assignment of color combinations to those functional leads may be dependent upon the following considerations:

a) Maintenance of pairing requirements.

b) The elimination of splitting paired conductors over fanning strip holes or apparatus locations.

c) The recognition of apparatus patterns for both ends of the cable so as to provide the best sequence of color combinations.

2.13 Before assigning colors to wires shown on a particular circuit drawing without colors, refer to the connecting circuit drawing for colors shown on that drawing.

2.131 When a strap is shown on a piece of apparatus within a group and this group requires a loop to other groups such as busy test leads, etc., use the same size and color of wire for the loop as shown on the drawing for the incoming or outgoing lead connected to the strap.

2.14 Where all of the conductors in the cable are used for one or two circuits, as shown on some wiring diagrams and connecting charts, these colors are shown for the installer's convenience only. It is not a circuit requirement that the colors be used as shown and cases may be found where the colors do not correspond with the color code of the cable specified. In such cases, the installer may disregard the colors shown on the wiring diagram or connecting chart.

2.15 On cable connecting drawings where the functional designations are shown but the the colors are not assigned due to flexibility of the circuit, the colors are to be assigned by the installer.

2.151 On cable connecting drawings (H and CCED drawings) where the terms, "1st circuit served by cable," "2nd circuit served by cable," etc., are used, these terms generally mean "lowest numbered circuit served by cable" and "next higher numbered circuit served by cable", etc.

2.16 Sectional type cables in 22, 24 and 26 gauge, composed of from one to six sections are used for various circuits. Each section in a cable uses the same color combinations but is identified by a different colored binder, (BL, O, G, BR, S, or BL-W). In each section the basic colors, blue to slate-white, ("M" and "CL" type cables) BL2W to S2Y ("A" type cable) or BL-W to SY ("R" type cable) are used for the ring leads, the basic colors with a novelty tracer ("M" cable) BL1W to S1Y ("A" type cable) or W-BL to Y-S ("R" type cable) are used for the tip leads. The basic colors with a red tracer ("M" cable) BL3W to S3Y ("A" type cable) or W3BL to Y3S are used for sleeve leads. Refer to Section 102 for detailed description of the various types of sectioned cables.

2.161 The recently developed mixed gauge cables (289A-293A Series) may be used where the tip and ring leads require only 24 gauge wire and for circuit requirement reasons, such as critical leads, etc., the sleeve leads require 22 gauge wire. Refer to Section 102 for detailed information.

2.17 Where a quadded cable is furnished for both phantom and side circuits, each third quad shall be assigned for the two phantoms on the preceding two quads.

2.18 Colors of wires in switchboard power cables are not always shown on the switchboard power cable drawings. Where the colors are not shown and switchboard cables are used, assign colors to the leads in accordance with the color arrangement that may apply as outlined in this section.

2.19 Where cables are used for circuits laid out differently than those outlined in this section and the colors of the leads are not specified, assign the colors as nearly as possible in accordance with the color assignments covered.

2.191 SD48-125, SD48-126, SD48-127, SD48-126A and SD48-127A are convenient forms for recording color assignments and, where necessary, the lead designations or other similiar information may be included in the "Color Code" column.

2.2 One-Wire Circuits

NOTE: The circuit numbers referred to are in the order that the circuits are connected, rather than the actual circuit numbers as stamped on the equipment.

2.21 When switchboard cables having paired wires are used for one-wire circuits, the tip or mate leads (BL-NR, O-NR, etc., W-BL, W-O or BL1W, O1W, etc.) shall be used for the 1st, 3rd, 5th, etc., circuits. The ring leads (BL, O, G, etc., or BL2W, O2W, G2W, etc.) shall be used for the 2nd, 4th, 6th, etc., circuits. An example of a cable consisting of pairs being used for one-wire circuits is the 66 type cable for the register leads of the subscriber line circuits from the IDF to the message registers.

2.22 When standard switchboard cables made up of "Singles" only are used for one-wire circuits, the wires may be assigned in numerical color sequence to consecutively numbered circuits unless otherwise specified.

2.3 Two-Wire Circuits

NOTE: The circuit numbers referred to are in the order that the circuits are connected, rather than the actual circuit numbers as stamped on the equipment.

2.31 Two-wire circuits are usually cabled with switchboard cables having paired wires. They shall be connected as follows:

Ckt. No.	Type	Color Comb.	T	R
1	M	181	BL-NR	BL
	A	1C	BL1W	BL2W
	R	26C	W-BL	BL-W
2	M	182	O-NR	O
ETC	A	2C	O1W	O2W
	R	27C	W-O	O-W

FIG. 1 TWO-WIRE CIRCUITS - PARIED WIRE CABLE (PAR. 2.31)

2.32 As a rule, when a pair of wires in a switchboard cable is designated to carry current supply and ground, the tip or mate wire shall be used for the ground and the associated ring wire shall be used for the current supply. This shall be followed when "AM" type wire is used in lieu of switchboard cables on cable racks, particularly when local cable wiring is associated with such leads, or when all leads in the cable service current supply. In those cases where leads are part of a cable serving a single circuit, and the cable carries other functional leads, the rule need not be applied.

2.4 Three-Wire Circuits

NOTE: The circuit numbers referred to are in the order that the circuits are connected, rather than the actual circuit numbers as stamped on the equipment.

2.41 Three-wire circuits are usually cabled with switchboard cables having paired and single wires. They shall be connected as follows:

Ckt. No.	Type	Color Comb. Pair	Color Comb. Sing.	T	R	S
1	M	181	1	BL-NR	BL	R-BL
	A	1C	1C	BL1W	BL2W	BL3W
	R	26C	26C	W-BL	BL-W	W-3BL
2	M	182	2	O-NR	O	R-O
	A	2C	2C	O1W	O2W	O3W
ETC	R	27C	27C	W-O	O-W	W-30

FIG. 2 THREE-WIRE CIRCUITS - PAIRED AND SINGLE WIRE CABLE (PAR. 2.41)

2.5 Four-Wire Circuits

NOTE: The circuit numbers referred to are in the order that the circuits are connected, rather than the actual circuit numbers stamped on the equipment.

2.51 Four-wire circuits are usually cabled with switchboard cables having two groups of paired wires. They shall be connected in the following manner, depending on whether they are formed into a two leg form with 10 circuits in each leg or a single leg form containing 20 circuits. A one color "slip" is used in the latter case to avoid duplicate colors at breakout points.

2 Leg Form - 10 Circuits Per Leg - Sectional Cables

Ckt. No.	Type	Color Comb. Pair	Color Comb. Sect.	T	R	S	MR
1	M	181 191	BL	BL-NR	BL	O-W-NR	O-W
	A	1C 11C	BL	BL1W	BL2W	BL1BK	BL2BK
	R	26C 36C	BL	W-BL	BL-W	BK-BL	BL-BK
2	M	182 192	BL	O-NR	O	O-G-NR	O-G
	A	2C 12C	BL	O1W	O2W	O1BK	O2BK
	R	27C 37C	BL	W-O	O-W	BK-O	O-BK
11	M	181 191	O	BL-NR	BL	O-W-NR	O-W
	A	1C 11C	O	BL1W	BL2W	BL1BK	BL2BK
	R	26C 36C	O O	W-BL	BL-W	BK-BL	BL-BK

(Cont'd)

(Cont'd)

Ckt. No.	Type	Color Comb. Pair	Color Comb. Sect.	T	R	S	MR
20	M	190	0	BL-S-NR	BL-S		
		200				S-W-NR	S-W
	A	10C	0	S1R	S2R		
		20C				S1Y	S2Y
	R	35C	0	R-S	S-R		
		45C				Y-S	S-Y

FIG. 3 FOUR-WIRE CIRCUITS - PAIRED SECTIONAL CABLE (PAR. 2.51)

Single Leg Form - 20 Circuits - Sectional Cables

Ckt. No.	Type	Color Comb. Pair	Color Comb. Sect.	T	R	S	MR
1	M	181	BL	BL-NR	BL		
		182	0			O-NR	O
	A	1C	BL	BL1W	BL2W		
		2C	0			O1W	O2W
	R	26C	BL	W-BL	BL-W		
		27C	0			W-O	O-W
2	M	182	BL	O-NR	O		
		183	0			G-NR	G
	A	2C	BL	O1W	O2W		
		3C	0			G1W	G2W
	R	27C	BL	W-O	O-W		
		28C	0			W-G	G-W
19	M	199	BL	BR-S-NR	BR-S		
		200	0			S-W-NR	S-W
	A	19C	BL	BR1Y	BR2Y		
		20C	0			S1Y	S2Y
	R	44C	BL	Y-BR	BR-Y		
		45C	0			Y-S	S-Y
20	M	200	BL	S-W-NR	S-W		
		181	0			BL-NR	BL
	A	20C	BL	S1Y	S2Y		
		1C	0			BL1W	BL2W
	R	45C	BL	Y-S	S-Y		
		26C	0			W-BL	BL-W

FIG. 4 FOUR-WIRE CIRCUITS - PAIRED SECTIONAL CABLE (PAR. 2.51)

2.52 In addition to the section cables for four-wire circuits as covered in Paragraph 2.51, nonsectional flat type cables are used for switchboard multiple forms. The one color "slip" arrangement, as illustrated below, is used to avoid duplicate basic colors at breakout points.

Single Leg Form - 20 Circuits - Nonsectional Cables

Cables Containing Pairs (232 Type and Similiar)

Ckt. No.	Type	Color Comb.	T	R	S	L
1	M	1 182	W	BL	O-NR	O
2	M	2 183	W	O	G-NR	G
19	M	19 200	W	BR-S	S-W-NR	S-W
20	M	20 181	W	S-W	BL-NR	BL

FIG. 5 FOUR-WIRE CIRCUITS - NONSECTIONAL CABLE (PAR. 2.52)

2.6 Five-Wire Circuits

NOTE: The circuit numbers referred to are in the order that the circuits are connected, rather than the actual circuit numbers stamped on the equipment.

2.61 Sectional cables adaptable to five-wire circuits are of two types: (a) three section cables, two sections of which contain 20 pairs while the third section contains 20 singles, and (b) three section cables having two sections of 20 pairs each with the third section containing 10 pairs. They shall be connected in the following manner depending on whether they are formed out on a two leg or single leg basis.

2.62 In addition to the sectional cables for five-wire circuits as covered in Paragraph 2.61, nonsectional flat type cables are used for switchboard multiple forms. The one color "slip" arrangement, as illustrated below, is used to avoid duplicate basic colors at breakout points.

2 Leg Form - 10 Circuits Per Leg

Cables Containing Pairs and Singles (106 Type and Similar)

Ckt. No.	Type	Color Comb. Pair	Single	Section	T	R	S	M	M1
1	M	181		BL	BL-NR	BL			
		191		BL				O-W-NR	O-W
			1	G			R-BL		
	A	1C		BL	BL1W	BL2W			
		11C		BL				BL1BK	BL2BK
			1C	G			BL3W		
	R	26C		BL	W-BL	BL-W			
		36C		BL				BK-BL	BL-BK
			26C	G			W3BL		

(Cont'd)

(Cont'd)

Ckt. No.	Type	Color Comb. Pair	Single	Section	T	R	S	M	M1
10	M	190		BL	BL-S-NR	BL-S			
		200		BL				S-W-NR	S-W
			10	G			R-BL-S		
	A	10C		BL	S1R	S2R			
		20C		BL				S1Y	S2Y
			10C	G			S3R		
	R	35C		BL	R-S	S-R			
		45C		BL				Y-S	S-Y
			35C	G			S3R		
19	M	189		O	BL-BR-NR	BL-BR			
		199		O				BR-S-NR	BR-S
			19	G			R-BR-S		
	A	9C		O	BR1R	BR2R			
		19C		O				BR1Y	BR2Y
			19C	G			BR3Y		
	R	34C		O	R-BR	BR-R			
		44C		O				Y-BR	BR-Y
			44C	G			Y3BR		
20	M	190		O	BL-S-NR	BL-S			
		200		O				S-W-NR	S-W
			20C	G			R-S-W		
	A	10C		O	S1R	S2R			
		20C		O				S1Y	S2Y
			20C	G			S3Y		
	R	35C		O	R-S	S-R			
		45C		O				Y-S	S-Y
			45C	G			Y3S		

FIG. 6 FIVE-WIRE CIRCUITS - PAIRED AND SINGLE SECTIONED CABLE (PAR. 2.61)

2 Leg Form - 10 Circuits Per Leg

Cables Containing Only Pairs (66 Type and Similar)

Ckt. No.	Type	Color Comb. Pair	Color Comb. Section	T	R	S	M	M1
1	M	181	BL	*BL-NR	BL			
		191	BL				O-W-NR	O-W
		181(1/2)	G			*BL-NR		
	A	1C		*BL1W	BL2W			
		11C	BL				BL1BK	BL2BK
		1C(1/2)	G			*BL1W		
	R	26C		W-BL	BL-W			
		36C	BL				BK-BL	BL-BK
		26C(1/2)	G			W-BL*		
10	M	190		BL-S-NR	BL-S			
		200	BL				S-W-NR	S-W
		185(1/2)	G			S		
	A	10C		S1R	S2R			
		20C	BL				S1Y	S2Y
		5C	G			S2W		
	R	35C		R-S	S-R			
		45C	BL				Y-S	S-Y
		30C	G			S-W		
11	M	181		BL-NR	BL			
		191	O				O-W-NR	O-W
		186C(1/2)	G			BL-W-NR		
	A	1C		BL1W	BL2W			
		11C	O				BL1BK	BL2BK
		6C	G			BL1R		
	R	26C	O	W-BL	BL-W			
		36C					BK-BL	BL-BK
		31C	G			R-BL		
19	M	189		BL-BR-NR	BL-BR			
		199	O				BR-S-NR	BR-S
		190(1/2)	G			BL-S-NR		
	A	9C		BR1R	BR2R			
		19C	O				BR1Y	BR2Y
		10C	G			S1R		
	R	34C		R-BR	BR-R			
		44C	O				Y-BR	BR-Y
		35C	G			R-S		

(Cont'd)

(Cont'd)

Ckt. No.	Type	Color Comb. Pair	Section	T	R	S	M	MI
20	M	190		BL-S-NR	*BL-S			
		200	O				S-W-NR	S-W
		190(1/2)	G			*BL-S		
	A	10C		S1R	*S2R			
		20C	O				S1Y	S2Y
		10C	G			*S2R		
	R	35C		R-S	S-R			
		45C	O				Y-S	S-Y
		35C	G			S-R*		

*Unavoidable color duplication. Leads to be identified as necessary to facilitate connection.

FIG. 7 FIVE-WIRE CIRCUITS - PAIRED SECTIONED CABLE (PAR. 2.61)

Single Leg Form - 20 Circuits

Cables Containing Pairs and Singles (106 Type and Similar)

Ckt. No.	Type	Color Comb. Pair	Single	Section	T	R	S	M	MI
1	M	181		BL	BL-NR	BL			
		182		O				O-NR	O
			1	G			R-BL		
	A	1C		BL	BL1W	BL2W			
		2C		O				O1W	O2W
			1C	G			B13W		
	R	26C		BL	W-BL	BL-W			
		27C		O				W-O	O-W
			26C	G			W3BL		
2	M	182		BL	O-NR	O			
		183		O				G-NR	G
			2	G			R-O		
	A	2C		BL	O1W	O2W			
		3C		O				G1W	G2W
			2C	G			O3W		
	R	27C		BL	W-O	O-W			
		28C		O				W-G	G-W
			27C	G			W30		

(Cont'd)

(Cont'd)

Ckt. No.	Type	Color Comb. Pair	Section	T	R	S	M	M1
19	M	199	BL	BR-S-NR	BR-S			
		200	O				S-W-NR	S-W
		19	G			R-BR-S		
	A	19C	BL	BR1Y	BR2Y			
		20C	O				S1Y	S2Y
		19C	G			BR3Y		
	R	44C	BL	Y-BR	BR-Y			
		45C	O				Y-S	S-Y
		44C	G			Y3BR		
20	M	200	BL	S-W-NR	S-W			
		181	O				BL-NR	BL
		20	G			R-S-W		
	A	20C	BL	S1Y	S2Y			
		1C	O				BL1W	BL2W
		20C	G			S3Y		
	R	45C	BL	Y-S	S-Y			
		26C	O				W-BL	BL-W
		45C	G			Y3S		

FIG. 8 FIVE-WIRE CIRCUITS - PAIRED AND SINGLE SECTIONED CABLE (PAR. 2.61)

Single Leg Form - 20 Circuits

Cables Containing Only Pairs (66 Type and Similar)

Ckt. No.	Type	Color Comb. Pair	Section	T	R	S	M	M1
1	M	181	BL	*BL-NR	BL			
		182	O				O-NR	O
		181(1/2)	G			*BL-NR		
	A	1C	BL	*BL1W	BL2W			
		2C	O				O1W	O2W
		1C(1/2)	G			*BL1W		
	R	26C	BL	W-BL	BL-W			
		27C	O				W-O	O-W
		26C(1/2)	G			*W-BL		

(Cont'd)

(Cont'd)

Ckt. No.	Type	Color Comb. Pair	Color Comb. Section	T	R	S	M	M1
2	M	182	BL	O-NR	O			
		183	O				G-NR	G
		181(1/2)	G			BL		
	A	2C	BL	O1W	O2W			
		3C	O				G1W	G2W
		1C(1/2)	G			BL2W		
	R	27C	BL	W-O	O-W			
		28C	O				W-G	G-W
		26C(1/2)	G			BL-W		
19	M	199	BL	BR-S-NR	BR-S			
		200	O				S-W-NR	S-W
		190(1/2)	G			BL-S-NR		
	A	19C	BL	BR1Y	BR2Y			
		20C	O				S1Y	S2Y
		10C	G			S1R		
	R	44C	BL	Y-BR	BR-Y			
		45C	O				Y-S	S-Y
		35C(1/2)				R-S		
20	M	200	BL	S-W-NR	S-W			
		181	O				BL-NR	BL
		190(1/2)	G			BL-S		
	A	20C	BL	S1W	S2W			
		1C	O				BL1W	BL2W
		10C	G			S2R		
	R	45C	BL	Y-S	S-Y			
		26C	O				W-BL	BL-W
		35C(1/2)	G			S-R		

* Unavoidable color duplication. Leads to be identified as necessary to facilitate connection.

FIG. 9 FIVE-WIRE CIRCUITS - PAIRED SECTIONED CABLE (PAR. 2.61)

Single Leg Form - 10 Circuits

Nonsectional Cable Containing Singles (183 Type and Similar)

Ckt. No.	Type	Color Comb. Pair	Color Comb. Single	T	R	S	L	L1
1	M	181	1	BL-NR	BL	R-BL		
		191					O-W-NR	O-W
	A	1C	1C	BL1W	BL2W	BL3W		
		11C					BL1BK	BL2BK
	R	26C	26C	W-BL	BL-W	W3BL		
		36C					BK-BL	BL-BK
2	M	182	2	O-NR	O	R-O		
		192					O-G-NR	O-G
	A	2C	2C	O1W	O2W	O3W		
		12C					O1BK	O2BK
	R	27C	27C	W-O	O-W	W3O		
		37C					BK-O	O-BK

FIG. 10 FIVE-WIRE CIRCUITS - NONSECTIONAL CABLE (PAR. 2.61)

Single Leg Form - 20 Circuit (239M and Similar Cables) Nonsectional Cables

Ckt. No.	Type	Color Comb. Pair	Color Comb. Single	T	R	S	L	L1
1	M	1	1	W	BL	R-BL		
		182					O-NR	O
2	M	2	2	W	O	R-O		
		183					G-NR	O
19	M	19	19	W	BR-S	R-BR-S		
		200					S-W-NR	S-W
20	M	20	20	W	S-W	R-S-W		
		181					BL-NR	BL

FIG. 11 FIVE-WIRE CIRCUITS - NONSECTIONAL FLAT CABLE (PAR. 2.61)

2.7 Six Wire Circuits

NOTE: The circuit numbers referred to are in the order that the circuits are connected, rather than the actual circuit numbers stamped on the equipment.

2.71 Cables adaptable to six-wire circuits are of two types: (a) two section cables, each of which contain 20 pairs and 20 singles, and (b) three section cables, each of 20 pairs. They shall be connected in the following manner, depending on whether they are formed out on a single or two leg basis.

2-Leg Form - 10 Circuits Peg Leg

Cables Containing Pairs and Singles (233 Type and Similar)

Ckt. No.	Type	Color Comb. Pair	Color Comb. Single	Section	T	R	S	L	M	M1
1	M	181	1		BL-NR	BL	R-BL			
		191	11	BL				O-W-NR	O-W	R-O-W
	A	1C	1C		BL1W	BL2W	BL3W			
		11C	11C	BL				BL1BK	BL2BK	BL3BK
	R	26C	26C		W-BL	BL-W	W3BL			
		36C	36C	BL				BK-BL	BL-BK	BL3BK
2	M	182	2		O-NR	O	R-O			
		192	12	BL				O-G-NR	O-G	R-O-G
	A	2C	2C		O1W	O2W	O3W			
		12C	12C	BL				O1BK	O2BK	O3BK
	R	27C	27C		W-O	O-W	W3O			
		37C	37C	BL				BK-O	O-BK	O3BK
10	M	190	10		BL-S-NR	BL-S	R-BL-S			
		200	20					S-W-NR	S-W	R-S-W
	A	10C	10C		S1R	S2R	S3R			
		20C	20C	BL				S1Y	S2Y	S3Y
	R	35C	35C		R-S	S-R	S3R			
		45C	45C	BL				Y-S	S-Y	Y3S
11	M	181	1		BL-WR	BL	R-BL			
		191	11	0				O-W-NR	O-W	R-O-W
	A	1C	1C		BL1W	BL2W	BL3W			
		11C	11C	0				BL1BK	BL2BK	BL3BK
	R	26C	26C		W-BL	BL-W	W3BL			
		36C	36C	0				BL-BK	BK-BL	BL3BK
20	M	190	10		BL-S-NR	BL-S	R-BL-S			
		200	20	0				S-W-NR	S-W	R-S-W
	A	10C	10C		S1R	S2R	S3R			
		20C	20C	0				S1Y	S2Y	S3Y
	R	35C	35C		R-S	S-R	S3R			
		45C	45C	0				Y-S	S-Y	Y3S

FIG. 12 SIX-WIRE CIRCUITS - PAIRED AND SINGLE SECTIONED CABLE (PAR. 2.71)

2-Leg Form - 10 Circuits Peg Leg

Cables Containing Only Pairs (97 Type and Similar)

Ckt. No.	Type	Color Comb. Pair	Section	T	R	S	L	M	MI
1	M	181	BL	BL-NR	BL				
		182	BL			O-NR	O		
		183	BL					G-NR	G
	A	1C	BL	BL1W	BL2W				
		2C	BL			O1W	O2W		
		3C	BL					G1W	G2W
	R	26C	BL	W-BL	BL-W				
		27C	BL			W-O	O-W		
		28C	BL					W-G	G-W
7	M	199	BL	BR-S-NR	BR-S				
		200	BL			S-W-NR	S-W		
		181	O					BL-NR	BL
	A	19C	BL	BR1Y	BR2Y				
		20C	BL			S1Y	S2Y		
		1C	O					BL1W	BL2W
	R	44C	BL	Y-BR	BR-Y				
		45C	BL			Y-S	S-Y		
		26C	O					W-BL	BL-W
14	M	200	O	S-W-NR	S-W				
		181	G			BL-NR	BL		
		182	G					OR-NR	O
	A	20C	O	S1Y	S2Y				
		1C	G			BL1W	BL2W		
		2C	G					O1W	O2W
	R	45C	O	Y-S	S-Y				
		26C	G			W-BL	BL-W		
		27C	G					W-O	O-W
20	M	198	G	BR-W-NR	BR-W				
		199	G			BR-S-NR	BR-S		
		200	G					S-W-NR	S-W
	A	18C	G	G1Y	G2Y				
		19C	G			BR1Y	BR2Y		
		20C	G					S1Y	S2Y
	R	43C	G	Y-G	G-Y				
		44C	G			Y-BR	BR-Y		
		45C	G					Y-S	S-Y

FIG. 13 SIX-WIRE CIRCUITS - PAIRED SECTIONED CABLE (PAR. 2.71)

Single Leg Form - 20 Circuits

Cables Containing Pairs and Singles (233 Type and Similar)

Ckt. No.	Type	Color Comb. Pair	Single	Section	T	R	S	L	M	M1
1	M	181	1	BL	BL-NR	BL	R-BL			
		182	2	0				O-NR	0	R-O
	A	1C	1C	BL	BL1W	BL2W	BL3W			
		2C	2C	0				O1W	O2W	O3W
	R	26C	26C	BL	W-BL	BL-W	W3BL			
		27C	27C	0				W-O	O-W	W3O
2	M	182	2	BL	O-NR	O	R-O			
		183	3	0				G-NR	G	R-G
	A	2C	2C	BL	O1W	O2W	O3W			
		3C	3C	0				G1W	G2W	G3W
	R	27C	27C	BL	W-O	O-W	W3O			
		28C	28C	0				W-G	G-W	W3G
19	M	199	19	BL	BR-S-NR	BR-S	R-BR-S			
		200	20	0				S-W-NR	S-W	R-S-W
	A	19C	19C	BL	BR1Y	BR2Y	BR3Y			
		20C	20C	0				S1Y	S2Y	S3Y
	R	44C	44C	BL	Y-BR	BR-Y	Y3BR			
		45C	45C	0				Y-S	S-Y	Y3S
20	M	200	20	BL	S-W-NR	S-W	R-S-W			
		181	1	0				BL-NR	BL	R-BL
	A	20C	20C	BL	S1Y	S2Y	S3Y			
		1C	1C	0				BL1W	BL2W	BL3W
	R	45C	45C	BL	Y-S	S-Y	Y3S			
		26C	26C	0				W-BL	BL-W	W3BL

FIG. 14 SIX-WIRE CIRCUITS - PAIRED, SINGLE SECTIONED CABLE (PAR. 2.71)

Single Leg Form - 20 Circuits

Cables Containing Only Pairs (97 Type and Similar)

Ckt. No.	Type	Color Comb. Pair	Section	T	R	S	L	M	M1
1	M	181	BL	BL-NR	BL				
		182	O			O-NR	O		
		183	G					G-NR	G
	A	1C	BL	BL1W	BL2W				
		2C	O			O1W	O2W		
		3C	G					G1W	G2W
	R	26C	BL	W-BL	BL-W				
		27C	O			W-O	O-W		
		28C	G					W-G	G-W
2	M	182	BL	O-NR	O				
		183	O			G-NR	G		
		184	G					BR-NR	BR
	A	2C	BL	O1W	O2W				
		3C	O			G1W	G2W		
		4C	G					BR1W	BR2W
	R	27C	BL	W-O	O-W				
		28C	O			W-G	G-W		
		29C	G					W-BR	BR-W
19	M	199	BL	BR-S-NR	BR-S				
		200	O			S-W-NR	S-W		
		181	G					BL-NR	BL
	A	19C	BL	BR1Y	BR2Y				
		20C	O			S1Y	S2Y		
		1C	G					BL1W	BL2W
	R	44C	BL	Y-BR	BR-Y				
		45C	O			Y-S	S-Y		
		26C	G					W-BL	BL-W
20	M	200	BL	S-W-NR	S-W				
		181	O			BL-NR	BL		
		182	G					OR-NR	O
	A	20C	BL	S1Y	S2Y				
		1C	O			BL1W	BL2W		
		2C	G					O1W	O2W
	R	45C	BL	Y-S	S-Y				
		26C	O			W-BL	BL-W		
		27C	G					W-O	O-W

FIG. 15 SIX-WIRE CIRCUITS - PAIRED SECTIONED CABLE (PAR. 2.71)

2.8 AM or BH Type Wire

2.81 Where AM or BH wire is used, and no assignment of colors has been made on the drawing, or in the specifications, assign the colors in accordance with the following:

NOTE: Ordinarily only the colors of AM or BH type wire listed below will be ordered in the specifications.

Single

Black-Red - Used for the purpose for which the wire is provided.

Pair

Black - Ground, T, TI, etc., and as a feeder lead on the first of two circuits or group of circuits serviced by the pair.

Black-Red - Battery, R, R1, etc., and as a feeder lead on the second of two circuits or group of circuits served by the pair.

Triple

Yellow - Ground, T, TI, etc., and as a feeder lead on the first of three circuits or groups of circuits served by the triple.

Yellow Green - Ringing potential, R, R1, etc., and as a feeder lead on the second of three circuits or groups of circuits served by the triple.

Red-Green - Ringing potential, S, S1, etc., and as a feeder lead on the third of three circuits or groups of circuits served by the triple.

Quad

Yellow - T, T1, etc., and as a feeder lead on the first of four circuits or groups of circuits served by the quad.

Yellow Green - R, R1, etc., and as a feeder lead on the second of four circuits or groups of circuits served by the quad.

Quad (Cont'd)

Red - S, T1, T2, etc., and as a feeder lead on the third of four circuits or groups of circuits served by the quad.

Red-Green - L, A, R1, R2, etc., and as feeder lead on the fourth of four circuits or groups of circuits served by the quad.

3. FANNING AND FORMING - COMMON REQUIREMENTS

3.1 Application

3.11 The fanned form, as covered in Section 210, shall be used for all switchboard cable forms terminating at terminal strips, protectors or other apparatus equipped with a fanning strip or other fanning device such as fanning rings. Local cables terminated at terminal strips or other apparatus equipped with fanning strips may be fanned out without sewing where this method of forming is practicable.

3.12 Except where surface wiring or loose wiring is specified, the sewed form, as covered in Sections 220 and 221, shall be used for local and switchboard cables formed out to jacks, lamps, relays, coils, message registers, and similar type apparatus not generally equipped with a fanning strip or other fanning device.

3.13 The loose wire forms may be used for the vertical portion of what is normally considered as the bay cable form (either switchboard or local cable form).

3.2 Distributing Frames

3.21 At the horizontal side, leads from one cable may be spread over a maximum of 120 inches (15-8 inch bays). A cable entering the horizontal side from the vertical side, either from above or below, should be butted approximately at the center of the group of terminal strips being served or as shown on the applicable method of cabling drawing.

3.22 At the vertical side, a cable can be formed over one entire vertical or any portion of it, as required.

3.3 Fuse Boards

3.31 A cable can be formed to any panel in one bay, regardless of whether or not the panels are adjacent.

3.4 Relay Racks

3.41 The leads from one switchboard cable may be formed over one or more groups of mounting plates or relay rack units but shall not be spread over more than one relay rack bay, except as follows:

3.411 Cables employing AM (such as 400M through 450M type) may be formed over five adjacent bays or the equivalent. In such cases, the cable shall be butted on the cable rack near the center of the group and the wires run as loose wires.

3.412 Cables employing other than type AM wire (except cables containing shielded pairs) may be formed over more than one bay only for bay wired equipment having terminal strips and associated fanning rings at the top of the bay. For such equipment, one cable may be formed over five adjacent bays or the equivalent. It is usually preferable to butt the cable at the center of the group.

3.42 On channel frameworks, where cables serve only equipment in one bay, each cable shall be butted at the first mounting plate or unit which all or part of the leads terminate regardless of the location of the equipment in the bay. The stripped portion of the cable and wires not in cable shall be run as a loose wire form.

3.43 On bulb angle or box type frameworks, all cables serving equipment in the bay shall be butted at a cable bracket at the top of the bay and the strippers are run as loose wire in the vertical form.

3.5 Switchboards

3.51 Leads from one cable shall not be spread over more than six adjacent switchboard or desk positions except for cable employing "AM" wire (400M type, etc.). Such cable can be spread over a maximum of twelve adjacent positions.

3.511 Where 224 (Well) type terminal strips are used in switchboards, cables containing a maximum of three leads to a position can be spread over twelve positions. Cables containing more than three leads to a position shall serve in general four positions. Cables from multifrequency current supply (MFCS) can serve odd or even positions for a group of eight positions.

3.52 Where one switchboard cable is to be spread over more than two terminal strips, the cable shall be butted at the center of the group, and the leads spread in both directions to reduce congestion at any point to a minimum. This does not apply, however, to terminal strips arranged in vertical rows in the rear of the switchboard or to cables run through distributing rings in the rear of the switchboard.

3.521 Cables serving multifrequency current supply (MFCS) to odd positions shall be butted between the third and fourth positions of a group of eight positions served, and the cables to the even positions shall be butted between the fourth and fifth positions of a group of eight positions served.

3.53 Where switchboard cables are used to carry leads from the switchboard lower or position units to equipment located in the roof of the switchboard (roof cables), the leads from one cable shall not be spread over more than one section, whether the sections includes one, two or three positions.

3.6 Forms at Terminal Strips

3.61 Refer to Section 201 for information covering the forming of common wires looped between adjacent terminal strips on relay rack units or bay wired equipment.

3.62 Unless there are factors which make it desirable to do otherwise, in designing equipment of the present general types, the switchboard cable shall be formed to the left-hand side of a terminal strip mounted vertically, or the lower side of a terminal strip mounted horizontally, and the local cable to the right-hand or upper side, facing the clamping strip. In general, present test fixtures are designed for this arrangement.

3.621 Exceptions to the requirement stated in Paragraph 3.62 relay rack units using vertically mounted 203, 227, and C4A type terminal strips, 224 (Well type) terminal strips, relay rack mounted panels designed for use on relay racks having the switchboard cable brought down the right-hand side of the bay (facing the rear).

3.6211 At vertically mounted 203 type terminal strips, terminate the switchboard cable on the right-hand side.

3.6212 At "D" type and 224 (Well) type terminal strips, terminate the switchboard cable on the front (apparatus) side and the local cable on the rear (wiring) side of the mounting plate.

3.6213 At vertically mounted 227 type terminal strips, terminate switchboard cables on the right-hand side in all cases, except for a terminal strip located at the extreme right end of a mounting plate or panel, in which case terminate the switchboard cable on the left side of the strip and the local cable on the right.

3.622 At equipment other than relay rack units, the same practice should be followed with respect to the termination of the switchboard cable as at the equipment with which it is most closely associated.

3.63 New equipment fundamentally different in design from existing types of equipment, or which uses terminal strips so radically different from conventional design as to require new test fixtures, shall, unless there are controlling reasons for doing otherwise, have the switchboard cable connected to the right-hand or upper side of the terminal strips.

3.64 Loops and straps on relay rack unit terminal strips will be placed by the shop except:

3.641 Loops between terminal strips when there is no supporting shop made local cable.

3.642 Optional loops and straps dependent upon traffic conditions or upon information not available during manufacture.

4. LOOSE WIRING

4.1 Loose wire forms are held in cable formation by wire retaining devices such as fanning rings, plastic retaining clips, bands of twine, nylon cable ties, etc. They may consist of bulk wire run from outside of the bay or as local wiring, or switchboard cable leads run loose from the cable butt. The wires are run through the wire retaining devices, banded with twine or nylon ties without slack, but they are not drawn so tightly as to interfere with the skinner dress. Usually no ties will be required because of the relatively close spacing of the devices. A wire retaining device is usually provided at each breakout point for the wires. The leads to the apparatus terminals (skinners) are dressed in the normal manner for skinners from sewed forms. Refer to Section 240 for the requirements and methods covering the installing of loose wire forms.

5. USE OF SPARE CONDUCTORS IN SWITCHBOARD CABLES

5.1 Spare conductors shall not be used as regular conductors except to replace defective regular conductors or where authorized for use in the engineering requirements for specific equipments. In quadded cables, however, spare quads may be used to provide a choice in case it is necessary to secure the proper capacity balance.

5.11 A conductor is considered to be defective when the break (or other defect) occurs under the sheath of the cable or in a position where it can not be repaired or spliced.

5.12 Spare singles and pairs in switchboard cables shall be used in sequence starting from the first numbered single or pair as shown in Section 100.

5.13 When it is necessary to use spare conductors in a switchboard cable to replace any of the conductors of a pair or quad, the entire pair or quad shall be replaced, respectively, with a spare pair or quad.

5.14 Spare singles in a switchboard cable shall be used only to replace single regular wires as shown on the wiring diagram.

7. VERIFICATION ITEMS

VERFICATION ITEMS AND BRIEF STATEMENT OF REQUIREMENTS	REFERENCE	
	PAR. NO.	FIG. NO.
6.01 Groups of like circuits are connected in numerical sequence per color.	2.11, 2.18 2.19, 2.31 2.41	1, 2
6.02 Where quads are used for both phantom and side circuits, each third quad is assigned on the proceeding two quads. Tip or mate wire of cable pairs, used for (1 wire) circuits, are connected to the first, third, etc., circuit.	2.17 2.21	
6.03 Loop leads between strapped apparatus in a group or to other groups, use the same size and color wire as the incoming or outgoing lead connected to the strap.	2.131	
6.04 The tip or mate lead of a cable pair carries the ground supply and the associated ring lead carries the current supply.	2.32	
6.05 Four-wire circuits are connected in numerical sequence per color and/or binders.	2.51, 2.52	3, 4, 5
6.06 Five-wire circuits are connected in numerical sequence per color and/or binder.	2.61, 2.62	6, 7, 8, 9, 10, 11
6.07 Six-wire circuits are connected in numerical sequence per color and/or binder.	2.71	12, 13 14, 15
→ 6.08 When AM type wire was used, the proper colors of pairs, triples and quads are connected to (tip-ground) (ring battery) and (sleeve-ring potential).	2.81	
6.09 The proper type of form was used as required at specific apparatus, terminal strips, etc. Refer to Section 210.	3.11, 3.12	
6.10 On horizontal side of distributing frame, a cable shall not → be formed over 120 inches (15-8" Bays).	3.21	
6.11 On vertical side of distributing frame, a cable can be formed over one entire vertical.	3.22	
6.12 On fuse boards, a cable can be formed to panels in any one bay.	3.31	
6.13 Cables cannot be formed over more than one relay rack frame → except for cables employing AM wire such as 400M thru 450M (5-Bays).	3.41, 3.411, 3.412	
6.14 On channel and I Beam framework, the cable serving one bay shall butt at the first mounting plate or unit to which any or all leads terminate.	3.42	
6.15 On bulb angle and box type framework, cables shall butt at top cable bracket.	3.43	
6.16 At switchboard and desk positions, cables shall not spread → over more than six adjacent positions except for AM, 400M type cables which has a maximum of twelve positions.	3.51, 3.511	

VERFICATION ITEMS AND BRIEF STATEMENT OF REQUIREMENTS (Cont'd)	REFERENCE	
	PAR. NO.	FIG. NO.
6.17 At switchboards and desk positions, cables serving more than two terminal strips shall be butted in the center of the group to reduce congestion.	3.52	
6.18 Cables serving multifrequency current supply to odd positions shall be butted between the third and fourth positions served; cables serving even positions butted between the fourth and fifth positions served.	3.521	
6.19 Cables carrying leads from the lower position to the roof equipment shall not spread over more than one section.	3.53	
6.20 At terminal strips, the cables shall be formed on the proper sides (on the left hand side for vertically mounted strips and lower side of horizontally mounted strips). For exceptions, refer to Paragraphs 3.621, 3.6211, 3.6212, 3.6213, and 3.63.	3.62, 3.621 3.6211, 3.6212, 3.6213, 3.63	
6.21 Spare cable conductors shall be used only to replace defective conductors.	5.1	
6.22 Spare singles and pairs of switchboard cables shall be used in numerical sequence.	5.12	
6.23 When using spare pairs and quads of switchboard cable replace the entire defective pair of quad.	5.13	
6.24 Replace defective switchboard cable single leads with spare singles only.	5.14	

→ Indicates new or changed information

[Vertical lines at side of paragraph indicates requirements.

Engineering Planning Manager
(Installation)

Reason for Reissue:
Revise Figures 1-15 to
Reflect M, A & R Cable Codes.
Revise Paragraphs 3.21, 3.411, and 3.412.