

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.



EXCEEDING EXPECTATIONS WITH PERFORMANCE !!!

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.

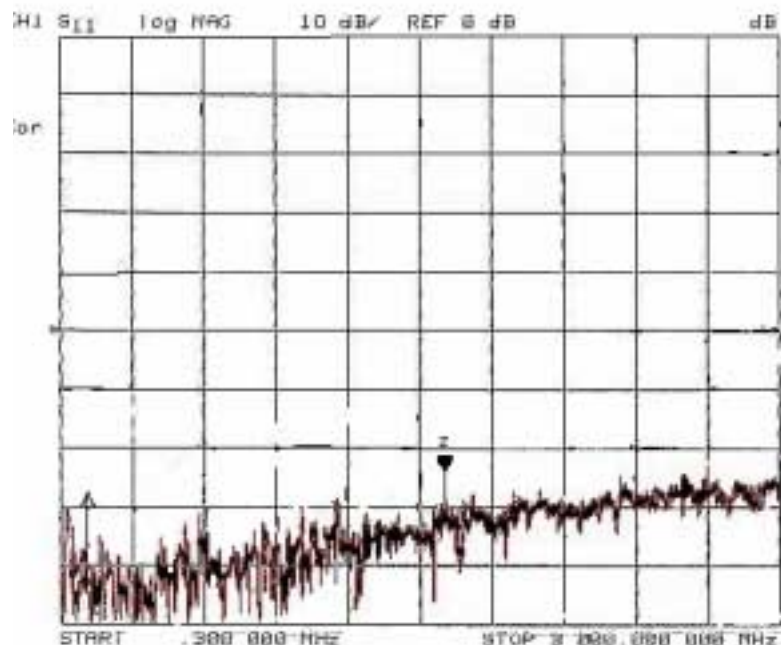
Other factors involving Impedance and Return Loss:

- 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:

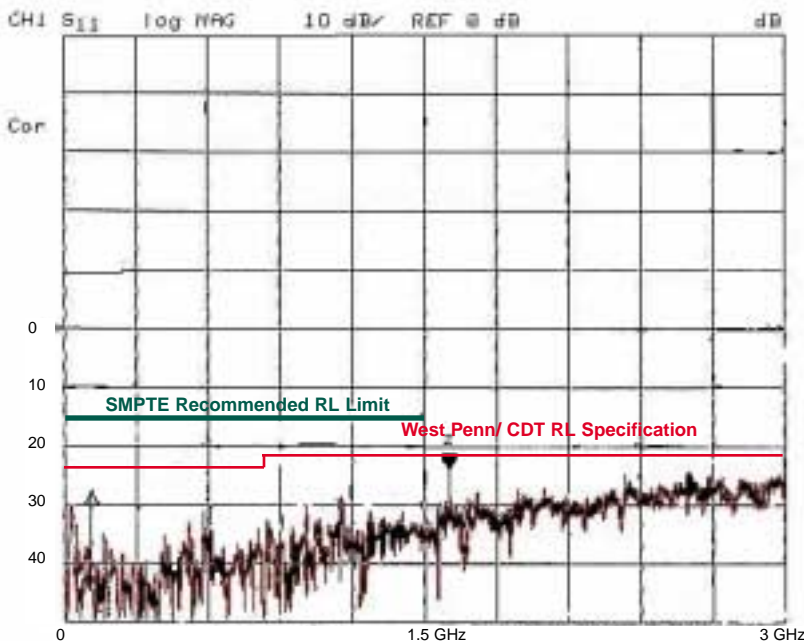
SMPTE Recommended RL Limit	>15 dB	5 - 1.5 GHz
WPW Guaranteed RL Limit	> 23 dB	5 - 850 MHz
WPW Guaranteed RL Limit	> 21 dB	850 MHz - 3 GHz

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	Composite NTSC	Composite PAL	Component Video	Component Widescreen	Compressed HDTV	HDTV
WPW P.N.						
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

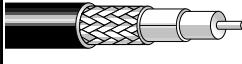

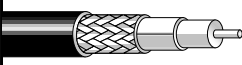

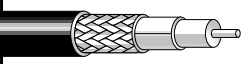

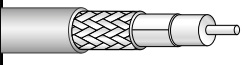

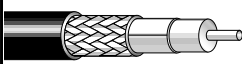

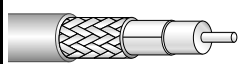

The bit error rate (BER) can vary dramatically as the calculated distances are approached. BER is dependent on receiver design and the losses of the actual coax used. West Penn Wire/ CDT recommended distance is 90% of the calculated maximum distance, which allows a safety margin for typical lot-to-lot 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.

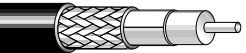

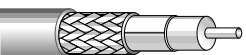

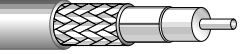

DIGITAL VIDEO CABLES

WEST PENN WIRE

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

Catalog No.	Description	NEC Type	AWG Size Stranding Nom. D.C.R.	Insulation Nom O.D.		Shield Type and % Coverage	Nom. Cable O.D. Jacket Type		Nominal Capacitance		Nom. Vel. of Prop.	Nom. Imp. Ω	Nom. Attenuation		
				inch	mm		inch	mm	pf/ft	pf/m			mhZ	db/100 ft	db/100 m
HD825	 MINIMAX Miniature Coax SDI** Digital Video Cable		25 (Solid) Bare Copper 30Ω/M'	.085	2.16	BiFoil* 100% Tinned Copper Braid 95%	.146	3.71	16.2	53.1	82%	75	1	.48	1.57
				Gas Injected PE ‡	PVC Jacket Colors: Black, Red, Green, Blue, White, Yellow Connector: 75 Ω 3 Piece BNC, CN-BM 74-18		3.6	.98	3.21						
							10	1.73	5.67						
							71.5	3.51	11.51						
							135	4.69	15.38						
							270	6.51	21.35						
							360	7.72	25.32						
							540	9.3	30.50						
							720	10.88	35.69						
							1000	13.34	43.76						
2250	18.92	62.06													
3000	22.16	72.68													
HD25825	 MINIMAX Miniature Coax SDI** Digital Video Cable		25 (Solid) Bare Copper 30Ω/M'	.078	1.98	BiFoil* 100% Tinned Copper Braid 95%	.146	3.71	16.2	53.1	82%	75	1	.48	1.59
				Foam FEP	Flexible Plenum Jacket Colors: Black, Red, Green, Blue, White, Yellow Connector: 75 Ω 3 Piece BNC, CN-BM 74-18		3.6	.99	3.24						
							10	1.75	5.73						
							71.5	3.54	11.62						
							135	4.73	15.52						
							270	6.57	21.54						
							360	7.79	25.55						
							540	9.38	30.78						
							720	10.98	36.01						
							1000	13.46	44.15						
2250	19.28	63.24													
3000	22.80	74.79													
819	 HDTV, DTV SDI** Digital Video RG-59/U Type		20(Solid) Bare Copper 10Ω/M'	.142	3.61	BiFoil* 100% Tinned Copper Braid 95%	.232	5.89	16.2	53.1	82%	75	1	.28	.92
				Gas Injected PE ‡	PVC Jacket Colors: Black, Red, Green, Blue, White, Yellow Connector: 75 Ω 3 Piece BNC, CN-BM 73-2		10	.66	2.16						
							71.5	1.93	6.33						
							185	3.0	9.8						
							270	3.79	12.4						
							360	4.3	14.1						
							720	6.23	20.43						
							1000	7.49	24.57						
							1500	9.16	30.0						
							2250	11.19	36.7						
3000	13.23	43.4													
25819	 HDTV, DTV SDI** Digital Video RG-59/U Type		20 (Solid) Bare Copper 10Ω/M'	.138	3.51	BiFoil* 100% Tinned Copper Braid 95%	.207	5.26	16.1	52.8	84%	75	1	.28	.93
				Foam FEP	Flexible Plenum Jacket Colors: Ivory Connector: 75 Ω 3 Piece BNC, CN-BM 73-30		10	.67	2.18						
							71.5	1.95	6.39						
							135	2.55	8.37						
							270	3.82	12.54						
							360	4.34	14.23						
							540	5.31	17.41						
							720	6.29	20.62						
							1000	7.56	24.79						
							1500	9.33	30.62						
2250	11.40	37.40													
3000	13.61	44.65													
6350	 HDTV, DTV SDI** Digital Video RG-6/U Type		18 (Solid) Bare Copper 6.4Ω/M'	.180	4.57	BiFoil* 100% Tinned Copper Braid 95%	.275	6.99	16.2	53.1	82%	75	1	.23	.75
				Gas Injected PE ‡	PVC Jacket Colors: Black, Red, Green, Blue, White, Yellow Connector: 75 Ω 3 Piece BNC, CN-BM 73-5		10	.5	1.64						
							71.5	1.47	4.82						
							135	1.93	6.33						
							270	2.85	9.35						
							360	3.22	10.56						
							540	3.93	12.89						
							720	4.65	15.25						
							1000	5.52	18.11						
							1500	7.06	23.16						
2250	8.75	28.70													
3000	10.45	34.28													
256350	 HDTV, DTV SDI** Digital Video RG-6/U Type		18 (Solid) Bare Copper 6.4Ω/M'	.170	4.32	BiFoil* 100% Tinned Copper Braid 95%	.236	5.99	16.2	53.1	84%	75	1	.23	.69
				Foam FEP	Flexible Plenum Jacket Colors: Ivory Connector: 75 Ω 3 Piece BNC, CN-BM 73-4		10	.5	1.92						
							71.5	1.48	4.37						
							135	1.95	5.79						
							270	2.88	8.08						
							360	3.25	9.30						
							540	3.97	11.38						
							720	4.69	13.24						
							1000	5.57	15.92						
							1500	7.19	20.02						
2250	8.92	24.27													
3000	10.75	28.79													

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

Catalog No.	Description	NEC Type	AWG Size Stranding Nom. D.C.R.	Insulation Nom O.D.		Shield Type and % Coverage	Nom. Cable O.D. Jacket Type		Nominal Capacitance		Nom. Vel. of Prop.	Nom. Imp. Ω	Nom. Attenuation		
				inch	mm		inch	mm	pf/ft	pf/m			mhZ	db/100 ft	db/100 m
7210	 HDTV, DTV SDI** Digital Video RG-7/U Type		16 (Solid) .051 Bare Copper 4.1 Ω /M'	.236	5.99	BiFoil* 100% Tinned Copper Braid 95%	.340	8.64	16.2	53.1	83%	75	1	.21	.69
													10	.58	1.90
													71.5	1.32	4.33
													135	1.75	5.74
													270	2.44	8.00
													360	2.81	9.22
													540	3.44	11.28
													720	4.00	13.12
													1000	4.81	15.78
													1500	5.99	19.65
													2250	7.26	23.81
													3000	8.53	27.98
													PVC Jacket Colors: Black, Red, Green, Blue, White, Yellow Connector: 75 Ω 3 Piece BNC, CN-BM 73-7		
257210	 HDTV, DTV SDI** Digital Video RG-7/U Type		16 (Solid) .051 Bare Copper 4.1 Ω /M'	.230	5.84	BiFoil* 100% Tinned Copper Braid 95%	.298	7.57	16.2	53.1	83%	75	1	.21	.69
													10	.59	1.92
													71.5	1.33	4.37
													135	1.77	5.79
													270	2.46	8.08
													360	2.84	9.30
													540	3.47	11.38
													720	4.04	13.24
													1000	4.85	15.92
													1500	6.10	20.02
													2250	7.40	24.27
													3000	8.78	28.79
													Plenum jacket Color: Natural		
1135	 HDTV, DTV SDI** Digital Video RG-11/U Type		14 (Solid) .064 Bare Copper 2.5 Ω /M'	.280	7.11	BiFoil* 100% Tinned Copper Braid 95%	.405	10.29	16.0	52.5	85%	75	1	.15	.49
													10	.34	1.12
													71.5	1.11	3.64
													135	1.45	4.76
													270	2.02	6.63
													360	2.40	7.87
													540	2.93	9.61
													720	3.46	11.35
													1000	4.08	13.38
													1500	4.78	15.68
													2250	6.01	19.71
													3000	7.24	23.74
													PVC Jacket Colors: Black, Red, Green, Blue, White, Yellow		

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

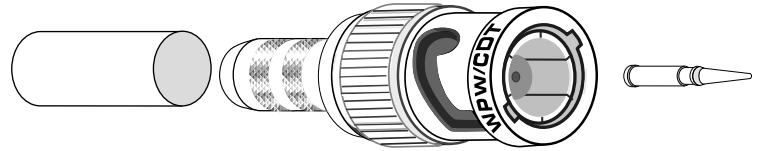
Chart 1.

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

Chart 2.

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- 75Ω BNC to 4 Pin Mini Din**

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