

G.703
Fractional T1
Access Unit

User Guide

Fractional T1 G.703 Pack

Description

The **G.703 T1/FT1 ACCESS UNIT** is a single port access unit for T1 or Fractional T1 services. Data Port rates are selectable via DIP-switches, for any multiple of 64 Kbps up to 1536 Kbps. User data is placed into the T1 frame, using only the required number of timeslots. Timeslot assignment is accomplished according to the Data Port speed and is also selected by DIP switches. The main T1 link may be clocked from the recovered receive clock (LBT). The data channel interface is RS-530 standard. Adapter cables are available for V.35, X.21, and RS-449. The **G.703 T1/FT1**'s DIP and slide switches, located on the front and side panels, provide for easy setup and control of functions.

Features

- ◆ LTU (Line Terminating Unit) built in unit.
- ◆ Single port access to T1 & Fractional T1 services.
- ◆ Interface conversion between G.703 and RS-530, RS-449(V.36), X.21, or V.35.
- ◆ Data rate: DIP selectable Sync Nx64Kbps - 1536Kbps.
- ◆ Fully transparent signal conversion under unframed mode (1544Kbps).
- ◆ Clock Regeneration from incoming AMI or B8ZS Data.
- ◆ Diagnostics Loopbacks both for G.703 (Recovery) and Data port side.
- ◆ All 1's monitor.
- ◆ Decoded data in NRZ form.
- ◆ DC +9V input power.

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SPECIFICATIONS

CCITT G.703 interface specifications :

- ◆ TYPE Bidirectional (T1) 1544Kbps.
- ◆ Line 4 wires, 16-26AWG.
- ◆ Range Up to 655feet/ AWG#24 better.
- ◆ Impedance 100ohm.
- ◆ "Pulse" amplitude Nominal 3.00V.
- ◆ "Zero" amplitude +/- 0.1V max.
- ◆ Clock frequency 1.544 MHz.
- ◆ Frequency tracking +/- 50ppm
- ◆ Interface connector RJ-45.
- ◆ Complies with ITU-T G.703; G.704; G.706; and G.824.
- ◆ Frame format CRC6 ON/OFF, DF/ESF, Unframed/Framed.
- ◆ Line code AMI or B8ZS.

Data communications interface specifications :

- ◆ Interface Type RS-530/DB25 standard or V.35, RS-449(V.36), X.21 with adapter cables.
- ◆ Data rate 64Kbps - 1.544Mbps.
- ◆ Connector DB25/F with adapter cables.
- ◆ Line code NRZ.

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INDICATORS

◆ DTE	[Green LED]	Data port set DTE mode.
◆ DCE	[Green LED]	Data port set DCE mode.
◆ TD	[Yellow LED]	Transmit data indication.
◆ RD	[Yellow LED]	Receive data indication.
◆ TEST	[Red LED]	Loopback test indication.
◆ Alarm	[Red LED]	Indication for Data error; Sync loss; Frame loss; Remote alarm.
◆ T-Clk loss	[Red LED]	Transmit clock loss.
◆ R-Sig loss	[Red LED]	Receive signal loss.

OPTIONAL CABLES

Ordering Part No.	Female	Male
G703/V35	V.35F	V.35M
G703/449	RS449F	RS449M
G703/X21	X.21F	X.21M
G703/530	RS530F	RS530M

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OPERATION: SLIDE SWITCH FUNCTION

There are two slide switches on the unit. The **POWER** switch is a two position slide switch that controls the flow of DC power to the internal circuitry.

NOTE: Changes to the DIP switch settings are only recognized during CPU initialization. Use the **POWER** switch to cycle the DC off and then on, this will RESET the CPU and it will "read" the new DIP switch settings.

The other slide switch on the **G.703 Pack** is for loopback operations. The middle position is for normal operation. The loopback positions provide an internal loopback on either the Data Port or the Recovery Port.

OPERATION: DIP SWITCH FUNCTIONS

Refer to the following tables for the functions of the DIP switches located along the side of the **G.703 Pack**. The **G.703 T1/FT1** provides a total of 24 DIP switches for timeslot setting. Each switch will enable or disable one 64Kbps timeslot (follow the $N \times 64$ formula).

For example, if you wish to translate only 128K from a 1544K T1 line, you only need to set two dip switches ($128K \div 64K = 2$). You may select any two of the 24 timeslots.

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SW. No.	DIP STATUS			FUNCTIONS	
SW1	1	2	3		
	OFF	OFF	OFF	DSX-1 0-133 feet / CSU 0 dB	
	OFF	OFF	ON	DSX-1 133 to 266 feet	
	OFF	ON	OFF	DSX-1 266 to 399 feet	
	OFF	ON	ON	DSX-1 399 to 533 feet	
	ON	OFF	OFF	DSX-1 533 to 655 feet	
	ON	OFF	ON	CSU -7.5 dB	
	ON	ON	OFF	CSU -15 dB	
	ON	ON	ON	CSU -22.5 dB	
	4	OFF ON	Receive Equalizer Gain Limit -36dB Receive Equalizer Gain Limit -30dB		
	5	OFF ON	Line Code B8ZS Line Code AMI		
SW2	1 thru 8			Timeslot 1 thru 8	
SW3	1 thru 8			Timeslot 9 thru 16	
SW4	1 thru 8			Timeslot 17 thru 24	
SW5	1	----	7	8	Test Mode:
	OFF	OFF	OFF	OFF	Normal Mode
	OFF	OFF	OFF	ON	Diagnostics Test Mode
SW6	1	2			Rx/Tx timing source
	OFF	OFF			Rx← Recovery, Tx← Data port
	OFF	ON			Rx/Tx← Data port
	ON	OFF			Rx/Tx← Recovery
	ON	ON			Rx/Tx← Internal Oscillator
		3	OFF ON		Rx Clk Polarity - Normal RX Clk Polarity - Inverted
		4	OFF ON		Tx Clk Polarity - Normal Tx Clk Polarity - Inverted
		5	OFF ON		CRC6 Disabled CRC6 Enabled
		6	OFF ON		ESF frame mode D4 frame mode
		7	OFF ON		Idle code is MARK (FFh) Idle code is FLAG (7Eh)
	8	OFF ON		Data port is DCE Data port is DTE	

Table 1, **G.703 T1/FT1 Pack** DIP Switch Quick Reference.

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G.703 T1 DB25 PIN DEFINITIONS				
DB25 FEMALE PIN NUMBER	PIN NAME	DTE MODE	DCE MODE	COMMENT
1	SHIELD			
2	TD(A)	OUTPUT	INPUT	
3	RD(A)	INPUT	OUTPUT	
4	RTS(A)			NOTE 1
5	CTS(A)			NOTE 1
6	DSR(A)			NOTE 2
7	GROUND			
9	RC(B)	INPUT	OUTPUT	
11	ETC(B)	OUTPUT	INPUT	
12	TC(B)	INPUT	OUTPUT	
13	CTS(B)			NOTE 3
14	TD(B)	OUTPUT	INPUT	
15	TC(A)	INPUT	OUTPUT	
16	RD(B)	INPUT	OUTPUT	
17	RC(A)	INPUT	OUTPUT	
18	POWER IN			
19	RTS(B)			NOTE 3
20	DTR(A)			NOTE 2
22	DSR(B)			NOTE 4
23	DTR(B)			NOTE 4
24	ETC(A)	OUTPUT	INPUT	
25	GROUND			NOTE 5

Table 2, Pin Definitions of **G.703 Pack** Data Port

NOTE 1: RTS(A) AND CTS(A) INTERNALLY CONNECTED TOGETHER.

NOTE 2: DSR(A) AND DTR(A) INTERNALLY CONNECTED TOGETHER.

NOTE 3: RTS(B) AND CTS(B) INTERNALLY CONNECTED TOGETHER.

NOTE 4: DSR(B) AND DTR(B) INTERNALLY CONNECTED TOGETHER.

NOTE 5: This pin used by *HCT-6000* to indicate presence of **G.703 Pack**.

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DIP SW1: SETTING LINE INTERFACE PARAMETER						
DIPSW No.			SW STATE			FUNCTIONS
1	2	3	OFF	OFF	OFF	DSX-1 0 TO 133 feet / CSU 0dB
			OFF	OFF	ON	DSX-1 133 to 266 feet
			OFF	ON	OFF	DSX-1 266 to 399 feet
			OFF	ON	ON	DSX-1 399 to 533 feet
			ON	OFF	OFF	DSX-1 533 to 655 feet
			ON	OFF	ON	CSU -7.5 dB
			ON	ON	OFF	CSU -15 dB
			ON	ON	ON	CSU - 22.5 dB
4			OFF			Receive Equalizer Gain Limit -36dB
			ON			Receive Equalizer Gain Limit -30dB
5			OFF			Line code is B8ZS
			ON			Line code is AMI

Table 3, **G.703 T1/FT1 Pack** Setting Line Interface Parameter.

DIP SW2: SETTING TIME SLOT 1-8			
DIPSW NO.	SW STATE	FUNCTION	COMMENT
1	OFF	TIME SLOT 1 IDLE	
	ON	TIME SLOT 1 ACTIVE	
2	OFF	TIME SLOT 2 IDLE	
	ON	TIME SLOT 2 ACTIVE	
3	OFF	TIME SLOT 3 IDLE	
	ON	TIME SLOT 3 ACTIVE	
4	OFF	TIME SLOT 4 IDLE	
	ON	TIME SLOT 4 ACTIVE	
5	OFF	TIME SLOT 5 IDLE	
	ON	TIME SLOT 5 ACTIVE	
6	OFF	TIME SLOT 6 IDLE	
	ON	TIME SLOT 6 ACTIVE	
7	OFF	TIME SLOT 7 IDLE	
	ON	TIME SLOT 7 ACTIVE	
8	OFF	TIME SLOT 8 IDLE	
	ON	TIME SLOT 8 ACTIVE	

Table 4, **G.703 T1/FT1 Pack** Setting TimeSlot 1-8.

NOTE: DIPSW2 to DIPSW4 all OFF is UNFRAMED MODE, the Clock Rate is FIXED at 1554K. In FRAMED MODE, the Clock Rate = 64KxN (N = NUMBER OF TIME SLOTS, 1-24).

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DIP SW3: SETTING TIME SLOT 9-16			
DIPSW NO.	SW STATE	FUNCTION	COMMENT
1	OFF	TIME SLOT 9 IDLE	
	ON	TIME SLOT 9 ACTIVE	
2	OFF	TIME SLOT 10 IDLE	
	ON	TIME SLOT 10 ACTIVE	
3	OFF	TIME SLOT 11 IDLE	
	ON	TIME SLOT 11 ACTIVE	
4	OFF	TIME SLOT 12 IDLE	
	ON	TIME SLOT 12 ACTIVE	
5	OFF	TIME SLOT 13 IDLE	
	ON	TIME SLOT 13 ACTIVE	
6	OFF	TIME SLOT 14 IDLE	
	ON	TIME SLOT 14 ACTIVE	
7	OFF	TIME SLOT 15 IDLE	
	ON	TIME SLOT 15 ACTIVE	
8	OFF	TIME SLOT 16 IDLE	
	ON	TIME SLOT 16 ACTIVE	

Table 5, **G.703 T1/FT1 Pack** Setting TimeSlot 9-16.

DIP SW4: SETTING TIME SLOT 17-24			
DIPSW NO.	SW STATE	FUNCTION	COMMENT
1	OFF	TIME SLOT 17 IDLE	
	ON	TIME SLOT 17 ACTIVE	
2	OFF	TIME SLOT 18 IDLE	
	ON	TIME SLOT 18 ACTIVE	
3	OFF	TIME SLOT 19 IDLE	
	ON	TIME SLOT 19 ACTIVE	
4	OFF	TIME SLOT 20 IDLE	
	ON	TIME SLOT 20 ACTIVE	
5	OFF	TIME SLOT 21 IDLE	
	ON	TIME SLOT 21 ACTIVE	
6	OFF	TIME SLOT 22 IDLE	
	ON	TIME SLOT 22 ACTIVE	
7	OFF	TIME SLOT 23 IDLE	
	ON	TIME SLOT 23 ACTIVE	
8	OFF	TIME SLOT 24 IDLE	
	ON	TIME SLOT 24 ACTIVE	

Table 6, **G.703 T1/FT1 Pack** Setting TimeSlot 17-24.

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DIP SW5: SETTING DIAGNOSTIC TEST				
DIPSW NO.		SW STATE	FUNCTION	COMMENT
1 thru 7		OFF	Not Assigned. Must set to OFF.	
8		OFF	Normal Mode	
		ON	Diagnostic Test Mode	

Table 7, **G.703 T1/FT1 Pack** Setting Diagnostics Test.

DIP SW6: FUNCTIONS					
DIP SW NO.		SW STATE		FUNCTION	COMMENT
1	2	OFF	OFF	RX timing from recovery, TX timing from data port. (X'parent)	Reference DTE/DCE Timing Source select Table 9.
		OFF	ON	RX and TX timing all from data port.	
		ON	OFF	RX and TX timing all from recovery.	
		ON	ON	RX and TX timing all from internal oscillator.	
3		OFF		RX clock polarity: NORMAL	
		ON		RX clock polarity: INVERT	
4		OFF		TX clock polarity: NORMAL	
		ON		TX clock polarity: INVERT	
5		OFF		CRC6 select: DISABLE	
		ON		CRC6 select: ENABLE	
6		OFF		Frame mode select: ESF	
		ON		Frame mode select: D4	
7		OFF		IDLE code select: MARK(0xFF)	
		ON		IDLE code select: FLAG(0x7E)	
8		OFF		DATA PORT set to DCE	
		ON		DATA PORT set to DTE	

Table 8, **G.703 T1/FT1 Pack** DIP SW6 Functions.

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DTE/DCE TIMING SOURCE SELECT TABLE					
DIP SW6 SETTING		DTE MODE		DCE MODE	
1	2	RX TIMING	TX TIMING	RX TIMING	TX TIMING
OFF	OFF	Recover from T1 port Output to ETC pins.	Source from data port. Input from RC pins.	Recover from T1 port. Output to RC/TC pins.	Source from data port. Input from ETC pins.
OFF	ON	Source from data port. Input from RC pins. Output to ETC pins.	Source from data port. Input from RC pins.	Source from data port. Input from ETC pins. Output to RC/TC pins.	Source from data port. Input from ETC pins.
ON	OFF	Recover from T1 port Output to ETC pins.	Source from T1 port.	Recover from T1 port. Output to RC/TC pins.	Source from T1 port.
ON	ON	From internal oscillator. Output to ETC pins.	From internal oscillator.	From internal oscillator. Output to RC/TC pins.	From internal oscillator.

Table 9, **G.703 T1/FT1 Pack** Timing Source.

LED INDICATORS TABLE		
LED NAME	COLOR	INDICATION
DTE	GREEN	DATA PORT DTE MODE & POWER ON
DCE	GREEN	DATA PORT DCE MODE & POWER ON
TD	YELLOW	TRANSMIT DATA STATUS (ON:1/OFF:0/FLASH:CHANGE)
RD	YELLOW	RECEIVE DATA STATUS (ON:1/OFF:0/FLASH:CHANGE)
TEST	RED	LOOPBACK TEST (ON:TEST/OFF:NORMAL)
ALARM	RED	DETAIL SEE NEXT TABLE (ON:TEST/OFF:NORMAL)
TX CLOCK LOSS	RED	TRANSMIT CLOCK LOSS
RX SIGNAL LOSS	RED	RECEIVE SIGNAL LOSS

Table 10, **G.703 T1/FT1 Pack** LED Indicators.

ALARM LED INDICATORS TABLE	
UNFRAMED MODE	FRAMED MODE
CODE VIOLATION RX DATA ALL ONES	CODE VIOLATION RX DATA ALL ONES YELLOW ALARM RECEIVER LOSS OF SYNC

Table 11, **G.703 T1/FT1 Pack** Alarm LED Indicators.

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EXAMPLES OF DIP SWITCH SETTINGS

Note: X means "don't care"

Example 1:

Line length 0-133 feet: DIPSW1-1 to DIPSW1-3 OFF.

Receive Equalizer Gain Limit -30dB: DIPSW1-4 ON.

Line code AMI: DIPSW1-5 ON.

UNFRAMED mode, Clock rate fixed 1554Khz: DIPSW2-1 to DIPSW4-8 OFF.

Rx timing from T1 recovery, Tx timing from Data Port: DIPSW6-1&2 OFF.

Data port receive clock polarity, NORMAL: DIPSW6-3 OFF.

Data port transmit clock polarity, NORMAL: DIPSW6-4 OFF.

Data port set to DCE mode: DIPSW6-8 OFF.

		DIPSW1				
		1	2	3	4	5
OFF						
ON						

		DIPSW2							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW3							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW4							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW5							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW6							
		1	2	3	4	5	6	7	8
OFF						X	X	X	
ON						X	X	X	

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Example 2:

Line length 399-533 feet: DIPSW1-1 OFF, DIPSW1-2&3 ON.

Receive Equalizer Gain Limit -36dB: DIPSW1-4 OFF.

Line code B8ZS: DIPSW1-5 OFF.

FRAMED mode, Clock rate 64Khz, Using timeslot 4: DIPSW2-5 ON,

Others DIPSW2 to DIPSW4 OFF.

Rx and Tx timing from T1 Rx recovery: DIPSW6-1 ON DIPSW6-2 OFF.

Data port receive clock polarity, INVERT: DIPSW6-3 ON.

Data port transmit clock polarity, NORMAL: DIPSW6-4 OFF.

Data port set to DTE mode: DIPSW6-8 ON.

		DIPSW1				
		1	2	3	4	5
OFF						
ON						

		DIPSW2							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW3							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW4							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW5							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW6							
		1	2	3	4	5	6	7	8
OFF						X			
ON						X			

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Example 3:

Line length 133-266 feet: DIPSW1-1&2 OFF, DIPSW1-3 ON.

Receive Equalizer Gain Limit -36dB: DIPSW1-4 OFF.

Line code B8ZS: DIPSW1-5 OFF.

FRAMED mode, Clock rate 1024Khz, Using timeslot 1-4, 9,10, 15-24

Rx and Tx timing from DATA PORT: DIPSW6-1 OFF DIPSW6-2 ON.

Data port receive clock polarity, NORMAL: DIPSW6-3 OFF.

Data port transmit clock polarity, INVERT: DIPSW6-4 ON.

Data port set to DTE mode: DIPSW6-8 ON.

		DIPSW1				
		1	2	3	4	5
OFF						
ON						

		DIPSW2							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW3							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW4							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW5							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW6							
		1	2	3	4	5	6	7	8
OFF									
ON									

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Example 4:

Line length 133-266 feet: DIPSW1-1&2 OFF, DIPSW1-3 ON.

Receive Equalizer Gain Limit -36dB: DIPSW1-4 OFF.

Line code B8ZS: DIPSW1-5 OFF.

FRAMED mode, Clock rate 1536Khz, Using timeslot 1-24

Rx and Tx timing from INTERNAL OSC: DIPSW6-1&2 ON.

Data port receive clock polarity, INVERT: DIPSW6-3 ON.

Data port transmit clock polarity, INVERT: DIPSW6-4 ON.

Data port set to DCE mode: DIPSW6-8 OFF.

		DIPSW1				
		1	2	3	4	5
OFF						
ON						

		DIPSW2							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW3							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW4							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW5							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW6							
		1	2	3	4	5	6	7	8
OFF									
ON									

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G.703 T1/FT1 Access Pack factory settings.

		DIPSW1				
		1	2	3	4	5
OFF						
ON						

		DIPSW2							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW3							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW4							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW5							
		1	2	3	4	5	6	7	8
OFF									
ON									

		DIPSW6							
		1	2	3	4	5	6	7	8
OFF									
ON									

Line length: 0-133 feet.

Receive Equalizer Gain Limit: -36dB.

Line code: B8ZS.

UNFRAMED mode.

Clock: 2048KHz

Rx timing from Recovery.

Tx timing from Data Port.

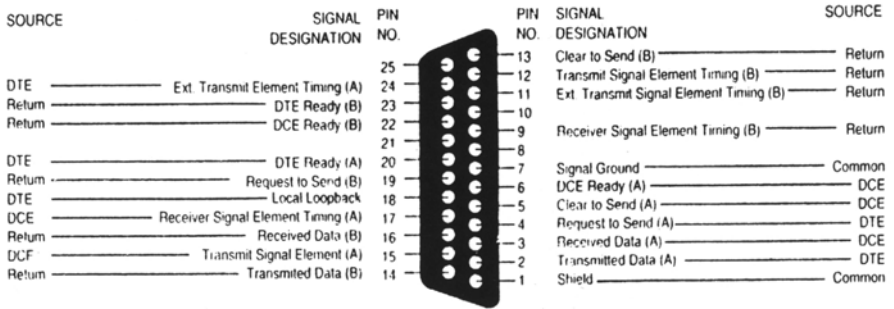
Data port receive clock polarity, NORMAL.

Data port transmit clock polarity, NORMAL.

Data port set to DCE mode.

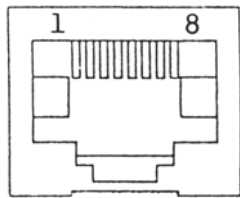
Interface PIN Assignment

Data Port : RS-530 DB-25 Female

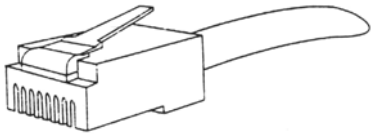
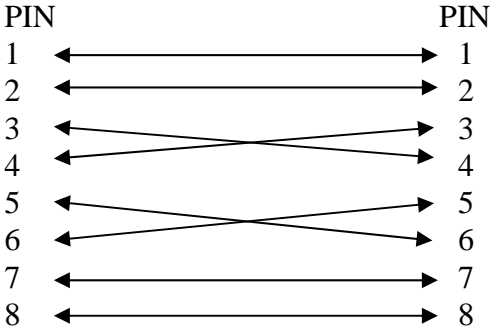


G.703 Port : RJ-45

- 1 NC
- 2 GND
- 3 Transmit (-)
- 4 Receive (-)
- 5 Receive (+)
- 6 Transmit (+)
- 7 GND
- 8 NC



G.703 RJ-45 cable PINOUT





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