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EXCEEDING EXPECTATIONS WITH PERFORMANCE

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TAKING DIGITAL ONE STEP FURTHER !

West Penn Wire has taken our Digital Coaxial cables to another level, with manufacturing techniques, Testing, engineering, and overall performance.

DIGITAL VIDEO CABLES

Digital Video Coaxial cables are designed differently than plain old coax. The manufacturing techniques, and testing become more crucial. A constant eye is focused on the manufacturing machinery, that may cause periodicity, testing of the coaxial electrical parameters are a daily activity, and engineered proprietary materials are used make the best digital cables in the world.

ELECTRICAL PARAMETERS

Superior electrical parameters or characteristics of a Digital Coaxial cables are what West Penn is achieving.

Parameters such as: Minimized Return Loss (RL), Consistent Impedance , Low Capacitance, and High Velocity of Propagation.

RETURN LOSS (RL)

Return Loss (RL), one of the most important parameters for any transmission system, is signal attenuation caused by impedance variations in the structure of a cable or associated connection parts. The variations will cause the signal to reflect or return back to the source, causing the decrease in cable distance, and change to the amplitude of the signal reaching the receiver. A minimized Return Loss is required for a high frequency/ data rate performance, keeping the bit error rates at an acceptable level.

WHAT CAUSE RETURN LOSS (RL) ?

Variations in the Impedance of a cable produce Return Loss. Therefore the make-up, size, and design will affect the Impedance and Return Loss.

Center Conductor:

If the center conductor varies in size, this will cause periodic variations, hence reflections in the signal. The concentricity maintained by the dielectric is extremely important in minimizing Return Loss.

Dielectric:

The dielectric is extruded around the center conductor, the size, foaming techniques, and the make-up of material will greatly affect the Impedance and Return Loss.

If the dielectric is too soft, a bend in the cable will cause migration of the center conductor, that will cause severe Impedance variations, and Return Loss.

West Penn Wire uses a proprietary compounding material and technique for superior electrical and mechanical parameters.

Shielding:

The shielding used for digital coaxial cables usually have a foil-braid combination. The 100% aluminum foil used is effective from 10MHz up into the Gigahertz range, while the high percentage tinned copper braid is effective from 100kHz up to 10 MHz.

Other factors involving Impedance and Return Loss:

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- Choosing the Correct Connectors and tools.
- Maintaining the recommended bend radii.
- Maintaining the recommended pull tension.
- Cable handling
- Cable installation

TESTING RETURN LOSS

Every digital coax is 100% sweep tested up to 3GHz. Typical return loss of -30 db.

West Penn Wire provides the greatest level of Return Loss performance in the industry





DIGITAL STANDARDS

The Society of Motion Pictures and Television Engineers (SMPTE) have developed several standards for digital video transmission (SDI).

Serial Digital Interface (SDI) standards were developed for longer distance connections of component digital television equipment, the results being the viability of a truly digital broadcast (teleproduction) facility. There is also a European standards body known as the ITU, that develops digital video standards for the European PAL.

The Return Loss specifications for SMPTE SDI Cables are:

SMPTE Recommended RL Limit	>15 dB	5 - 1.5 GHZ
WPW Guaranteed RL Limit	> 23 dB	5 - 850 MHz
WPW Guaranteed RL Limit	> 21 dB	850 MHz - 3 GHz

Cor SMPTE Recommended RL Limit West Penn/ CDT RL Specification 0 15 GHz 3 GHz 3 GHz 3 GHz

The SDI standards are specified by data rates, bandwidth requirements, and transmission techniques.

STANDARD	DATA RATE	BANDWIDTH	DESCRIPTION
SMPTE259M	1.43Mb/s	71.5MHz	NTSC Composite
ITU-RBT.601	177Mb/s	88.5MHz	European PAL Composite
SMPTE259M	270Mb/s	135MHz	NTSC Component 4:3 ratio
SMPTE259M	360Mb/s	180MHz	NTSC Component 16:9 ratio
SMPTE344M	540Mb/s	270MHz	NTSC Component Widescreen
SMPTE292M	1.5Mb/s	750MHz	HDTV

The SMPTE259M 270Mb/s Component is the most popular standard.

BEYOND HDTV

Demanding the highest of quality digital picture is what is expected. Digital television will not only provide a high fidelity picture, but also high fidelity audio.

Events such as the Super Bowl, Olympics, and many other sports or live productions have a need for the highest technology that the broadcast industry can obtain, to ensure viewer satisfaction.

With West Penn digital coaxial cables, the fidelity need and wanted will be obtained.



SDI PERFORMANCE

Data Rate	143Mbps	177Mbps	270Mbps	360Mbps	540Mbps	1.485Gbps
Specs	SMPTE259M	ITU-RBT.601	SMPTE259M	SMPTE259M	SMPTE344M	SMPTE292M
Application WPW P.N.	Composite NTSC	Composite PAL	Component Video	Component Widescreen	Compressed HDTV	HDTV
HD825	769	705	576	509	415	158
819	1399	1292	1067	915	712	290
6350	1840	1746	1399	1205	947	380
7210	2045	1875	1543	1364	1107	450
1135	2432	2250	1862	1646	1337	513

Notes:

Lengths are calculated in feet.

The Serial Digital interconnect standards are designed to operate where the signal loss at 1/2 the clock frequency does not exceed the approximate loss values listed below. The maximum length values shown are based on typical attenuation values for the cables listed and the following criteria:

- Maximum length= 30 dB loss at 1/2 the clock frequency
 - SMPTE259M and ITU-R BT.601
- Maximum length= 20 dB loss at 1/2 the clock frequency
 - SMPTE292M

The bit error rate (BER) can vary dramatically as the calculated distances are approached. BER is dependent on receiver design and the losses of the actual coax used. West Penn Wire/ CDT recommended distance is 90% of the calculated maximum distance, which allows a safety margin for typical lot-to-lot cable attenuation variation, patch panel equipment loss, connectors loss and ensures operation below the "error cliff" region. Contact equipment manufactures for recommended transmission distances, and cable selection.

Distances can be approximately doubled, depending on the sensitivity of the receiving device.

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Pro Video Coax/Analog and Digital Miniature Coax, RG-59/U, and RG6/U Types

Catalog No.	Description	NEC Type	AWG Size Stranding	Insul Nom	ation O.D.	Shield Type and %	Nom. Cable O.D. Jacket Type		Nom. Cable O.D. Jacket Type		Non Capac	ninal itance	Nom. Vel. of	Nom. Imp.	Ati	Nom. tenuat	ion	
		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Nom. D.C.R.	inch	mm	Coverage	inch	mm	pf/ft	pf/m	Prop.	Ω	mhz	db/ 100 ft	db/ 100 m			
	R X X X C		25 (Solid)	.085	2.16		.146	3.71	16.2	53.1	82%	75	1 3.6 10	.48 .98 1.73	1.57 3.21 5.67			
HD825	MINIMAX Miniature Coax SDI ** Digital Video Cable		Bare Copper 30Ω/M'	Gas Injected PE [‡]		Gas Injected PE [‡]		BiFoil* 100% Tinned Copper Braid 95%	Color Conr	rs: Black, I nector: 75	PVC J Red, Gre Ω 3 Pie	acket en, Blue, ce BNC,	White, Ye CN-BM 74	llow -18	71.5 135 270 360 540 720 1000 2250 3000	3.51 4.69 6.51 7.72 9.3 10.88 13.34 18.92 22.16	11.51 15.38 21.35 25.32 30.50 35.69 43.76 62.06 72.68	
			2F (Calid)	.078	1.98		.146	3.71	16.2	53.1	82%	75	1 3.6 10	.48 .99 1.75	1.59 3.24 5.73			
HD25825	MINIMAX Miniature Coax SDI ** Digital Video Cable		25 (Solid) Bare Copper 30Ω/M'	Foam FEP		(Solid) Bare opper Foam PΩ/M' FEP		BiFoil* 100% Tinned Copper Braid 95%	Color Conr	Fle. rs: Black, 1 nector: 75	xible Ple Red, Gre Ω 3 Pie	num Jacl en, Blue, ce BNC,	ket White, Ye CN-BM 74	llow -18	71.5 135 270 360 540 720 1000 2250	3.54 4.73 6.57 7.79 9.38 10.98 13.46 19.28 22.90	11.62 15.52 21.54 25.55 30.78 36.01 44.15 63.24 74.70	
			20(Colid)	.142	3.61		.232	5.89	16.2	53.1	82%	75	1	.28	.92			
819	HDTV, DTV SDI** Digital Video RG-59/U Type	CMR	Bare Copper 10Ω/M'	Gas Injected PE ‡		Gas Injected PE [‡]		Bare Copper 10Ω/M ^r Injected PE [‡]		BiFoil* 100% Tinned Copper Braid 95%	Color Con	PVC Jacket Colors: Black, Red, Green, Blue, White, Yellow Connector: 75 Ω 3 Piece BNC, CN-BM 73-2			llow 8-2	10 1.0 71.5 1.1 185 3 270 3. 360 4 720 6. 1000 7. 1500 9. 2250 11 3000 13	1.93 3.0 3.79 4.3 6.23 7.49 9.16 11.19 13.23	6.33 9.8 12.4 14.1 20.43 24.57 30.0 36.7 43.4
	@ Y Y Y C			.138	3.51		.207	5.26	16.1	52.8	84%	75	1 10	.28 .67	.93 2.18			
25819	HDTV, DTV SDI** Digital Video RG-59/U Type	CMP	20 (Solid) Bare Copper 10Ω/M'	Fo Fi	am EP	BiFoil* 100% Tinned Copper Braid 95%	Conr	Fle. nector: 75	xible Ple Colors: Ω 3 Pie	num Jack Ivory ce BNC,	ket CN-BM 73	-30	71.5 135 270 360 540 720 1000 1500 2250 3000	1.95 2.55 3.82 4.34 5.31 6.29 7.56 9.33 11.40 13.61	6.39 8.37 12.54 14.23 17.41 20.62 24.79 30.62 37.40 44.65			
			18 (Solid)	.180	4.57		.275	6.99	16.2	53.1	82%	75	1 10 71.5	.23 .5 1.47	.75 1.64 4.82			
6350	HDTV, DTV SDI** Digital Video RG-6/U Type		Bare Copper 6.4Ω/Μ'	G Injecte	Gas ted PE [‡] BiFoil* 100% Tinned Copper Braid 95%		Color Con	s: Black, I nector: 75	PVC J Red, Gre 5 Ω 3 Pi	acket en, Blue, ece BNC,	White, Ye CN-BM 73	llow I-5	135 270 360 540 720 1000 1500 2250 3000	1.93 2.85 3.22 3.93 4.65 5.52 7.06 8.75 10.45	6.33 9.35 10.56 12.89 15.25 18.11 23.16 28.70 34.28			
			18 (Calid)	.170	4.32		.236	5.99	16.2	53.1	84%	75	1 10 71.5	.23 .5 1.48	.69 1.92 4.37			
256350	HDTV, DTV SDI** Digital Video RG-6/U Type	CMP	Bare Copper 6.4Ω/M'	Fo Fi	Foam Coppe FEP 95		Con	Fle: nector: 75	xible Ple Colors: 5 Ω 3 Pi	num Jacl Ivory ece BNC,	ket CN-BM 73	-4	135 270 360 540 720 1000 1500 2250 3000	1.95 2.88 3.25 3.97 4.69 5.57 7.19 8.92 10.75	5.79 8.08 9.30 11.38 13.24 15.92 20.02 24.27 28.79			



Digital **Pro Video Coax** RG-7/U and RG-11/U Types

Catalog No.	Description	NEC Type	AWG Size Stranding	Insul Nom	ation O.D.	n Shield Nom. Cable Nominal No. D. Type and Jacket Type		Nom. Cable O.D. Jacket Type		ShieldNom. CableNominalType andO.D.Capacitan%Jacket Type		Nom. Cable O.D. Jacket Type		Shield Nom. Cable Nominal Nom ype and O.D. Capacitance Vel. % Jacket Type of	Nom. Vel. of	Nom. Imp.	Nom. Attenuation		
			Nom. D.C.R.	inch	mm	Coverage	inch	mm	pf/ft	pf/m	Prop.	52	mhz	db/ 100 ft	db/ 100 m				
7210			16 (Solid) .051 Bare	.236	5. 99	BiFoil* 100% Tinned	.340	8.64	16.2	53.1	83%	75	1 10 71 5	.21 .58 1.32	.69 1.90 4 33				
7210	HDTV, DTV SDI** Digital Video RG-7/11 Type	Copper		Gas Injected PE [‡]		Copper Braid 95%	d PVC Jac Colors: Black, Red, Greer		acket en, Blue,	ue, White, Yellow		135 270 360 540 720	1.32 1.75 2.44 2.81 3.44 4.00	4.33 5.74 8.00 9.22 11.28 13.12 15.78					
			4.1 Ω/M'				Connector: 75 Ω 3 Piece BNC, C			CN-BM 73	8-7	1500 2250 3000	5.99 7.26 8.53	19.65 23.81 27.98					
257210			16 (Solid) .051 Bare	.230	5.84	BiFoil* 100% Tinned	.298	7.57	16.2	53.1	83%	75	1 10 71.5	.21 .59 1.33	.69 1.92 4.37				
237210	HDTV, DTV SDI** Digital Video RG-7/U Type		Copper 4.1 Ω/M'	Foam Copper Bra FEP 95%		Copper Braid 95%	i Plenum jacket Color: Natural						135 270 360 540 720 1000 1500 2250 3000	1.77 2.46 2.84 3.47 4.04 4.85 6.10 7.40 8.78	4.37 5.79 8.08 9.30 11.38 13.24 15.92 20.02 24.27 28.79				
1125			14 (Solid) 064 Bare	.280	7.11	BiFoil* 100% Tinned	.405	10.29	16.0	52.5	85%	75	1 10 71.5	.15 .34 1.11	.49 1.12 2.64				
1133	HDTV, DTV SDI** Digital Video RG-11/U Type	CAR	Copper 2.5 Ω/M'	G Injecte	as ed PE [‡]	Copper Braid 95%	Colo	rs: Black, I	PVC Ja Red, Gee	acket n, Blue,	White, Yel	low	71.5 135 270 360 540 720 1000 1500 2250 3000	1.11 1.45 2.02 2.40 2.93 3.46 4.08 4.78 6.01 7.24	3.04 4.76 6.63 7.87 9.61 11.35 13.38 15.68 19.71 23.74				

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INSTALLATION RECOMMENDATIONS

Careful considerations must be taken when installing digital coaxial cables. Extreme bending, or exceeding the minimum bend radius can cause migration of the center conductor. Center conductor migration is the gradual movement of the conductor through the dielectric material caused by internal stress from bending. This effect will alter the impedance and return loss of the cable. See Chart 1. (Min. Bend Radius)

West Penn Wire uses a proprietary HDPE compounding material that assures minimal center conductor migration.

Pulling the digital cable must also be considered. Exceeding the suggested maximum pull strength can cause elongation of the center conductor, which has a significant effect on impedance and return loss. It can also cause the dielectric to deform by the collapse of the shield. See Chart 2. (Max. Pull Strength)

WPW Part No.	Min. Bend Radius
HD825	1.65 Inches
819	2.25 Inches
6350	2.75 Inches
7210	3.50 Inches
1135	4.05 Inches

Chart 1.

WPW Part No.	Max. Pull Strength
HD825	30 lbs
819	50 lbs
6350	60 lbs
7210	115 lbs
1135	145 lbs

CONNECTORIZATION

Connectors are a major consideration in impedance and return loss. Professional broadcast installers should be aware that 50Ω connectors are unacceptable. 75Ω Connectors are the only type of connector recommended for digital video cables. Using 75Ω connectors with 75Ω cable will maintain a consistent Impedance and minimize return loss.



CONNECTOR CROSS-REFERENCE

The chart below shows West Penn Wire Non-Plenum digital video coaxial cables with the appropriate 75Ω BNC connector.

WPW Part No.	WPW 75Ω BNC Crimp	WPW Compression	Kings 75Ω BNC Crimp	Canare 75Ω BNC Crimp	ADC 75Ω BNC Crimp
HD825	CN-BM73-18	CN-CSRCA-25	2065-11-9	-	-
819	CN-BM73-2	CN-BNCSNS-2	2065-2-9	BCP-C4F	BNC-1
6350	CN-BM73-5	CN-BNCSNS-5	2065-10-9	BCP-C53	BNC-8
7210	CN-BM73-7		2065-12-9	-	-
1135	CN-BM73-26		2025-60-9 2065-8-9	BCP-C71A	BNC-25

Call West Penn Wire Engineering for Plenum Connector Cross- Reference

1-800-245-4964 info@westpenn-cdt.com



CABLE ASSEMBLIES

West Penn Wire offers many digital video cable assemblies. Cable assemblies are an important part of the overall installation. Cable assemblies are used for short run installations, or for connections in a patch panel.

RGB/ Sync Cable Assemblies (75Ω Connectors) Male to Male Male to Female Female to Female

> Install Kit: RGB- HD15 to HD15 RGB- HD15 to 5 BNC SVHX- 75 Ω BNC to 4 Pin Mini Din

HD-15 (VGA) cable assemblies HD-15 to BNC Cable assemblies