



# VictoriaSTM-16/OC-48

The Smartest Solution for Testing SDH/SONET/PDH/T-Carrier

Thanks to its small size, light weight, and all the features of a portable tester, the battery-fed Victoria STM-16/OC-48 is the ideal solution for field work.

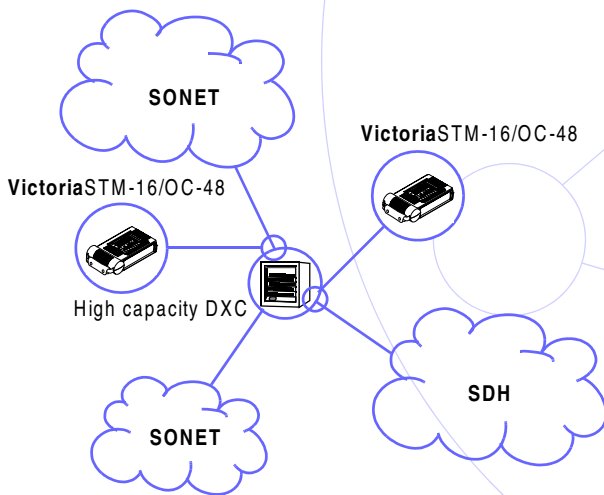
The unique measurement features of this tester make it suitable for a number of applications, both in and out of service:

- Installation
- Acceptance and commissioning
- Monitoring and surveillance
- Repair and maintenance

## Product Highlights

### Tests in International Gateways

The current technological needs call for testers that meet the varying standards of different countries. It is an essential requirement that a tester can interact with both European and American interfaces.

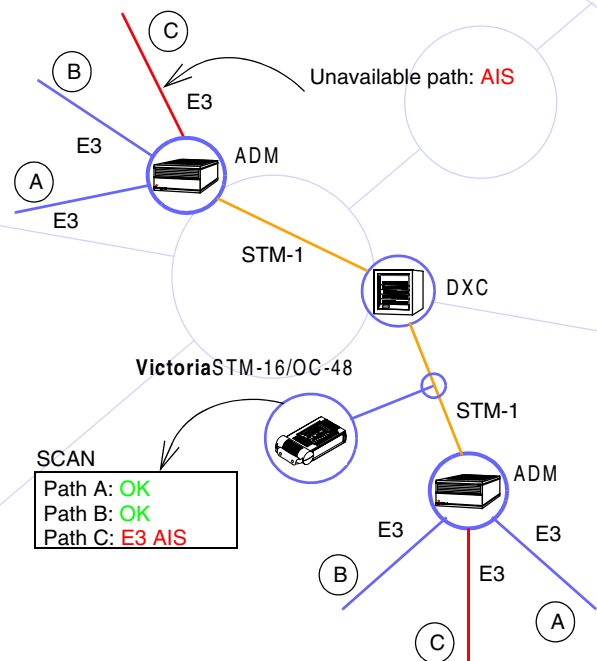


Victoria has the capacity to work with both SDH and SONET or PDH and T-Carrier at the same time, and this makes it a necessary tool in testing high-capacity gateways that interconnect SDH and SONET backbones.

Besides this, the use of some ANSI interfaces is becoming more common in Europe. For example, the use of DS3 signals at 45 Mbit/s is increasing in such applications as MPEG video transport.

### Alarm and Error Scan

SDH/SONET signals are formed by multiplexed lower order tributaries. It might happen that some of the tributaries get affected by errors or alarms, whereas others remain intact.



It is necessary to define the type of error and the part of the SDH/SONET signal affected, to find out which link or network element is causing the problem.

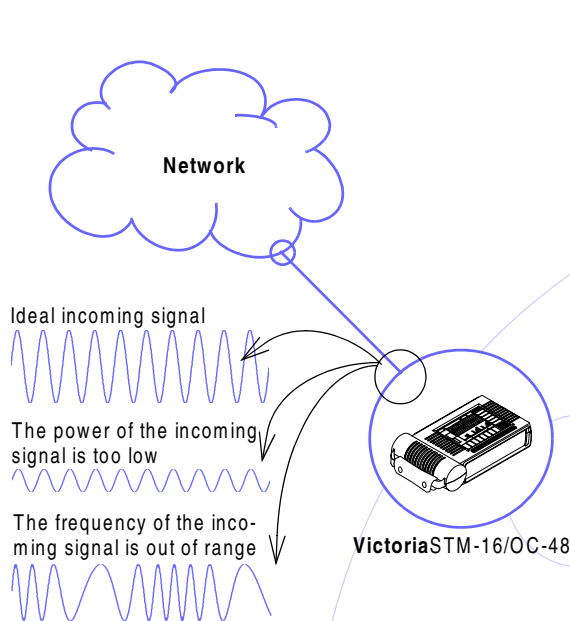
The Scan function makes it possible to locate and isolate network events automatically. This function works at any hierarchical level, and it can be used for any type of mapping or tributary signal.

The Path Trace analysis and TCM capabilities of Victoria STM-16/OC-48 are also very useful when identifying the affected link.

### Evaluating Analog Parameters

Before carrying out any digital measurements, it must be checked that the analog parameters of the signal remain within accepted margins.

Victoria STM-16/OC-48 makes it possible to instantly check that the optical power and the frequency of the received signal are within the margins accepted by the ITU.



With Victoria STM-16/OC-48, it is safe to establish connection to a link to carry out an optical power measurement, as the receiver is protected against any overload that might damage it.

Frequency measurements are not limited only to presenting measurement results in Hertz, but by using the Victoria STM-16/OC-48, it is possible to make sophisticated measurements to test the network synchronization:

- TIE (*Time Interval Error*) measurement; TIE is caused by pointer movements in SDH and SONET
- Programming and analysis of standard pointer sequences, to test the network tolerance
- Frequency offset generation in PDH / T-Carrier tributaries in SDH or SONET signals.

### Remote Control

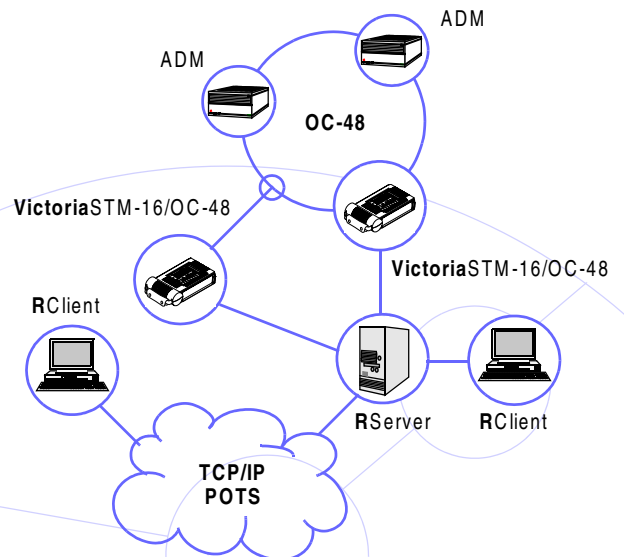
A Victoria STM-16/OC-48 tester can be controlled from anywhere in the world, thanks to the remote control system that makes use of the Internet.

This enables you to test the whole network, manage and compare results and give help to your field technicians from one single control centre.

The following can be highlighted from among the basic remote control features of Victoria:

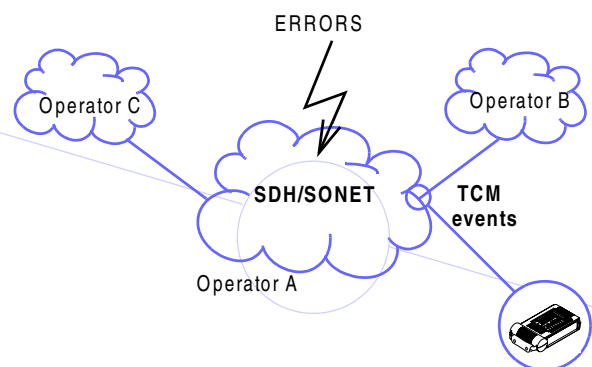
- Graphical interface based on intuitive and easy-to-use windows
- Simultaneous control of many instruments

- Client/Server architecture fully integrated into the Internet



### Tandem Connection Monitoring

In a multi-operator environment, there are some companies that offer transmission services of other operators or companies. In these circumstances, it is essential to delimit responsibilities whenever a problem occurs. The *Tandem Connection Monitoring* (TCM) protocol has been designed for this purpose.

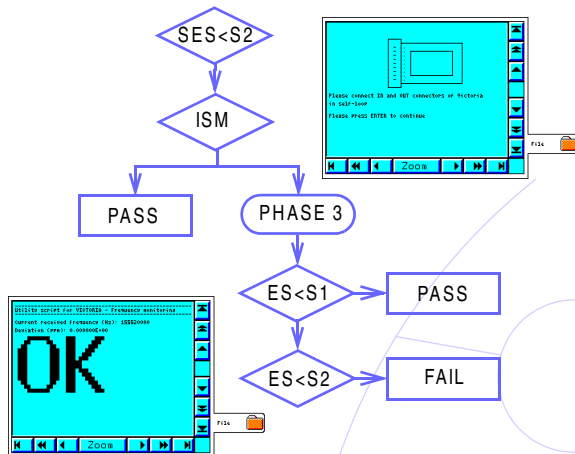


The TCM mechanism makes it possible to analyse the part of the path where a problem occurs when an SDH/SONET signal is crossing the network and arrives degraded at its destination.

The Victoria STM-16/OC-48 can generate and analyse all type of TCM events, this way being able to check that this protocol is working correctly.

## Automatic Measurements

The ability to make automatic measurements by using macros makes Victoria STM-16/OC-48 a powerful tool in carrying out repetitive tests, such as bringing-into-service and type approval of network equipment.



With the help of the macro utility, you can:

- Carry out complex measurements with a single keypress
- Give help to technicians throughout the measurement by means of the graphical user interface of the tester
- Program customized pass/fail tests that show the result by displaying a label on the screen
- Create new specialized measurements, such as repetitive BERT used when installing radio links

## Technical Specifications

### Electrical Interfaces

- BNC (default), DIN 1.6/5.6 (option DIN55)
- Rates: 2048 kbit/s HDB3 and AMI, 8448 kbit/s HDB3 and AMI, 34368 kbit/s HDB3, 139264 kbit/s CMI, 155520 kbit/s CMI
- Optional: 1544 kbit/s B3ZS and AMI (option 30554), 44736 kbit/s B3ZS & AMI (option 30552), DS3-HI and DSX-3 pulses (with AD045 accessory), 51840 kbit/s B3ZS (option 30551)
- Balanced Bantam (accessory AD300), Siemens (accessory AD320) and RJ48 (accessory AD322) for 1544 kbit/s and 2048 kbit/s
- Interfaces according to G.703, ANSI T1.102 and G.772
- Gain: 0, 20, 26, 30 dB from 1544 kbit/s to 51840 kbit/s; 0, 20, 26 dB for 139264 kbit/s and 0, 20 dB for 155520 kbit/s

### Optical Interfaces

- Built-in connectors for 155520 kbit/s, 622080 kbit/s and 2488320 kbit/s
- Interfaces according to the ITU-T G.957 L-16.1 and L-16.3
- FC (default), SC (option 3090SC) or ST (option 3090ST) connectors
- Automatic disconnection of the receiver for overload protection

- 1310 nm transmitter (configurations 3090C1, 3090C4) and 1550 nm transmitter (configurations 3090C2, 3090C4)
- Via external optical micromodules fed by the equipment for 34368 kbit/s (option 305531), 51840 kbit/s (option 305511), and 155520 kbit/s

### Clock

Clock sources

- Internal, according to G.812
- Recovered from the incoming signal
- External 1544/2048 kHz with a BNC connector
- External coded G.703 at 1544 kbit/s and 2048 kbit/s with BNC or balanced connector with 0 and 20 dB gain (accessory AD340)

### Modes

- SDH/SONET/PDH//T-Carrier termination
- SDH/SONET/PDH//T-Carrier, bridged
- SDH/SONET mux/demux
- Through mode for all the interfaces

### SDH

#### General

- According to G.707 and O.181
- Programmable scrambler and background

#### Mappings

- C-4-16c in STM-16
- C-4-4c in STM-4 and STM-16
- C-4 (unstructured or with framed E4) in STM-1, STM-4 and STM-16.
- C-3 (unstructured or with framed E3 or DS3) in STM-0, STM-1, STM-4 and STM-16 (both with an AU-3 or AU-4)
- C-12 (unstructured or with framed E1, asynchronous or byte synchronous) in STM-0, STM-1, STM-4 and STM-16
- C-11 (unstructured or with framed DS1) in STM-0, STM-1, STM-4 or STM-16

#### Programmable Bytes

Editing and display in hexadecimal or by descriptor

- RSOH: A1, A2, J0, C1
- MSOH: K1, K2, S1
- HO-POH (VC-4, VC-3): J1, C2, G1, H4, K3
- LO-POH (VC-3): J1, C2, G1, H4, K3
- LO-POH (VC-12, VC-11): V5, J2, K4

#### Path Trace

- Generation, analysis and expected 16- and 64-byte messages in J0, J1 and J2

#### Errors

- Insertion and detection of ECOD, EFAS, OOF, B1, B2, MS-REI, HP-B3, HP-REI, LP-B3, LP-REI, BIP-2, slips and bit errors
- Insertion mode: single, burst, repetitive burst and rate ( $1.1 \times 10^{-3}$  to  $0.9 \times 10^{-9}$ s)

## Alarms

- Insertion and detection of LOS, LOF, RS-TIM, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-UNQ, HP-RDI, HP-TIM, HP-PLM, TU-LOM, TU-AIS, TU-LOP, LP-UNQ, LP-RDI, RFI, LP-TIM, LP-PLM, LSS, AIS pattern
- Insertion mode: continuous, burst of M frames with alarm, repetitive M/N burst

## Pointer Events

- Increment, decrement, manual value with or without NDF, invalid pointer in AU-4, AU-3, TU-3, TU-2, TU-12 and TU-11
- G.783/O.172 pointer sequences
- Programming of SS bits
- Tributary frequency offset

## SONET

### General

- According to ANSI.105-1995 and Telcordia GR.253
- Programmable scrambler and background

### Mappings

- STS-48c
- STS -12c
- STS-3c bulk or with framed E4
- STS-1 bulk or with framed DS3 or E3
- VT-2 bulk or with framed E1 (asynchronous or byte synchronous)
- VT-1.5 bulk or with framed DS1

### Programmable Bytes

Display of all bytes and editing in hexadecimal or by descriptor of:

- SOH: A1, A2, J0, C1
- LOH: K1, K2, S1
- STS-POH: J1, C2, G1, H4, K3
- VT-POH: J2, V5, K4

### J0, J1, J2 Trail Trace

- Generation, analysis and expected 16- and 64-byte messages in J0, J1 and J2

### Errors

- Insertion and detection of ECOD, EFAS, SEF, B1, B2, REI-L, STS-B3, REI-P, VT-B3, REI-V, BIP-2, slip and bit errors
- Insertion mode: single, burst, repetitive burst and rate ( $1.1 \times 10^{-3}$  to  $0.9 \times 10^{-9}$ s)

### Alarms

- Insertion and detection of LOS, LOF, TIM-S, AIS-L, RDI-L, MS-L, AIS-P, LOP-P, UNEQ-P, RDI-P, TIM-P, PLM-P, LOM-V, AIS-V, LOP-V, UNEQ-V, RDI-V, RFI-V, TIM-V, PLM-V
- Insertion mode: continuous, burst of M frames with alarm, repetitive M/N burst

### Pointer Events

- Increment, decrement, manual value with or without NDF, invalid pointer in STS-3c, STS-1, VT-2, VT-1.5
- G.783/O.172 pointer sequences

- Programming of SS bits
- Tributary frequency offset

## PDH

### Structure

- 140 and 8 Mbit/s according to G.751, G.742, G.704, framed and unframed
- 34 Mbit/s according to G.751 or optionally according to G.832 for transporting 14 TU-12s (options 30553, 305531), or unframed
- PCM30/31 frame structure with/without CRC for 2 Mbit/s signals. Test signal in 64 or N x 64 kbit/s. CAS signalling: setup and display of the CAS multiframe and spare bits of frame 0

### Errors

- Insertion and detection of code errors, FAS errors, CRC errors, REBE, slips and bit errors
- For G.832 framing in 34 Mbit/s, insertion and detection of EM, REI, LP-REI, BIP-2
- Insertion mode: single, burst, repetitive burst and rate ( $1.1 \times 10^{-3}$  to  $0.9 \times 10^{-9}$ s)

### Alarms

- Insertion and detection of LOS, AIS, LOF, RAI, CRC-LOM, MAIS, CAS-LOM, MRAI, LSS and AIS pattern
- For G.832 framing in 34 Mbit/s, insertion and detection of OOF, LOF, TIM, RDI, UNEQ, PLM, TU-AIS, TU-LOP, TU-LOM, LP-UNQ, LP-RDI, RFI, LP-TIM, LP-PLM
- Insertion mode: continuous, burst of M frames with alarm, repetitive M/N burst

## 45 Mbit/s

### Structure

- Framed M13 and C-bit according to G.752, G.704, also unframed

### Errors

- Insertion and detection of BPV, M-BIT, F-PAR, P-PAR, C-PAR, FEBE, slips and bit errors
- Insertion mode: single, burst, repetitive burst and rate ( $1.1 \times 10^{-3}$  to  $0.9 \times 10^{-9}$ s)

### Alarms

- Insertion and detection of LOS, AIS, LOF, Blue Alarm, IDLE, RAI (Yellow Alarm), LSS and AIS pattern
- Insertion mode: continuous, burst of M frames with alarm, repetitive M/N burst

## 1.5 Mbit/s

### Structure

- SF & ESF framing according to ANSI T1-400-1995, SLC-96 framing according to Telcordia TR-TSY-00008, and also unframed
- Fractional DS1: DS1 with test pattern in N x 64 & N x 56 kbit/s

### Errors

- Insertion and detection of BPV, EFAS, ECRC and bit errors
- Insertion mode: single, burst, repetitive burst and rate ( $1.1 \times 10^{-3}$  to  $0.9 \times 10^{-9}$ s)

## Alarms

- Insertion and detection of LOS, LOF, RAI, LSS and line AIS
- Insertion mode: continuous, burst of M frames with alarm, repetitive M/N burst

## Signalling

- Generation and analysis of *Robbed Bit* signalling
- Generation and analysis of *Data Link* messages in ESF & SLC-96 framing

## TCM

- Generation and analysis of N1 and N2
- Events generated: TC-IEC, TC-OEI, TC-REI, TC-AIS, TC-LTC, TC-UNEQ, TC-ODI, TC-RDI, TC-TIM
- Detection, display, performance calculation and storage of events: TC-IEC, TC-OEI, TC-REI, TC-AIS, TC-LTC, TC-UNEQ, TC-ODI, TC-RDI, TC-TIM
- B3 or BIP-2 compensation
- Analysis and generation of APId (Access Point Identifier)

## Pattern

The following patterns can be generated:

- PRBS11, PRBS15, PRBS20, PRBS23, PRBS31: normal or inverted
- Word: user defined, all zeros, all ones, 1010, 1000 and 1100

## Functions

### Results

- Counters, errored seconds and rate for all events: errors, alarms and pointer events

### Trace

- Events are shown graphically in time plots and histograms that have advanced filter, search, identification and quantization functions and a zoom from 1 s to 1 h

### SoftLEDs®

- 10 tricolour external LEDs with on-screen labelling, showing up to 80 simultaneous events

### Performance

- Performance measurements in line with ITU-T G.821, M.2100, M.2101.1 and G.826. Counter, rate, unavailability and PASS/FAIL indication of compliance with programmed objectives

### Round Trip Delay

- In all interfaces; range from 1  $\mu$ s to 10 s

### AutoConfiguration

- Identification of the incoming signal parameters: network (SDH, SONET, T-Carrier, PDH or G.832), bit rate, line code, optimal gain, frame structure, mapping
- PRBS auto search

### FastScan

- Search the incoming signal for all types of errors, alarms and events

## Transparency Test

- Generation and analysis of PRBS pattern in DCC channels or E1, E2, F1, N1 and N2 bytes
- Bit error counter, rate and errored seconds
- Seconds with alarm counter for LSS

## APS

- Measurement of disruption time for any STM-N/OC-N
- Tributaries: PDH, T-Carrier, SDH, SONET
- Range: 1 ms to 10 s
- Resolution: 1 ms

## Optical Power Measurement

- Range: 0 to -28 dBm (+2 to -40 dBm with external optical modules)
- Resolution:  $\pm 1$  dB

## Frequency Measurement

- In Hertz and bit/s with deviation in ppm
- ITU-T/ANSI in-range or out-of-range indication
- TIE measurement based on Pointer Justification Events

## Frequency Offset of the Transmission Clock

- Up to 40 ppm in steps of 0.01 ppm for the integrated optical interfaces
- Up to 20,000 ppm in steps of 0.01 ppm for electrical interfaces and for optical interface at 155 Mbit/s with external module

## Remote Control

- Via RS-232C interface and SCPI commands
- Optional remote control with advanced GUI (option CR3090)

## Printout of Results

- Totals and periods, events (trace, in real time or result files), header with configuration and results

## Transfer to PC

- Via RS-232C port

## AutoSave

- If the mains supply fails, the current context is saved and the measurement continues when power source is restored

## Automatic Measurements and Storage

- Measurements may last up to 999 days, with automatic start/stop. They are saved with name/date/time, the configuration of the tester at the time of the measurement and, if desired, a text comment by the user

## General

- Dimensions: 257 x 147 x 70 mm
- Weight: 2.4 kg
- 12 x 9 cm colour touch screen
- Autonomy: 2 hours (two battery packs)

## RF/EMI, ESD and Electrical Safety

- Radiated EMI: EN50081-1

- Immunity to EMI: EN 50082-1
- ESD: IEC801-2 ( $\pm 4$  kV contact)
- Electrical safety: EN61010-1

### Environmental conditions

- Operates at 0 to 45 °C
- Storage: -40 to +70 °C
- Humidity: 5 to 90%, without condensation

## Ordering Information

### Base Configurations

3090C1	Victoria STM-16/OC-48 SDH/SONET/PDH Colour. Hand-held Analyser/Generator. Battery operated. Interfaces: 2, 8, 34, 140, 155, 622, 2488 Mbit/s, VC-4-4c, VC-4-16c. Optional interfaces: 1.5, 45, 52 Mbit/s. Optical Transmitter for 1310 nm. FC/PC optical connectors.
3090C2	Victoria STM-16/OC-48 SDH/SONET/PDH Colour. Hand-held Analyser/Generator. Battery operated. Interfaces: 2, 8, 34, 140, 155, 622, 2488 Mbit/s, VC-4-4c, VC-4-16c. Optional interfaces: 1.5, 45, 52 Mbit/s. Optical Transmitter for 1550 nm. FC/PC optical connectors.
3090C4	Victoria STM-16/OC-48 SDH/SONET/PDH Colour. Hand-held Analyser/Generator. Battery operated. Interfaces: 2, 8, 34, 140, 155, 622, 2488 Mbit/s, VC-4-4c, VC-4-16c. Optional interfaces: 1.5, 45, 52 Mbit/s. Optical Transmitters for 1310 nm and 1550 nm. FC/PC optical connectors.

### Options

3090SC	SC connectors for optical interfaces replacing the FC/PC
3090ST	ST connectors for optical interfaces replacing the FC/PC
30551	STS-1/STM-0 Electrical Test
305511	OC-1/STM-0 Optical Test
30552	DS-3 Test
30553	G.832 34 Mbit/s Electrical Test
305531	G.832 34 Mbit/s Optical Test
30554	DS-1 Test
30561	Advanced options (TCM, M/N alarms, G.783 sequences, tributary offset)

CR3090	Remote control with graphical user interface for 3090C1, 3090C2 and 3090C4.
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### Accessories and Replacement Items

PR100.1	Portable, battery-powered printer
AD045	6 dB Line Simulator for 45 Mbit/s
AD210	High impedance attenuating probe
AD300	Balun Adapter 75 $\Omega$ BNC to 100 $\Omega$ Bantam Jack
AD320	Balun Adapter 75 $\Omega$ BNC to 120 $\Omega$ Siemens
AD322	2 Mbit/s Balun Adapter 2 x BNC 75 $\Omega$ to RJ-48
AD340	Coded 1544 and 2048 kbit/s External Clock 0 and -20 dB for 1544 kHz, 2048 kHz, 1544 kbit/s and 2048 kbit/s
AD10FC	FC aerial 10 dB attenuator m-f
AD15FC	FC aerial 15 dB attenuator
BT410	Ni-MH battery pack
MO3090	English user manual for 3090C
MO3090S	Spanish user manual for 3090C
MO3090SRE	Spanish replaces English user manual 3090C
MS3090	English Service and Calibration Manual for Victoria STM.16/OC-48
CA220	75 $\Omega$ BNC(m) - BNC(m) coaxial cable 2 m
CA230	75 $\Omega$ BNC(m) - BNC(m) coaxial cable 2 m
CA231	75 $\Omega$ BNC(f)-DIN 1.6/5.6(m) coaxial cable 2 m
CA232	75 $\Omega$ BNC(m)-DIN 1.6/5.6(f) coaxial cable 2 m
CA260	RS-232C cable for remote control sub-D 9 (f) - 9 (m)
CP2FC	Optical cable 2 m with FC-PC/FC-PC connectors
CP2SC	Optical cable 2 m with SC/SC connectors.
CP2ST	Optical cable 2 m with ST/ ST connectors
CPFC2SCPC	Optical cable 2 m with FC-PC/SC-PC connectors

Contact Trend Communications for information on additional options and accessories

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