ANEXO No. 11 - EVALUACIÓN TÉCNICA HABILITANTE

Para verificar el cumplimiento de los requerimientos técnicos las características técnicas, el proponente deberá suministrar los catálogos o fichas técnicas de los equipos, subrayando en el los mismos el cumplimiento de la característica técnica solicitada y relacionando en el Anexo el número de folio donde se encuentra la característica solicitada. Y subrayada, (El no cumplimiento de dicha solicitud será justificación de no calificación de la propuesta.)

MODULADORES SATELITALES				
DESCRIPCIÓN		CARACTERÍSTICA TÉCNICA	FOLIO	CUMPLE/NO CUMPLE
1	Estándares de Modulación	DVB-S2, DVB-S2X	3 y 4	SI
		DVB-S2 QPSK: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 8PSK: 3/5, 2/3, ¾3/4, 5/6, 8/9, 9/10	3 y 5	SI
		DVB-S2X QPSK: 1/4,1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10, 13/45, 9/20, 11/20 8PSK: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10, 23/36; 25/36; 13/18 8APSK-L: 5/9;26/45	3 y 5	SI
2	Symbol rate	≥15 MSyms	3 y 5	SI
3	Roll Off	5%, 10%, 15%, 20%, 25%, 35%	3 y 5	SI
4	Frame Length	DVB-S: 188 bytes	3 y 5	SI
		DVB-S2/S2X: 16200 bits (short frames) 64800 bits (normal frames)	3	SI
5	Entradas	≥ 1 ASI para Transport Stream MPTS o SPTS	3 y 5	SI
		≥ 1 Ethernet para Transport Stream sobre IP (SMPTE 2022 FEC) MPTS o SPTS (Debe soportar protocolos UDP y RTP), Unicast o Multicast	3 y 5	SI
		≥ 1 referencia 10 MHz	3 y 5	SI
6	Salidas	≥ 1 IF (BNC F) – 75 Ohms	3 y 6	SI
		≥ 1 Banda – L Frecuencia 950 – 2150 Mhz 50 Ohms	3 y 6	SI
		≥ 1 monitoreo en Banda – L	3	SI
		≥ 1 ASI loop through	3	SI
7	Gestión	≥ 1 Ethernet para gestión y control.	3 y 6	SI
		Debe contar con interfaz web	3 y 4	SI
		Debe permitir la gestión en modo local (Display) y remoto	3, 4, 16 y 46	SI
		Protocolo de comunicaciones basado en el estándar SNMP	3 y 4	SI

MODULADORES SATELITALES				
DESCRIPCIÓN		CARACTERÍSTICA TÉCNICA	FOLIO	CUMPLE/NO CUMPLE
		Contar con perfiles de usuario para el acceso seguro a través de contraseña	3	SI
		Se debe suministrar software de gestión con licenciamiento a perpetuidad	3	SI
8	CID	El equipo debe soportar el estándar ETS–I - 103 129	3 y 4	SI
9	Alimentación	Fuente de alimentación redundante 110 Vac @ 60 Hz	3 y 5	SI

SWITCH RF				
DESCRIPCIÓN		CARACTERÍSTICA TÉCNICA	FOLIO	CUMPLE/NO CUMPLE
1	Entrada	≥ 2 Banda L	7	SI
2	Salida	≥ 1 Banda L	7	SI
3	Conmutación	Switching manual y automático	7	SI
		Switching entre todas las entradas	7	SI
4	Gestión	≥ 1 Ethernet para gestión y control	7	SI
5	Alimentación	Fuente de alimentación redundante 110 Vac @ 60 Hz	7	SI

Nota: Si la configuración a ofertar por el proponente es modular, se debe asegurar que los equipos estén en configuración N+1 en redundancia de hardware, de tal forma que las tarjetas de modulación Main y Backup estén instalados en diferentes chasis, de no cumplir con esta solicitud será causal de rechazo el anexo técnico.

Para constancia y aprobación, el presente documento se firma en la ciudad de Cota a los ocho (8) días del mes de julio de 2021, por quienes intervinieron.



FIRMA DEL REPRESENTANTE PROPONENTE

DATOS DEL REPRESENTANTE LEGAL
Nombre: WILLIAM VALDÉS OSORIO
CC No. 79.619.843 de Bogotá

DATOS DEL PROPONENTE		
Nombre: GEARCOMMS S.A.S.		NIT: 900.462.907-1
Dirección: Autopista Medellín Km 1.8 • Parque Industrial Soko, Bodega A Piso 3		
Ciudad: Cota (Cundinamarca)	Teléfono. 1- 8766255	Fax: 1-8766255
E- mail: comercial@gearcomms.com		

Montreal, Canadá
28 de Junio de 2021

A quien corresponda,

Certificamos que nuestros equipos presentados por **Gearcomms S.A.S.** de marca **SpaceBridge Inc.** objeto de la Invitación Pública IA-09 de 2021 de RADIO TELEVISIÓN NACIONAL DE COLOMBIA – RTVC, cumplen en su totalidad con todas las especificaciones descritas en el ANEXO No. 3 - ANEXO TÉCNICO correspondientes a los siguientes ítems:

- Modulador DVB-S2-S2X
- Switch de conmutación RF

Desde ya quedo a sus órdenes por cualquier consulta o aclaración que considere necesaria.

Atentamente,



Nelson De Abreu

SpaceBridge™

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Overview

The extension of DVB-S2 standard, the DVB-S2X, has been proposed to accommodate increasing data rates and to provide better availability of the satellite services. It improves performance of video broadcast and high speed IP data services. At the same time it reduces a cost of implementation of these applications.

The High Throughput Satellites giving more bandwidth capacity and the DVB-S2X increasing efficiency of satellite links will reduce a transponder bandwidth cost

SpaceBridge **SBBM-85 modem** is designed as a multi-purpose high speed satellite modulator. It supports DVB-S/S2/S2X standards and can operate with equipment provided by other vendors. The hardware platform allows to add the additional features and software upgrades when it becomes necessary. The SBBM-85 modulator also follows the DVB-CID standard and transmits a Carrier ID.

The embedded router provides efficient and reliable solution for IP networking. It implements a variety of standard communication and encapsulation protocols, which are compatible with third-party telecommunication equipment and can be easily integrated into existing networks. It is a cost-effective networking solution for wide range of applications including satellite and terrestrial networks.

The router has four 10/100/1000 Mbps Gigabit Ethernet interfaces, in order to meet the aggregated data rates of the combined networks it can support. Because of the built-in synchronization inputs for NCR insertion, it can be used as a hub modulator in a DVB-RCS2 network.

The SBBM-85 modem utilizes the uplink and ACM controllers that increase availability and throughput of the satellite links. The unit Monitoring and Control is via Ethernet using Web Server, HTTP, Telnet, SNMP, RS-485 or via terminal mode RS232.

When used in a redundant configuration, the unit has a built-in detection and triggering system, requiring external switches only, rather than a complete external redundancy system. This offers the flexibility of being totally independent of the redundancy configuration, which can be varying from 1+1 to e.g. 10+1.



Features

- Supports DVB-S/S2/S2X standards
- As a part of a DVB-RCS2 system it is matched by the DVB-S2X remote terminals
- Ready for the future wideband satellite application with global outreach
- Provides important part of a global wideband network and a global broadcast system
- It supports star networks on multiple satellites and supports Multi-beam operation
- Extensive configuration flexibility, providing a wide range of satellite and terrestrial network solutions
- Includes Uplink power and ACM controllers
- External clock synchronization
- Carrier ID
- Supports DVB-S2X roll-off factors 0.05, 0.1, 0.15
- Maximum symbol rates 75 Msps at 128APSK

Applications

The SBBM-85 is designed to provide best in class performance for critical applications such as:

- Primary Distribution of terrestrial networks
- IP traffic to ISP's
- IP backbones and cable restoration
- Digital Video distribution Broadcast
- Digital Satellite Networks

Specifications

RF INTERFACE	
Transmit Frequency	▪ L-Band: 950MHz to 2150MHz in 10 Hz steps ▪ IF Band: 70 +/-18 MHz, 140 +/-36 MHz in 1 Hz steps
Output Connector	▪ N-Type (F) for L-band - Impedance 50 Ohms ▪ BNC (F) for 70 and 140MHz - Impedance: 50 Ω
Output Level	+10 - 40 dBm with 0.1 db Steps and 0.2 dB accuracy
Spurious level	< -65 dBc, Harmonics < -55 dBc
Output Frequency Stability	3 x 10e-9
Reference Input	External 10 MHz
MODULATION TYPE AND CODING RATE	
Data Rate	64 Kbps to 400 Mbps, 1 bps step
Symbol Rate	128 KSymbols to 75 MSymbols in 1 Symbol/s steps
DVB-S	▪ BPSK: 1/2 , 2/3 , 3/4 , 5/6 , 7/8 with RS (204,188) Outer Code, ▪ QPSK / OQPSK: 1/2 , 2/3 , 3/4 , 5/6 , 7/8 with RS (204,188), Outer Code, ▪ 8PSK: DSNG PTCM Rate 2/3 , 5/6 , 8/9 with RS (204,188) code ▪ 16QAM: DSNG PTCM Rate 3/4 , 7/8 with RS (204,188) code
DVB-S2	▪ QPSK: Block 16kbit 1/4 , 1/3 , 2/5 , 1/2 , 3/5 , 2/3 , 4/5 , 5/6 , 8/9 Block 64kbit 1/4 , 1/3 , 2/5 , 1/2 , 3/5 , 2/3 , 4/5 , 5/6 , 8/9 , 9/10 ▪ 8PSK: Block 16kbit 3/5 , 2/3 , 3/4 , 5/6 , 8/9 Block 64kbit 3/5 , 2/3 , 3/4 , 5/6 , 8/9 , 9/10 ▪ 16APSK: Block 16kbit 2/3 , 3/4 , 4/5 , 5/6 , 8/9 Block 64kbit 2/3 , 3/4 , 4/5 , 5/6 , 8/9 , 9/10 ▪ 32APSK: Block 16kbit 3/4 , 4/5 , 5/6 , 8/9 Block 64kbit 3/4 , 4/5 , 5/6 , 8/9 , 9/10
DVB-S2X	▪ QPSK: Block 64kbit 3/45 , 9/20, 11/20 Block 16kbit 11/45 , 4/15 , 14/45 , 7/15 , 8/15 , 32/45 ▪ 8PSK: Block 64kbit 23/36 , 25/36 , 13/18 Block 16kbit 7/15 , 8/15 , 26/45 , 32/45 ▪ 16APSK Block 64kbit 26/45 , 3/5 , 28/45 , 23/36 , 25/36 , 13/18 , 7/9 , 77/90 Block 16kbit 7/15 , 8/15 , 26/45 , 3/5 , 32/45 ▪ 32APSK Block 64kbit 32/45 , 11/15 , 7/9 Block 16kbit 2/3 , 32/45 ▪ 64APSK Block 64kbit 11/15 , 7/9 , 4/5 , 5/6 ▪ 128APSK Block 64kbit 3/4 , 7/9 ▪ 256 APSK 32/45 , 3/4 ▪ 8APSK-L 5/9 , 26/45 ▪ 16APSK-L 5/9 , 8/15 , 1/2 , 3/5 , 2/3 ▪ 32APSK-L 2/3 ▪ 256APSK-L 29/45 , 2/3 , 31/45 , 11/15 ▪ Supports CCM/VCM/ACM modes
Roll-off Factor	0.05, 0.1, 0.15, 0.2, 0.25, 0.3, 0.35
PHYSICAL SPECIFICATIONS	
Dimension	▪ Rack-mountable 1RU EIA ▪ H 4.4 cm (1.75") x W 43.2 cm (17") x D 55.8 cm (22")
Weight	11 lb (5 kg)
BUC power supply	24VDC/4A, 48 VDC/ 4 A
Power Options	▪ AC: Auto sensing 95-265 VAC, 50/60 Hz ▪ DC: - 48 VDC ▪ Redundancy Power: Double power supply
Typical Power Dissipation	100 W without BUC power supply, 145 W when powering a BUC
Reference Output @ 0 dBm	10 MHz frequency

Specifications subject to change without notice.
Datasheet SBBM-85 2021180

Specifications

ENVIRONMENTAL CONDITIONS	
Operating Temperature	0°C to 50°C (32°F to 122°F)
Storage Temperature	-25°C to 85°C (-13°F to 185°F)
Relative Humidity	up to 90% non-condensing, operating; up to 95% non-condensing, storage
Altitude	up to 10,000 ft (3,045 m) operating; to 40,000 ft (12,180 m) during transit
IP SERVICES	
Data Interfaces	▪ 2x ASI BNC input ports ▪ 4x 1GbE Ethernet RJ-45 ports
IP Encapsulation	MPE and GSE, 80,000 Packets per second
Encryption	BISS Encryption BISS-0, BISS-1 and BISS-E
TCP/IP stack	▪ Routing: static, dynamic (RIP v.1, v.2, OSPF v.2) ▪ Packets filtering (firewall) ▪ Policy Based Routing ▪ UDP broadcasts forwarding (DHCP, DNS, BOOTP, etc.) ▪ IPSEC ▪ NAT, PAT ▪ IP tunnels: GRE, IPIP ▪ Load balancing ▪ QoS Level 3: FIFO queue (FIFOQ) , Priority queuing (PRIQ) , Class based queuing (CBQ) , Random Early Detection (RED), Waited Fair Queue (WFQ) ▪ Configurable IP policy: ICMP, routing, switching, TCP, UDP
Monitoring & Control (M&C) Interfaces	▪ RS-232 Serial interface, RS-485 Serial interface, Terminal mode and packet protocol mode, ▪ Ethernet 10/ 10/100Base-T, Telnet, HTTP, SNMP ▪ Configuration Parameter Storage: NVRAM

Specifications subject to change without notice.

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ASIA PACIFIC
Jakarta, Indonesia

Montreal, Canadá
28 de Junio de 2021

A quien corresponda,

Certificamos que nuestro conmutador para brindar redundancia para los moduladores SBBM85 cumple con las siguientes características técnicas:

.- Dos (2) Entradas en banda L
.- Una (1) Salida en Banda L
.- Una (1) salida de monitoreo
.- Soporta conmutación automática y manual
.- Un (1) puerto Ethernet para gestión y control
.- Dos (2) fuentes de alimentación 110VAC @ 60Hz
.- Web monitor vía puerto Ethernet

Se anexa manual del equipo con todas las características técnicas del mismo para detalles de acceso remoto, SNMP, pantallas de monitoreo vía interfaz web, parámetros de configuración o conmutación de los equipos, entre otras funciones.

Desde ya quedo a sus órdenes por cualquier consulta o aclaración que considere necesaria.

Atentamente,



Nelson De Abreu

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MONITOR AND CONTROL PANEL

FOR 1:1 REDUNDANT RF SYSTEMS

INSTALLATION AND OPERATING MANUAL

WARRANTY

This SPACEBRIDGE INC (formerly Advantech Wireless Inc) product is warranted against defects in material and workmanship for a period of 2 years from date of shipment. During the warranty period, SPACEBRIDGE INC will, at its option, either repair or replace products that will prove to be defective.

To return a product for warranty or repair service, you must first request a Return Material Authorization (RMA) number by contacting SPACEBRIDGE INC at:

Phone:	(514) 420-0045	or	Fax: (514) 420-0073
Website:	www.spacebridge.com	or	e-mail: customerservicest@spacebridge.com

The unit should be shipped to the following address, in original shipping container (box), with shipping charges prepaid.

SpaceBridge
6300 Chemin de
la Côte-de
Liesse, Suite 200
Saint-Laurent,
Quebec H4T 1E3
CANADA

Please indicate the RMA number on all shipping documentation.

Units shipped without prior issued RMA, or shipped not in original packing, may be subject of rejection and returned at sender's own expense.

LIMITATIONS OF WARRANTY

SPACEBRIDGE INC warrants this product to be free of materials and workmanship defects.

The foregoing warranty shall not apply to defects resulting from improper handling or abuse by the Buyer, unauthorized modification, operation outside of the environmental specifications for the product, or improper installation or maintenance.

SPACEBRIDGE INC shall not be liable for any direct, indirect, special, incidental or consequential damages.

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1. SAFETY

As this Monitor and Control Panel is designed to monitor and control RF units, specific rules must be followed to insure human and environment as well as equipment protection. Be aware atany moment that the controls and commands issued by the operator through this Monitor and Control Panel have a direct impact upon high power transmission systems that should be operated with caution.

In addition to this section, included by reference are the following pertinent sections of the International Standard IEC-215, 'Safety requirements for radio transmitting equipment':

Appendix D, 'GUIDANCE ON ASSESSING THE COMPETENCE OF PERSONNEL FOR DESIGNATION AS SKILLED' and also Sub-clause 3.1 of the Standard.

Appendix E, 'GUIDANCE ON SAFETY PRECAUTIONS TO BE OBSERVED BY PERSONNEL WORKING ON RADIO TRANSMITTING EQUIPMENT', also Sub-clauses 3.2, 3.7 and 22.1 of the Standard.

To prevent the risk of personal injury or loss related to equipment malfunction SPACEBRIDGE INC uses the following symbols for safety related information. For your own safety, please read the information carefully BEFORE operating the equipment.

Symbols used in manual:

WARNING: This indicates a hazardous procedure that could result in serious injury or death if not performed properly.

CAUTION: This indicates a hazardous and dangerous procedure that could result in light- to-severe injury or loss related to equipment malfunction, if proper precautionsare not taken.

---------- **CAUTION** ----------

This equipment can not be repaired by the operator. DO NOT attempt to remove theequipment cover or to disassemble internal components. Only qualified service techniciansshould service this equipment. There is a risk of damage to precision components.

---------- **WARNING** ----------

ALWAYS TERMINATE THE OUTPUT OF A RF SYSTEM WITH A RF LOAD (TERMINATION) CAPABLE OF DISSIPATING FULL CW RF POWER. SIMILARLY TERMINATE THE INPUT TO AVOID THE POSSIBILITY OF THE RF SYSTEM BEING DRIVEN BY STRAY LEAKAGE SIGNALS. Incorporate the termination prior to applying prime power to the amplifier. This procedure prevents self-oscillation and irradiation of the local environment. Even if a source is not connected to the RF System you are working with, there are situations where the system can go into a self-induced mode and generate high levels of RF energy. Destruction caused under excessive load voltage standing wave ratio (VSWR) will void the warranty.

---------- **CAUTION** ----------

Note that the M&C Panel described in this manual is equipped with SMA 50 Ω termination rated at maximum 1W. The power of the RF Systems monitored by this M&C Panel should not exceed this 1W level.

---------- **WARNING** ----------

DO NOT LOOK INTO THE OUTPUT PORT OF A POWERED RF SYSTEM. Treat the powered RF System with extreme care. Keep in mind that levels of microwave radiation that do not induce immediate physical discomfort in most individuals can be sufficiently high to induce longer-term effects. Your eyes are particularly vulnerable parts of your body.

The permissible levels of exposure are quite low compared to the power levels of the amplifiers built driven by SPACEBRIDGE INC Control Panel (e.g. less than 10 mW versus 20 to 1000 W delivered by various units). The permissible levels are currently being studied by a number of organizations. In the past the U.S. safety Code established a dosage rate of 10 mW/cm^2. Currently there is consideration being given to reducing the permissible level to 1 mW/cm^2 in theUnited States, as has been the case for several European countries.

2. GENERAL INFORMATION

2.1 INTRODUCTION

This manual contains information required to install and operate the Monitor and Control Panel for 1:1 Redundant RF Systems. Because specialized training is required for some phases of installation and operation, certain parts of this manual are directed only to trained personnel. Warnings appear at the appropriate points to caution all users of potential RF and high-voltage hazards.

For a safe and versatile operation, please read the information carefully BEFORE using the equipment.

SPACEBRIDGE INC has prepared this manual for use as a guide for the proper installation, operation and maintenance of SPACEBRIDGE INC equipment and computer programs. The drawings, specifications and information contained herein are property of SPACEBRIDGE INC. Any unauthorized use or disclosure of these drawings, specifications and information is prohibited; they shall not be reproduced, copied or used in whole or in part as the basis for manufacturing or sale of the equipment or software programs, without the prior written consent of SPACEBRIDGE INC.

2.2 DESCRIPTION

The Monitor and Control Panel is used for 1:1 redundant systems of RF equipment, monitoring the status of 2 external systems and 1 internal switch in a redundant system and providing control to the switch. It also provides information about the internal switch position to the two monitored RF Systems.

2.2.1 CONTROLLER

One controller ensures the monitoring of the two external RF Systems and the monitoring and control of the internal switch.

The Control Panel consists of:

- ❖ One controller
- ❖ Front panel board with LEDs, display and buttons (digipad).
- ❖ Two redundant 12 V DC Power Supplies
- ❖ ETHERNET Enabler

2.2.2 FRONT PANEL

The Front Panel ensures the possibility to monitor two external RF Systems and to monitor and control the internal switch.

It consists of:

- ❖ Front panel PCB with LEDs:
  - "SSPA_A" green/orange/red LED (RF System A status)
  - "SSPA_B" green/orange/red LED (RF System B status)
  - "SW_STATUS" green/orange/red LED (switch status)
  - "AUTO/MAN" green/orange/red LED (auto or manual redundant system status)
  - "REM/LOC" green/orange/red LED (remote or local control status)
  - "PANEL_ST" green/orange/red LED (Control Panel status)
- ❖ Display (2 rows of 40 characters each)
- ❖ RS232 M&C connector (RJ-11 type) for RS-232 serial communication

2.2.3 REAR PANEL

The Rear Panel of the unit holds all external communication connectors (excepting the RS-232 serial connector located on the Front Panel) - see **Figure 2** at page 12:

- Interface Connectors:
  - RS485 SLAVE (DB-9 type, female) connection to the PC (via an RS485/232 adapter).
  - ETHERNET (RJ-45 type, female) connection to internet.
- Connectors to monitored RF Systems A and B:
  - A (DB-9 type, female) connection to RF System A.
  - B (DB-9 type, female) connection to RF System B.
- RF Connectors of the Redundancy Switch to monitored RF Systems A and B:
  - A (SMA-type, female) connection to RF System A (input 1 of the SWITCH).
  - B (SMA-type, female) connection to RF System B (input 4 of the SWITCH).
  - LOAD (SMA-type, female) connection to a 50 Ω termination (1W) to which the output of the stand-by system will be directed (output 2 of the SWITCH).
  - OUT (SMA-type, female) output connection of the on-line system (OUTPUT 3 of the SWITCH).
- Two AC connectors (85–264 VAC, 50–60 Hz) – both of these two AC line connectors should be used to supply the unit in a redundant mode.

PORT RS485 SLAVE Serial Interface is used for the connection to a Network Management System (NMS) or to a PC. The M&C Panel will be the slave and the NMS (or PC) will be master in this configuration.

Note that an RS-485/RS-232 adapter (supplied as an option by *SPACEBRIDGE INC*) is required to connect the M&C Panel RS-485 SLAVE to an RS-232 port of a PC.

TABLE 1: PORT RS485 SLAVE SERIAL INTERFACE – PIN ASSIGNMENT

Pin	Signal Name	Description
1	N/A	Not connected
2	N/A	Not connected
3	RX-	Serial receive port, RS485 RX- levels
4	TX-	Serial transmit port, RS485 TX- levels
5	COM	Common (GND)
6	TX+	Serial transmit port, RS485 TX+ levels
7	N/A	Not connected
8	N/A	Not connected
9	RX+	Serial receive port, RS485 RX+ levels

Note:

Tx+ and **Tx-** must be a twisted pair.
Rx+ and **Rx-** must be a twisted pair.
Common, together with the shields of both used twisted pairs, must be soldered only at one end of the cable (either at M&C Panel side, or at PC side).

2.2.4 POWER SUPPLY

The Controller Panel has two +12 VDC power supplies (PS12-1 & PS12-2), working from 85–264 VAC supply. The typical power consumption @ 110 VAC is 1 A total.

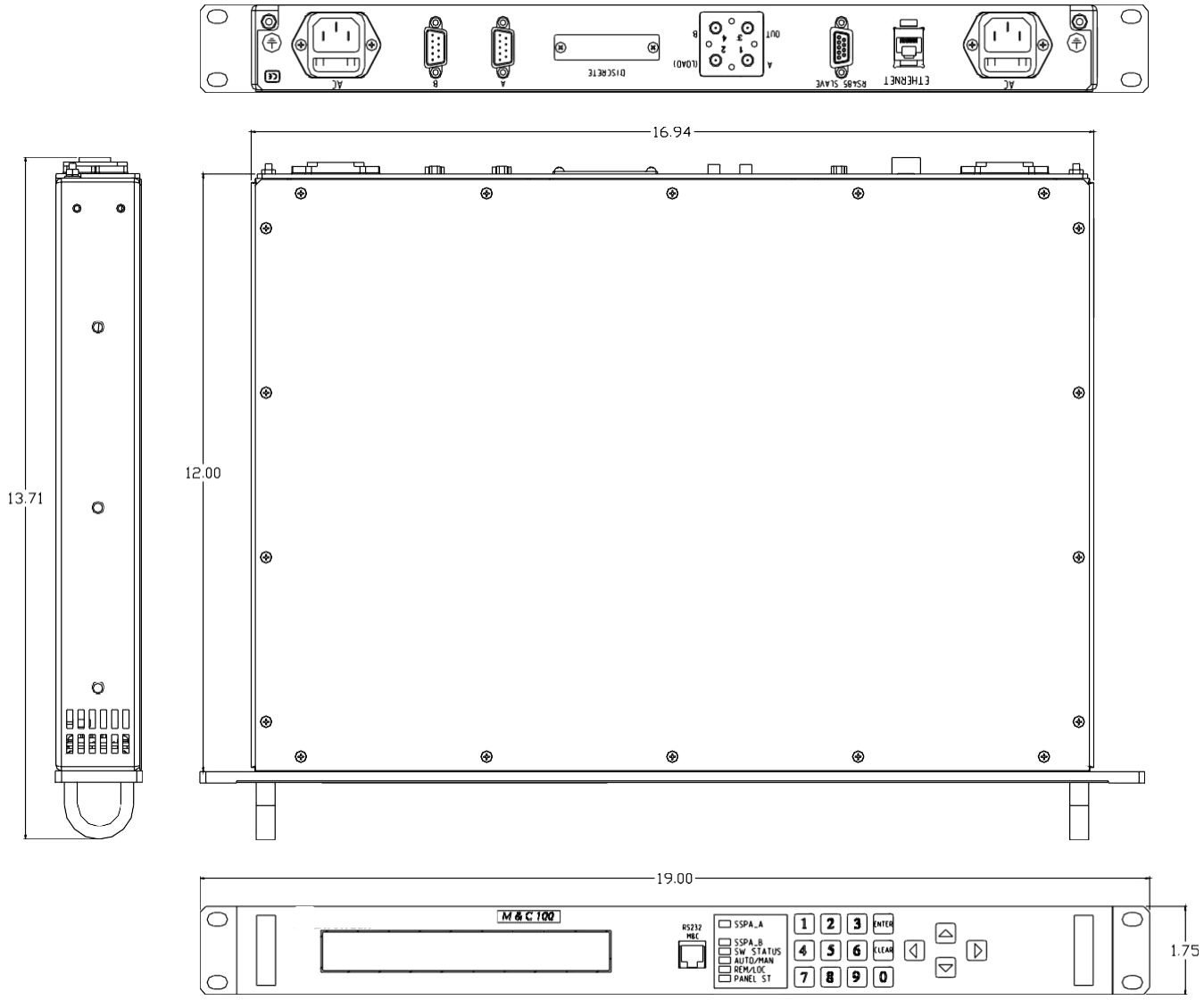


Figure 1: Product Outline

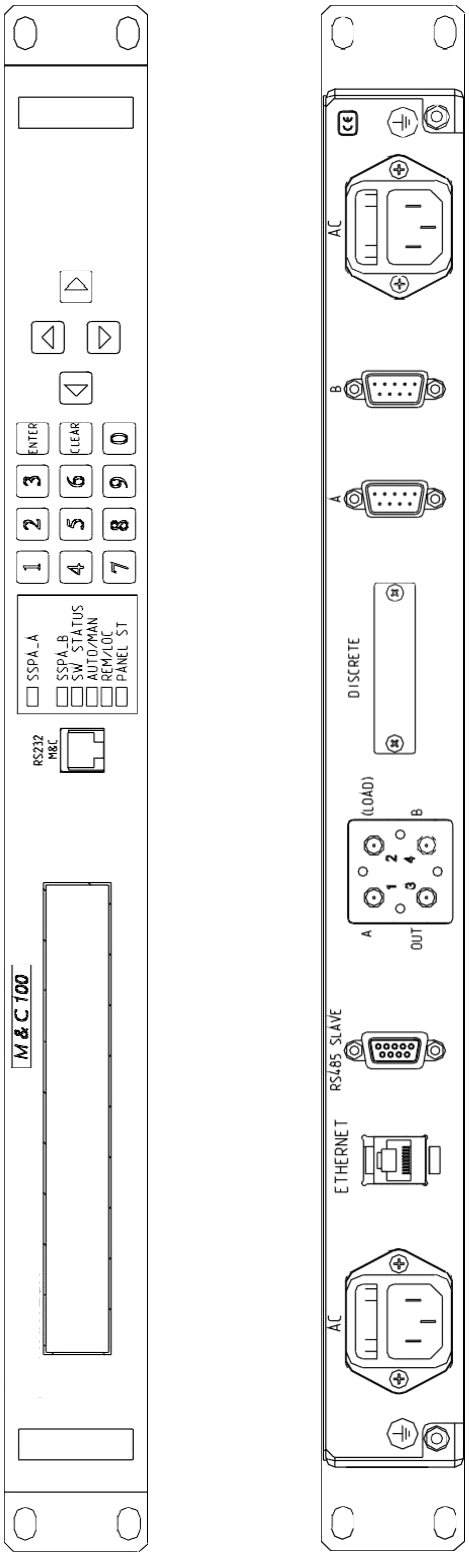


Figure 2: Front and Back Panels

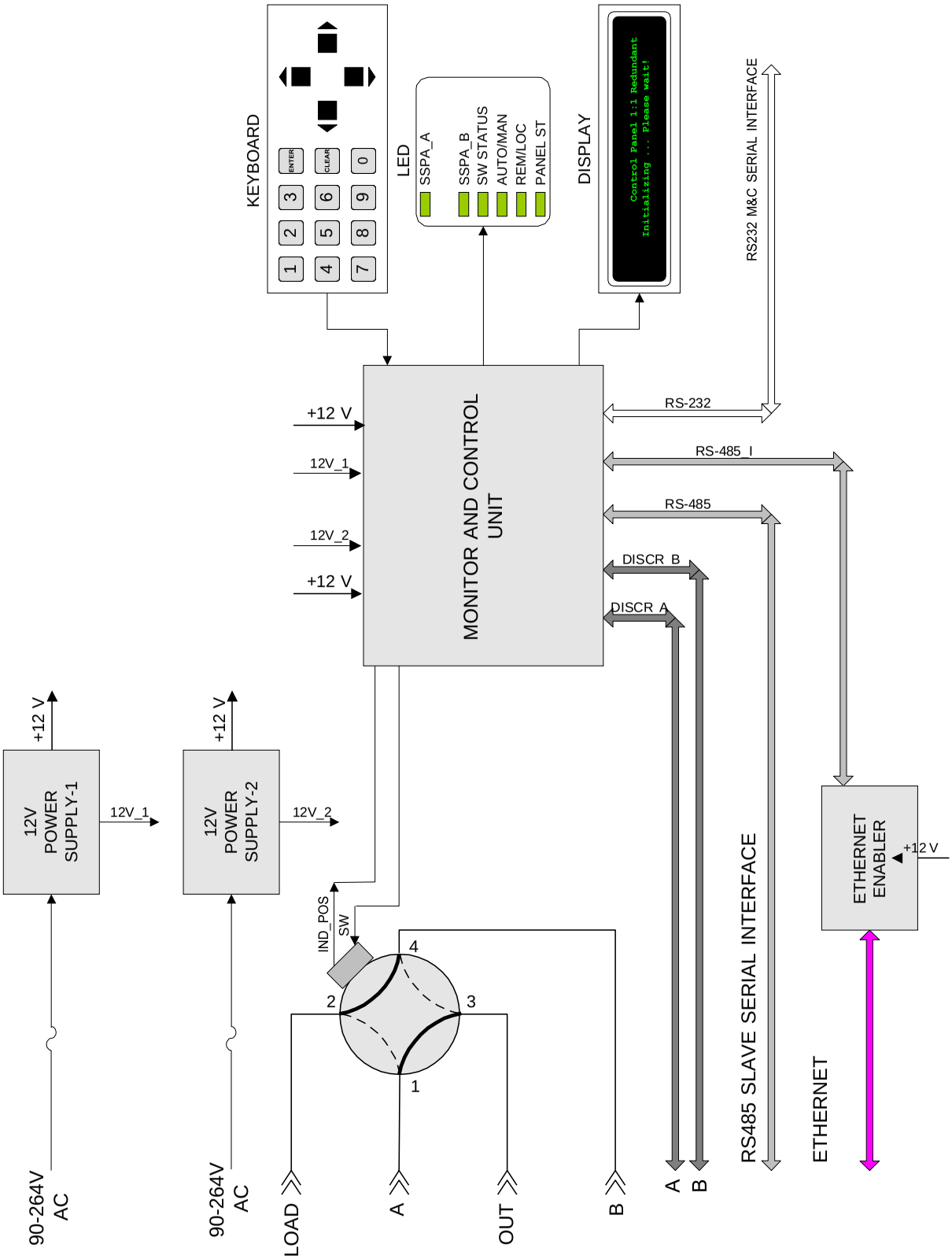


Figure 3: Block Diagram of the Control Panel

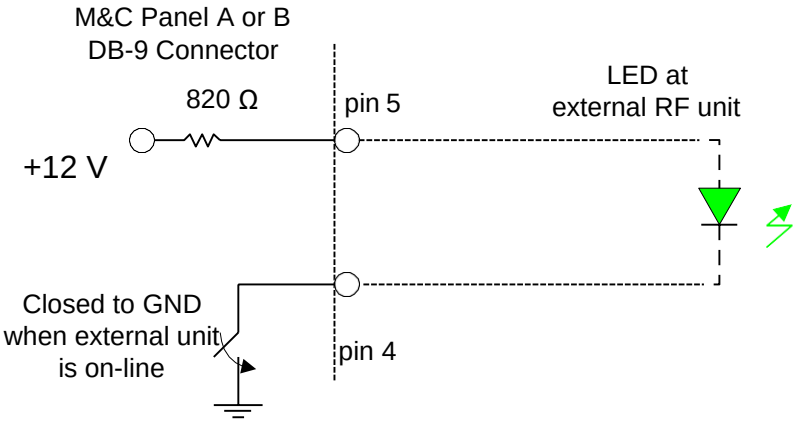
2.3 INSTALLATION

Connect coaxial cables between the outputs of the two RF Systems and the correspondent inputs of the panel switch.

Connect the discrete signals cables between DB-9 connectors A and B of the Control Panel and the corresponding connectors at RF Systems A and B (see **TABLE 2** at page 15).

After all connections are done, turn on the RF Systems. Then turn on the SPACEBRIDGE INC Control Panel.

TABLE 2: A&B DB-9 CONNECTORS – PIN ASSIGNMENT		
Pin @ A&B DB-9 CONNECTORS OF M&C Panel	**Signal Name**	**Active condition**
1	ALARM (A or B)	Unit is in ALARM state when pin 1 is closed to pin 2 (COM)
2	COM	Common
3	N/C (Not connected)	-
4	POS IND	Position indication; pin 4 is closed to GROUND (12V Return) when the unit is on-line (see schematic below)
5	+12 V	Supply voltage through current limiting resistor (820 Ω) for LED (see schematic below)
6	N/C (Not connected)	-
7	N/C (Not connected)	-
8	N/C (Not connected)	-
9	N/C (Not connected)	-



3. MONITORING AND CONTROL FROM THE FRONT PANEL

Local monitoring and control can be done using keypad, LEDs and fluorescent display located on the front panel.

3.1 KEYPAD AND FLUORESCENT DISPLAY

The Keypad is used to navigate through the various menus provided by the fluorescent display. Here are the basic rules to move between menus.

From main menu, the <⇳> and <⌧> keys are used to switch between different menus.

- The <⇳> and <➔> keys are used to navigate between parameters (highlighting them).
- The **<ENTER>** key is used to select the highlighted parameter.
- The <⇳> and <⌧> keys are used to change the selected parameter.
- The **<ENTER>** key is used to save the change performed upon the selected parameter.
- The **<CLEAR>** key is used to discard changes or to go back in the menu.

Figure 4 provides a flowchart of the front panel menus.

CAUTION: Do not press **<Yes>** for software downloading in the Download menu, if there is no valid software to download recorded in the computer monitoring the system.

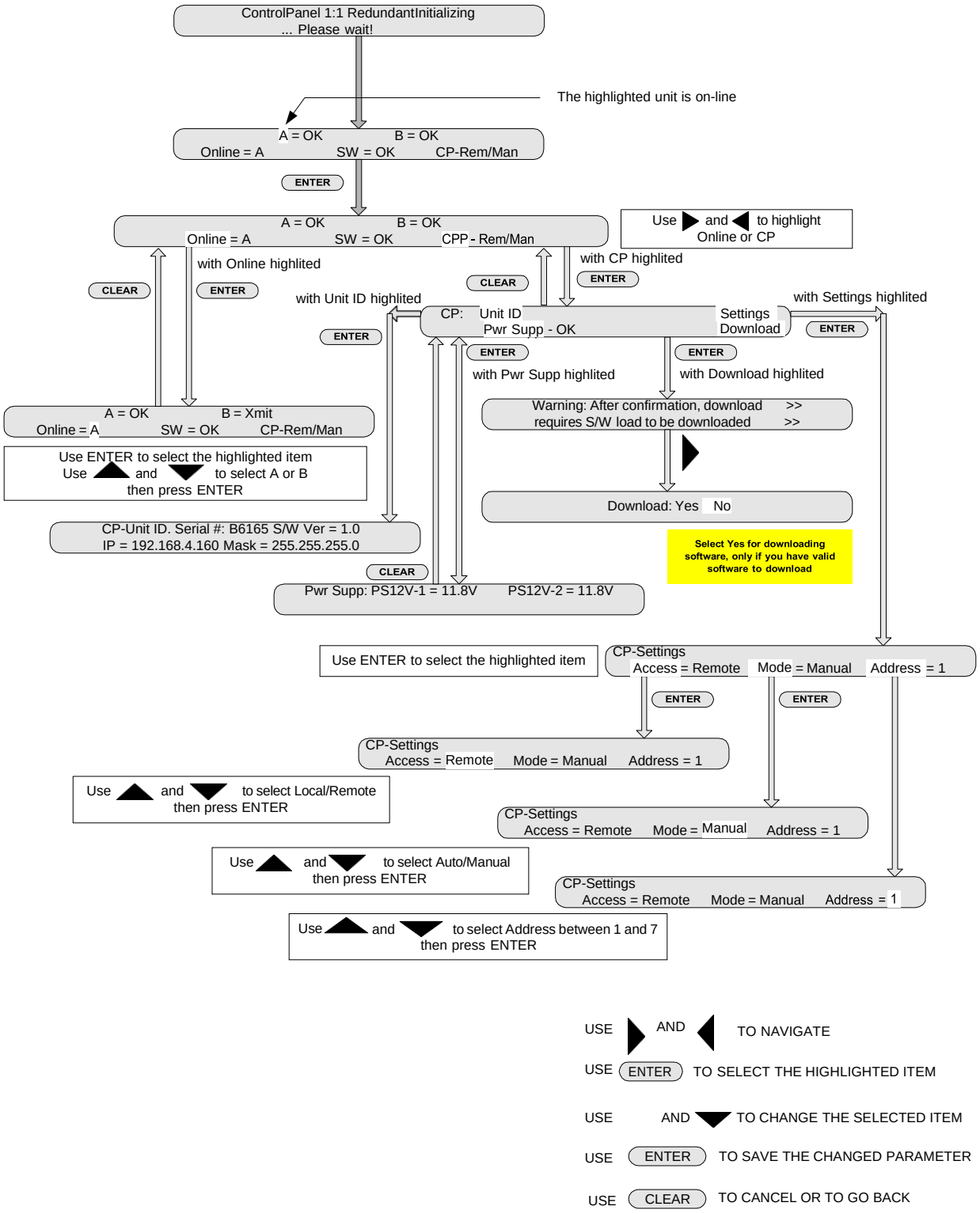


Figure 4: Remote M&C Panel Menu

3.2 LEDS

Seven LEDs on the front panel provide the status of the monitored RF Systems and of the 1 to 1 Redundant System as a whole. **TABLE 3** gives a description of each LED.

TABLE 3: LED INDICATORS

LED	Color	Description
SSPA_A SSPA_B	**Green**	RF System no FAULT, on-line, RF ON (not mute)
	Orange	RF System no FAULT, stand-by, RF ON (not mute)
	Red	RF System FAULT, stand-by
	Red blinking	RF System FAULT, on-line
SW STATUS	**Green**	Switch OK
	Red	Switch FAULT
	Red blinking	Switch Not connected
AUTO/MAN	**Green**	AUTO
	Orange	MANUAL
REM/LOC	**Green**	REMOTE
	Orange	LOCAL
PANEL ST	**Green**	PANEL OK
	Red	PANEL FAULT (Power Supply FAULT)

4. MONITORING AND CONTROL VIA THE RS-232 INTERFACE

The RS-232 serial interface is a terminal mode interface that allows for the configuration of the unit and for the download for upgrading software toward the M&C Panel.

4.1 RJ-11 TO 9-PIN ADAPTER CABLE

If it is desired to connect a hand-held terminal to the Monitor and Control connector on the rear panel labeled RS-232, use an adapter cable. Adapter cables are readily available, but must be individually wired. Follow the pin-out listed in **TABLE 4**. **Figure 5** shows the pin-out for the RJ-11 connector, looking toward the connector.

TABLE 4: RJ-11 TO 9-PIN CONNECTOR CABLE PIN-OUT

DB-9 Connector	Signal	RJ-11 Connector
Pin 1	Common	Pin 5
Pin 2	Term Data IN (RX)	Pin 3
Pin 3	Term Data OUT (TX)	Pin 2
Pin 5	Ground	Pin 1
Pin 6	Not connected	Pin 4
Pin 9	+5 V DC @ 100 mA	Pin 6

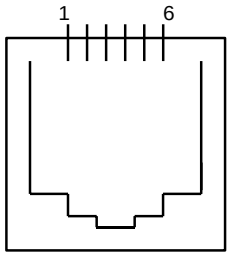


Figure 5: RJ-11 Connector Pin-out

4.2 ELECTRICAL CONNECTION

The RS-232 port of the M&C Panel can be directly connected to a COM port of computer. The RS-232 port uses a RJ-11 (6 wire telephone plug) connector with pin assignment described in EIA232 standard. See **TABLE 5** for pin assignment. To connect the RS-232 port of the M&C Panel to a PC, use a standard RS-232 cable for computer.

TABLE 5: SERIAL RS-232 INTERFACE – PIN ASSIGNMENT

Pin Number	Description
1	Ground
2	TX
3	RX
4	Not Connected
5	Common
6	+5V output

4.3 PORT SETTINGS

For proper operation, use the following settings:

TABLE 6: SERIAL RS-232 PORT SETTINGS

Parameter	Setting
Baud Rate	19200
Data Bits	8
Stop Bit	1
Parity	None

4.4 COMMAND DESCRIPTION

To monitor and control a 1 to 2 Redundant System via the RS-232 interface, start a terminal emulation program (like Term95 or HyperTerminal) and use the commands listed in **TABLE 7**.

TABLE 7: COMPUTER TERMINAL COMMANDS FOR RS-232 INTERFACE

Command	Command Description	Response
acc	Set Control Access	Allows the Control Panel (CP) to go into control access Local or Remote
mac	Set Control Panel (CP) address	Allows the address of the Control Panel (CP) to be set between 1 and 7
mod	Set Operation Mode	Allows for the setting of operation mode for redundancy (AUTO or MANUAL)
onl	Set RF System ON LINE	Allows to set online a certain RF System (A or B)
ver	Software Load Version	Allows for the reading of the software version in the controller of the CP
dnl	Download Control Panel Software	Allows the Control Panel (CP) to go into the download mode, for software downloading.

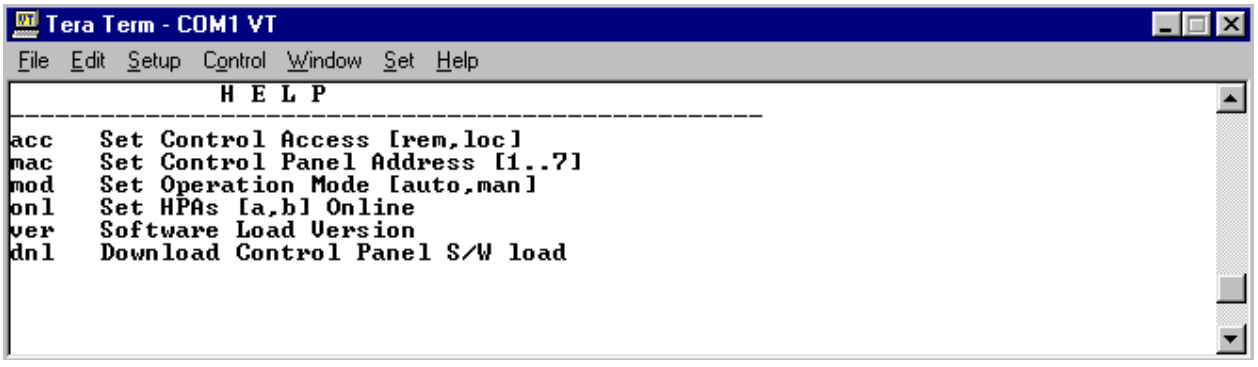


Figure 6: List of commands (after pressing h- Help) in Terminal Mode Display

After establishing communication, pressing ENTER will allow for the monitoring of the Control Panel (CP), the switch and the RF Systems, see figure below:

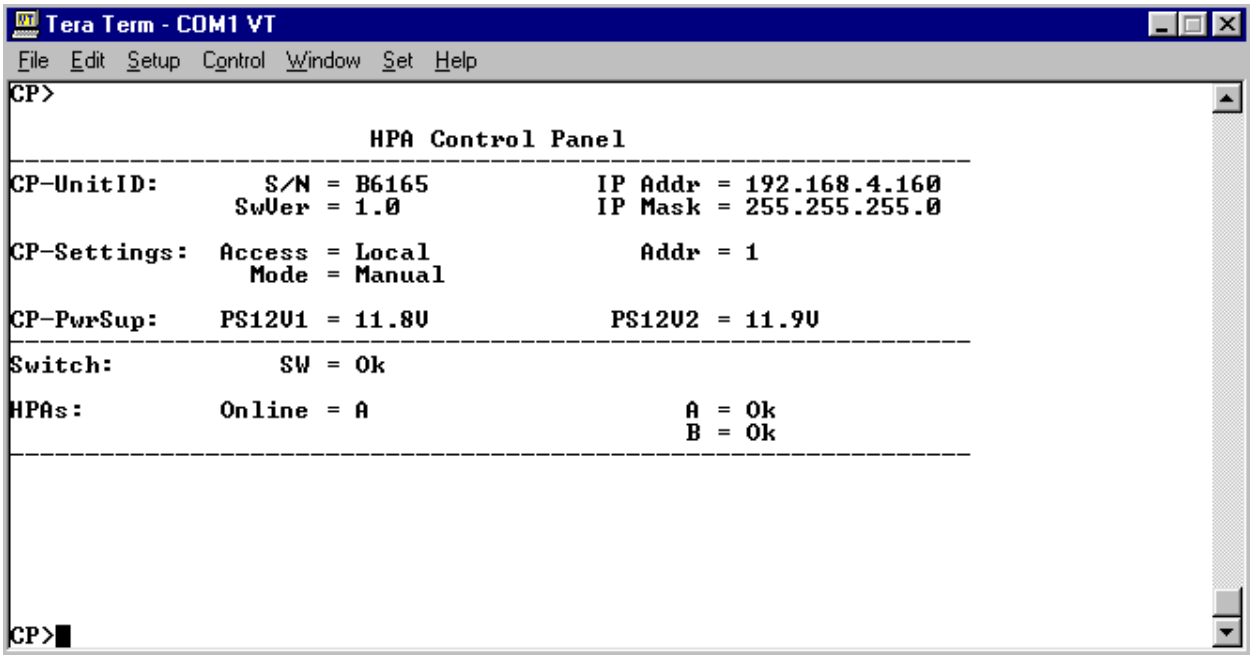


Figure 7: RS232 Terminal Mode Display (after pressing ENTER)

4.4.1 DOWNLOADING THE SPACEBRIDGE INC SUPPLIED SOFTWARE

If it is required to change the internal software features, then download the supplied software from PC, as follows (another method to download the software is from the front panel of the Control Panel, see **Figure 4** at page 17):

1. Create a new folder in the hard drive of a PC.
2. From the supplied source, copy the file "dlapp2000.exe" and the file with extension ".hex" into this folder.
3. Make R2-232 connection between PC and the unit.
4. Run the terminal mode program provided by the PC.
5. From the terminal mode type "dnl" command and press **<ENTER>**.

The message "Enter <yes> to confirm download" appears on the screen.

CAUTION! Typing **<yes>** for download will cause the contents in the non-volatile memory to be cleared and it cannot be recovered. If the user desires to retain the contents within the non-volatile memory, then any other key can be pressed.

6. Follow the screen instructions to set download mode.
7. After several seconds, the LED on the unit will be lit orange and the message "Ready for download from RS232" after typing **<yes>**
   From this moment, the memory of the unit is cleared! It is necessary to download the application!
8. Close the terminal mode program.
9. Open the new folder and start the dlapp2000.exe program.

The DLAPP2 display with instructions appears on the screen.
10. At the prompt type "s[space]comX" and then press **<ENTER>**.

NOTE: X is the number of the communication port connected to the unit.

11. At the prompt type "pl[space] 19200 and then press **<ENTER>**.
12. At the prompt type "l[space] filename.hex" and then press **<ENTER>**.
13. After 20–30 seconds the download process should start. You will see progress on the screen.
14. When loading is complete, press "q" and **<ENTER>** to close "dlapp2000".
15. Go to the terminal and check unit's settings.

If the download process was interrupted, it is need to restart power of the unit and start download process again without items from 5 to 7.

5. MONITORING AND CONTROL VIA THE RS-485 INTERFACE

The protocol described in this Section is used for the interconnection between the indoor SPACEBRIDGE INC Control Panel and a Network Management System (NMS). The protocol supports the 4-wire RS-485 interface, using the communication set-up 9600.N.8.1.

5.2 FRAME STRUCTURE

Each frame begins with the same starting byte: 0x55.

After the starting byte, 7 bytes are following in the frame.

The first byte in the master-to-slave direction is the address of the correspondent unit (0x01 to 0x07).

The first byte in the slave-to-master direction contains the address of the unit, shifted to the left by 4 (e.g. the unit with the address 0x05 will return address 0x50).

The second byte in the master-to-slave direction is a command or a data request.

The third byte in the master-to-slave direction is an expansion of command (if applicable).

The forth, fifth and sixth bytes in the master-to-slave direction carry the value of parameter. The fourth byte is the most significant (MS) byte, the fifth is the less significant (LS) byte, and the sixth byte is the value after the decimal point.

The second to the sixth bytes in the slave-to-master direction carry data or status from the slave unit.

The seventh byte in both the master-to-slave and the slave-to-master directions carry the check-sum, calculated as algebraic sum of bytes 1-6.

All not used (N/U) bytes are always set to 0xAA.

If the unit did not recognize a command or the check sum is not correct, the response is always "condition status" – see **TABLE 9** at page 26.

5.3 COMMANDS

These commands are going only from master to slave direction (any NMS and/or Ethernet adapter to Control Panel).

TABLE 8: RS-485 PROTOCOL COMMANDS

#	Description	2nd byte	3rd, 4th, 5th & 6th bytes	Response 2nd, 3rd, 4th, 5th & 6th bytes
1	Change CP address	0x03	0x01 to 0x07	No Response
2	Read CP serial number	0x08	0xAA AA AA AA	5 ASCII characters
3	Read DC voltages	0x12	0xA1 first two PS 0xA2 second two PS	bytes 2&3 24V PS, bytes 5&6 12V PS
4	Set operation mode	0x14	0x5A Auto 0xA5 Manual	See **TABLE 9**
5	Read system status	0x23	0xAA AA AA AA	See **TABLE 9**
6	Select on line units	0x24	0x13 – A&B on line 0x12 – A&S on line 0x23 – S&B on line	See **TABLE 9**
7	Read IP address	0x50	0xAA AA AA AA from user interface	bytes 2,3,4 and 5 to user interface
			0x XX XX XX XX from Ethernet adapter	no answer to Ethernet adapter
8	Read Net mask	0x51	0xAA AA AA AA from user interface	bytes 2,3,4 and 5 to user interface
			0x XX XX XX XX from Ethernet adapter	no answer to Ethernet adapter

5.4 STATUS RESPONSE

TABLE 9: RS-485 PROTOCOL STATUS RESPONSE

Bit #	2nd byte	3rd byte	4th byte	5th byte	6th byte
0	0	0 - B on-line 1 - A on-line	0	Software version number 0xXX	1 - SW Alarm
1	0	0	0		0
2	0	0	0		1 - SW not connected
3	1- Alarm A	0	0		0
4	0	0	0		0
5	1 - Alarm B	0	0		0
6	0	0	0		1 – Alarm CP (PS out of range)
7	0 – Local 1 - Remote	0 – Redundant Ready 1 - System error	0 – Manual 1 - Auto		1- Unknown command

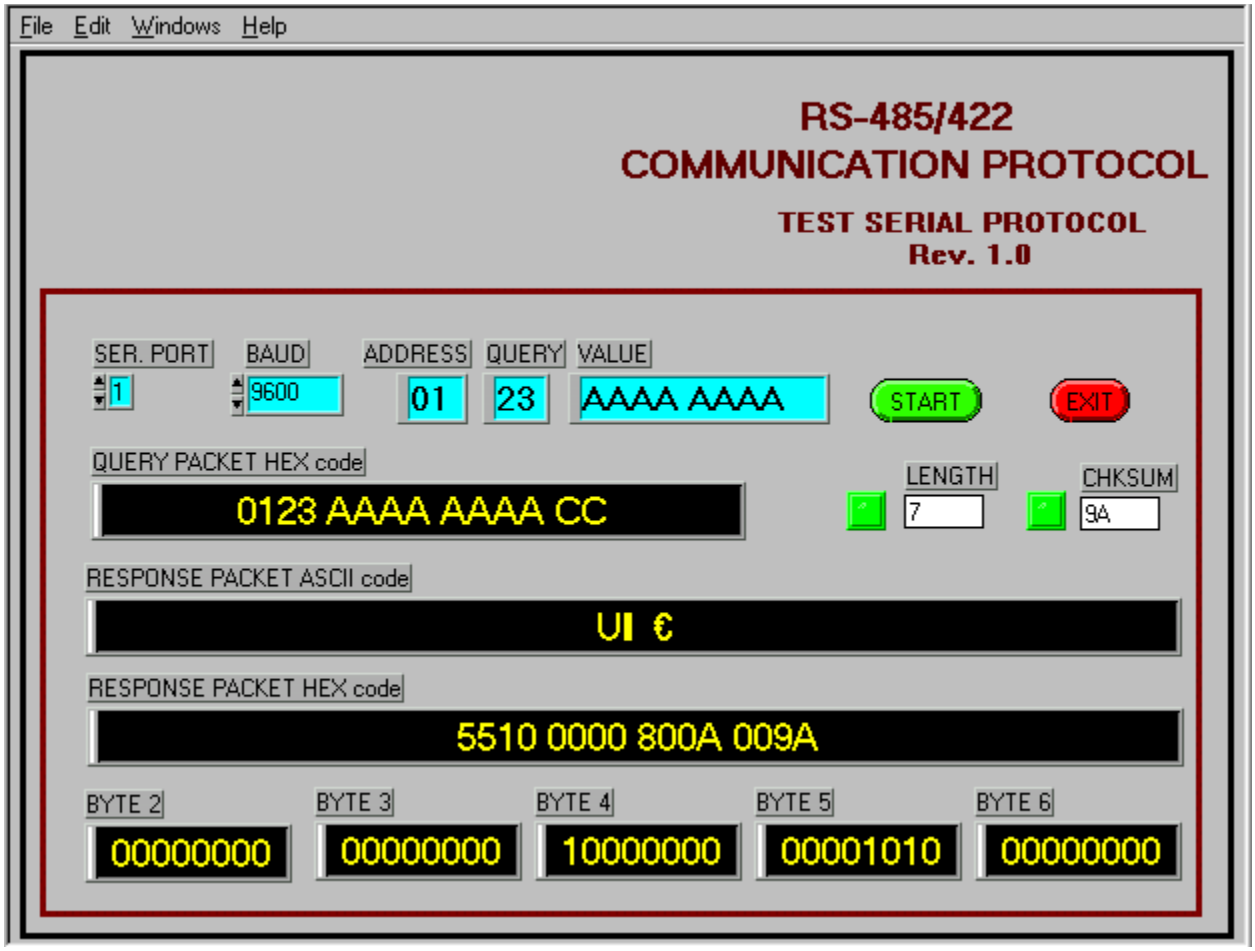


Figure 8: Proposed RS485 Monitoring and Control

6. MONITOR AND CONTROL VIA TCP/IP INTERFACE

The Remote Monitor and Control Panel unit may be monitored and controlled using SNMP v.1.

The hardware connection to an Internet outlet is achieved via a standard communication cable with RJ-45 connector or Terminal Strip connected to the ETHERNET connector of the unit.

6.1 SNMP INTERFACE

SPACEBRIDGE INC provides a MIB file with all necessary objects to monitor and control the Control Panel unit through SNMP. The MIB objects and their descriptions may be read from the MIB file.

Using an SNMP browser (server) (e.g. iReasoning MIB browser produced by iReasoning, found at http://www.ireasoning.com, see **Figure 9** and **Figure 10** below) and the provided MIB file, all the RF parameters of the unit may be remotely controlled.

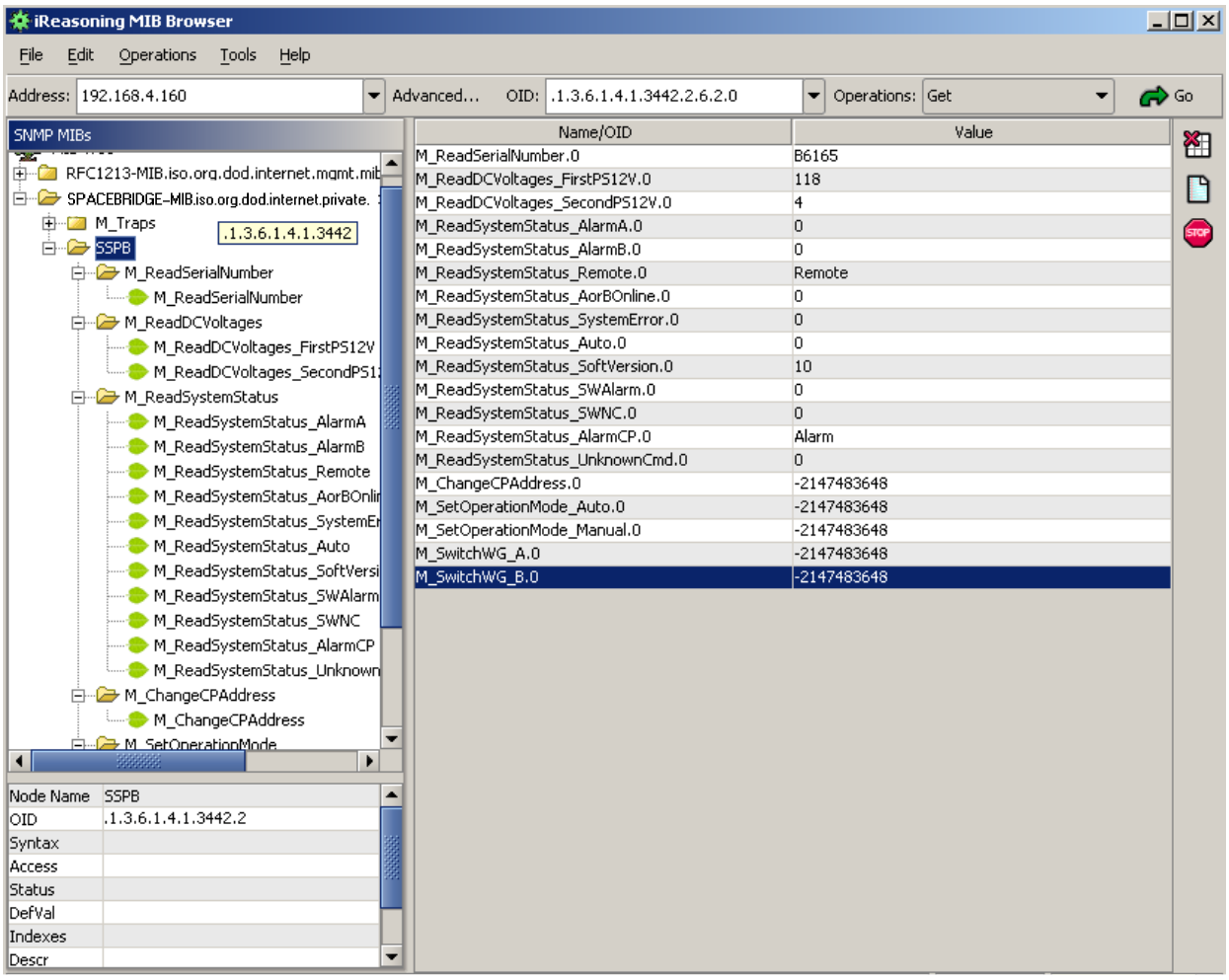


Figure 9: SNMP Monitoring Example

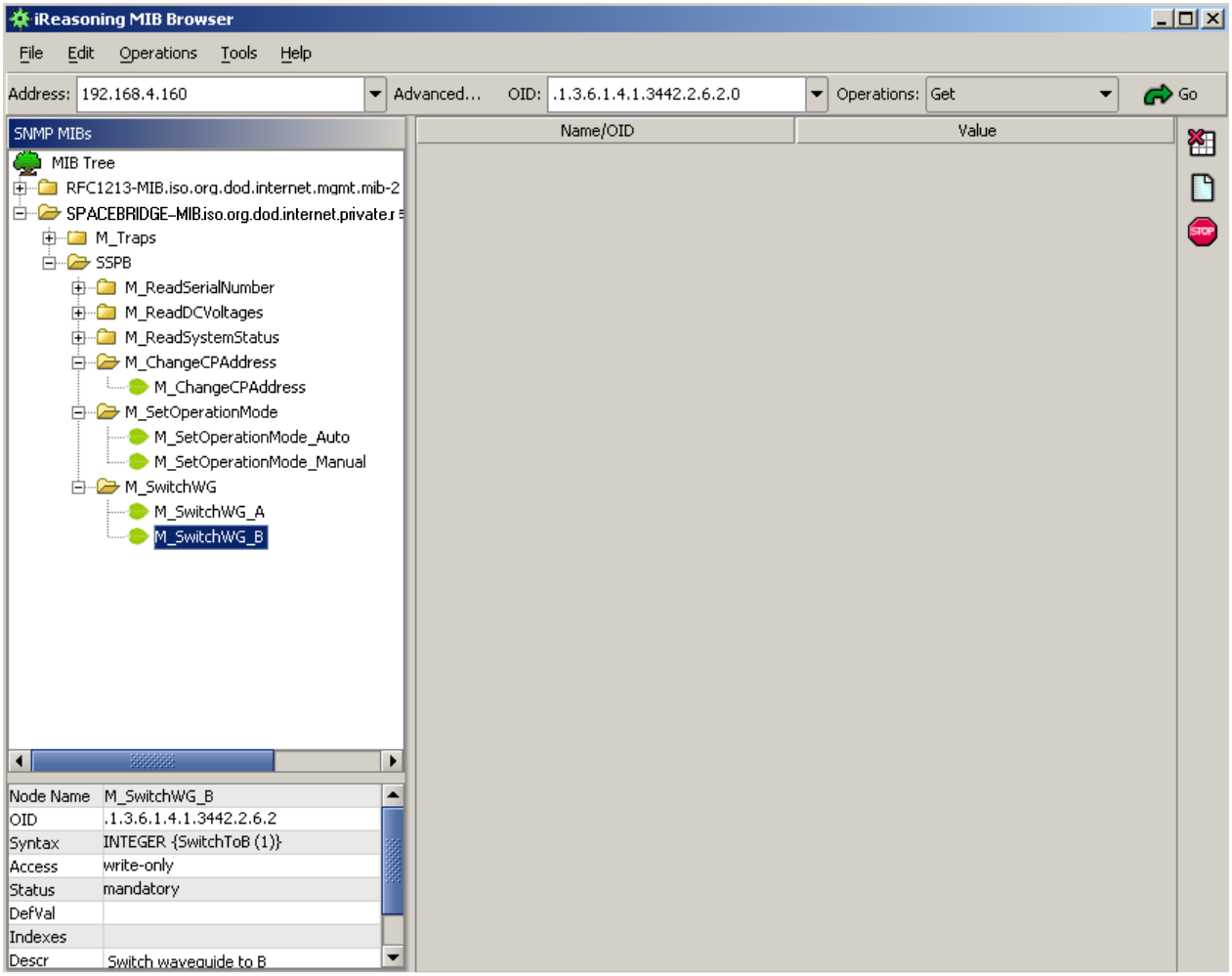


Figure 10: SNMP Settings Example

6.2 TELNET INTERFACE

The Telnet interface allows the user to do settings related with the serial communication, TCP/IP parameters such as IP address, mask, SNMP parameters as read community name, write community name, the addresses of the computers which will receive the traps in case of an error, reset the passwords for the web access etc.

To start a Telnet session press "Start", "Run" (or from any other DOS command window), and type:

telnet, the IP address, blank, 9999 and press Enter (*e.g*. telnet 192.168.7.160 9999)

In the Change Setup menu illustrated in **Figure 11** the following options are available:

0. With this option the user can set the IP address of the unit, the mask and the Telnet password. The Telnet password has to be set in Final Test "amti1234". This is confidential information.

1. This option can be used to set the speed for the serial communication and the port number for the "transparent mode" (RS232 over TCP/IP).

2. This option is useful for toggling between the Snmp Agent and Ethernet adapter functionality. The information displayed on the screen is the status which will be obtained after pressing the key "2". For example Start SNMP Agent means that in that moment the device acts as an Ethernet adapter (is capable of doing RS232 over TCP) and after pressing the key "2" will act as a SNMP agent.

3. With this option the user can set the community name for write and read (both names have to be set in Final Test "public") and also a list of maximum 3 IP addresses where the traps will be sent in case of an error.

5. This option will deactivate the tftp server; the tftp server is useful for the software upgrade.

6. With this option the port 77FE can be activated/deactivated. This port is used in the factory for different settings.

7. This option will activate the tftp server, the port 77FE and will reset the passwords for the web access to void. Those passwords are for reading access and for read/write access.

8. This option is for exit without save.

9. Save the settings and reset the device.

The options *1, 2, 5* and *6* have to be used only by SPACEBRIDGE INC employees. The modification of any setting in these menus options will void the warranty.

The access to Telnet menu has to be done by qualified personnel, only with SPACEBRIDGE INC approval and/or supervision.

For improved security, the customer should set a password for telnet (using option 0), then select options 5 and 6 in order to deactivate the TFTP server and the port 77FE, which is only used by the manufacturer.

The password for TELNET is: amti1234.

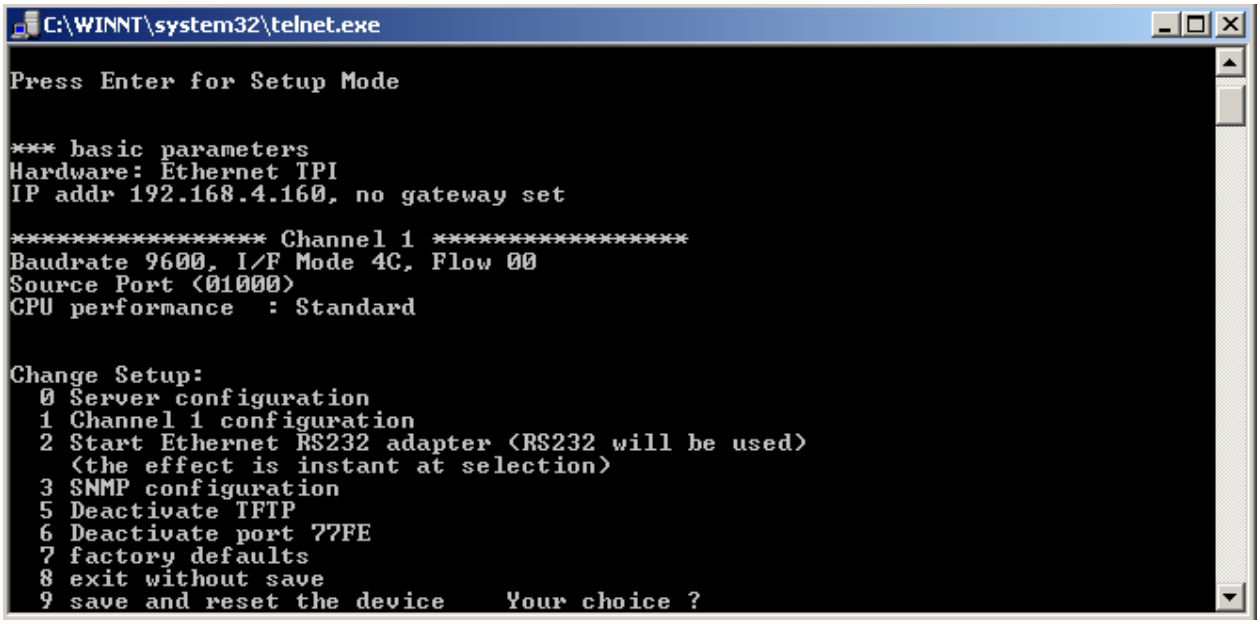


Figure 11: Telnet Communication

6.2 GRAPHICAL USER INTERFACE (GUI)

The ETHERNET connection may be used with a Graphical User Interface (GUI) available at the indicated ipaddress on internet.

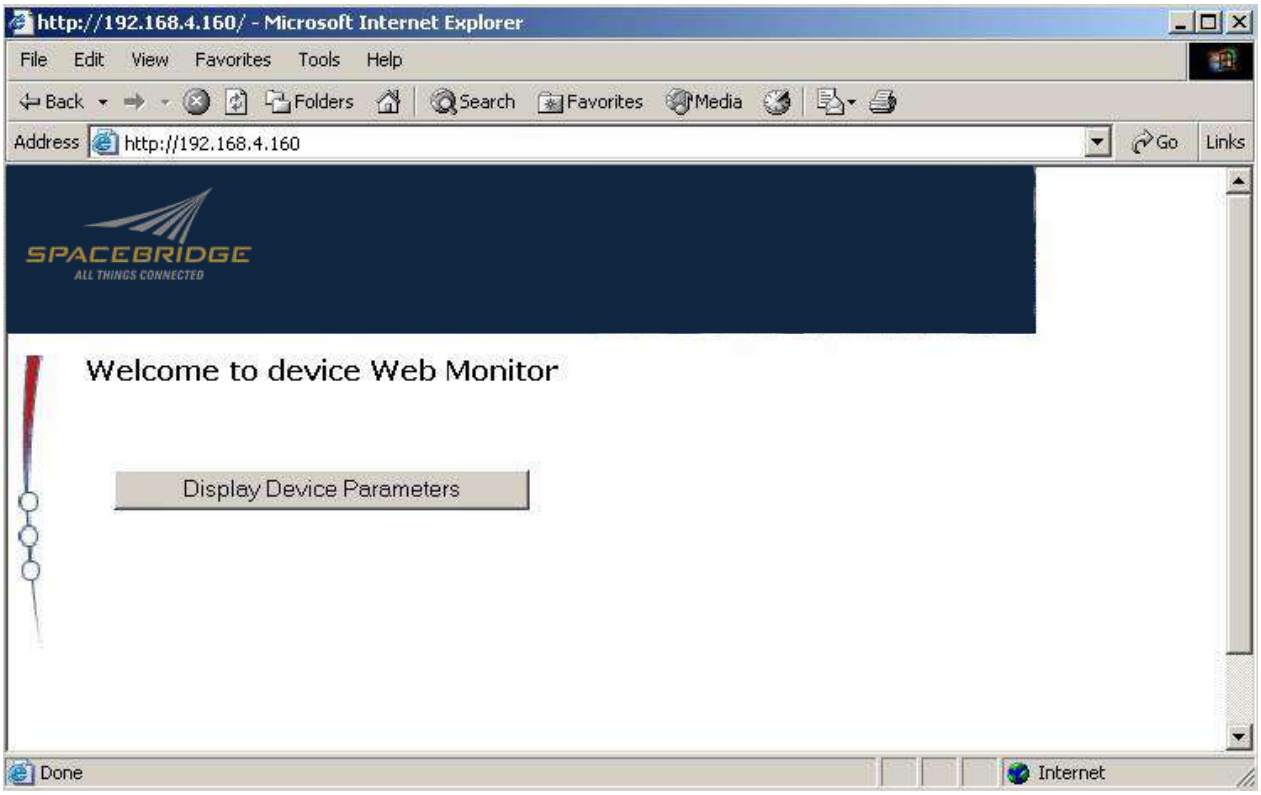


Figure 12: Access to the Graphical User Interface via ipaddress

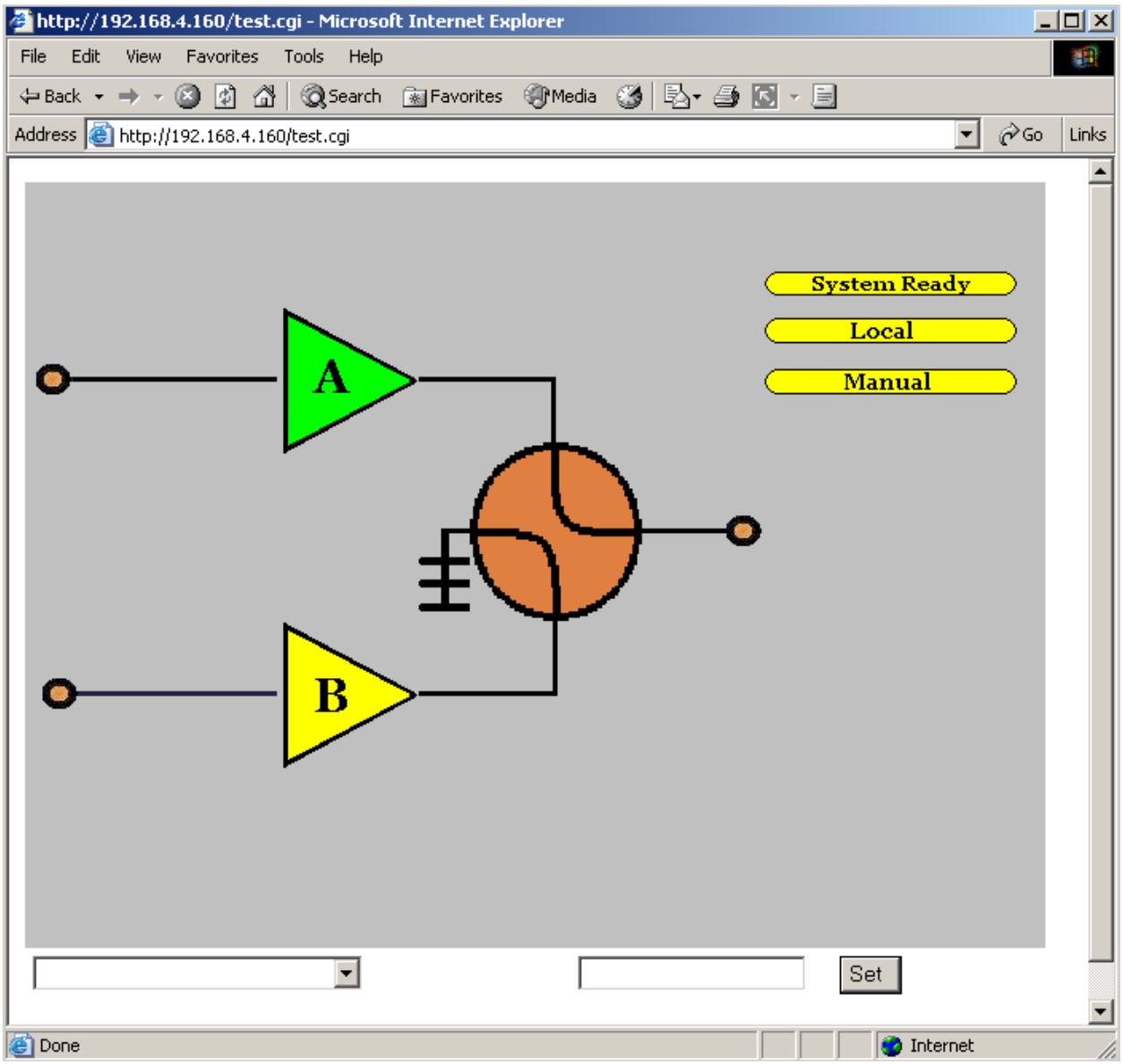


Figure 13: Graphical User Interface Display (normal conditions)

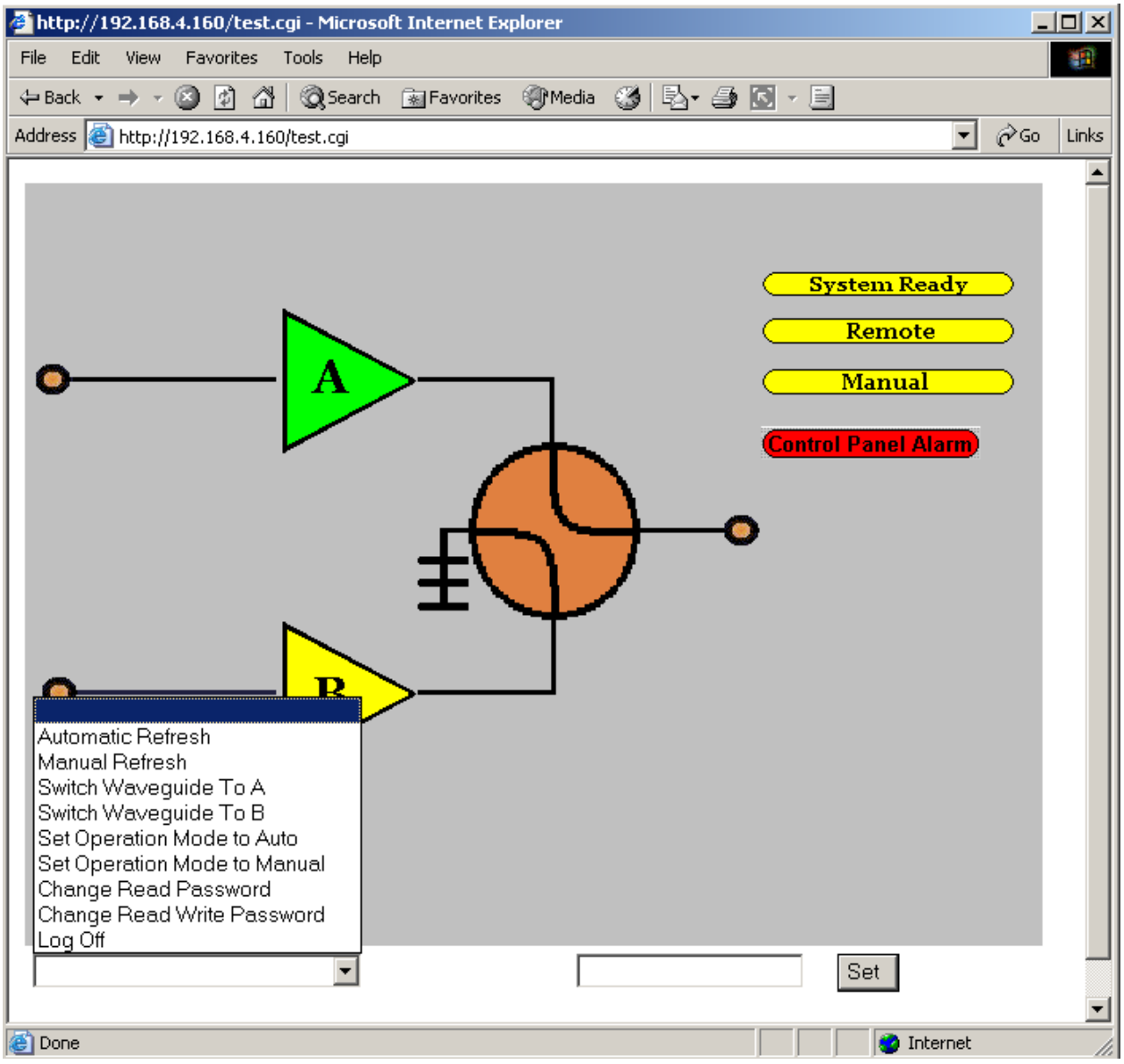


Figure 14: Graphical User Interface Display (CP alarm condition, with pop-up menu)

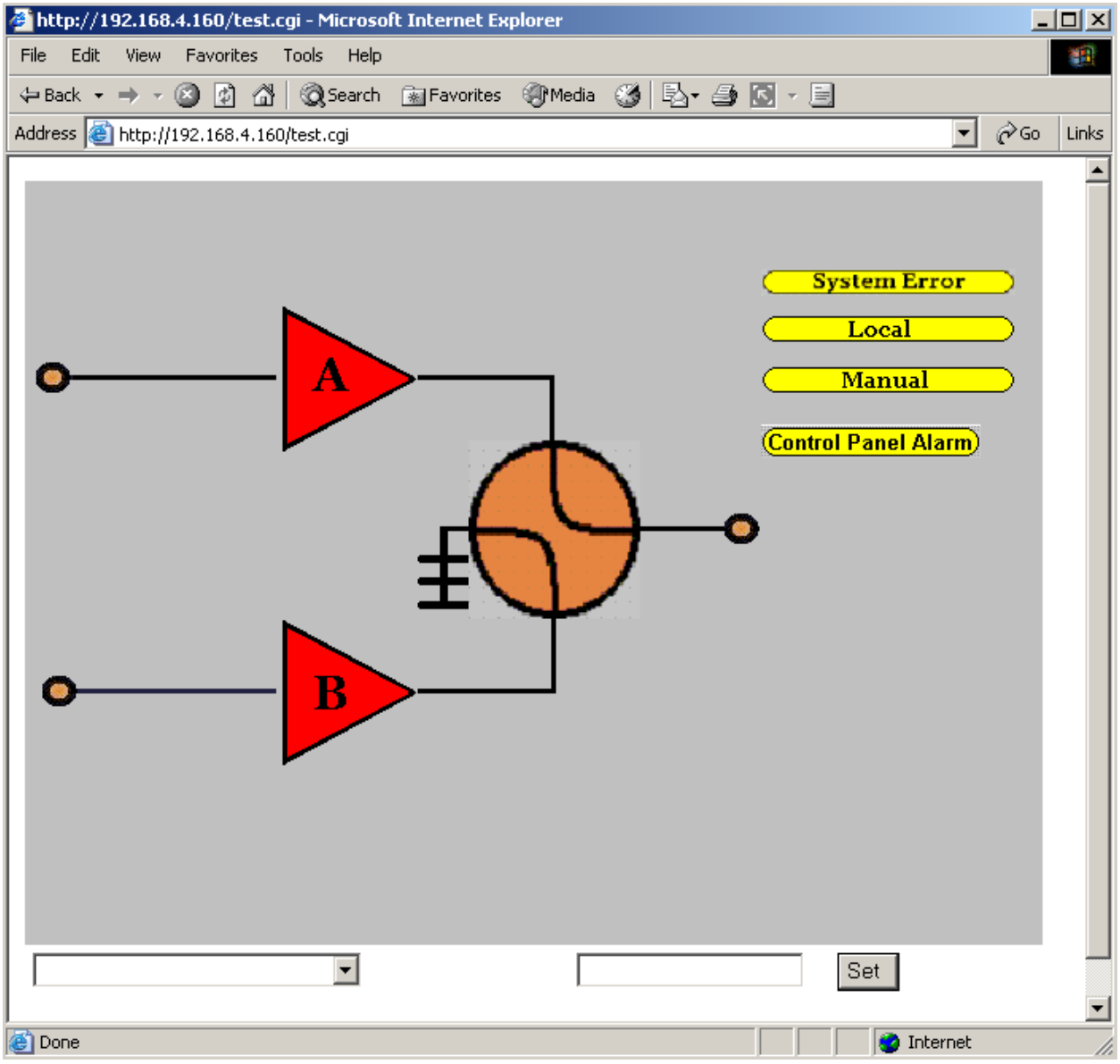


Figure 15: Graphical User Interface Display (alarm conditions)

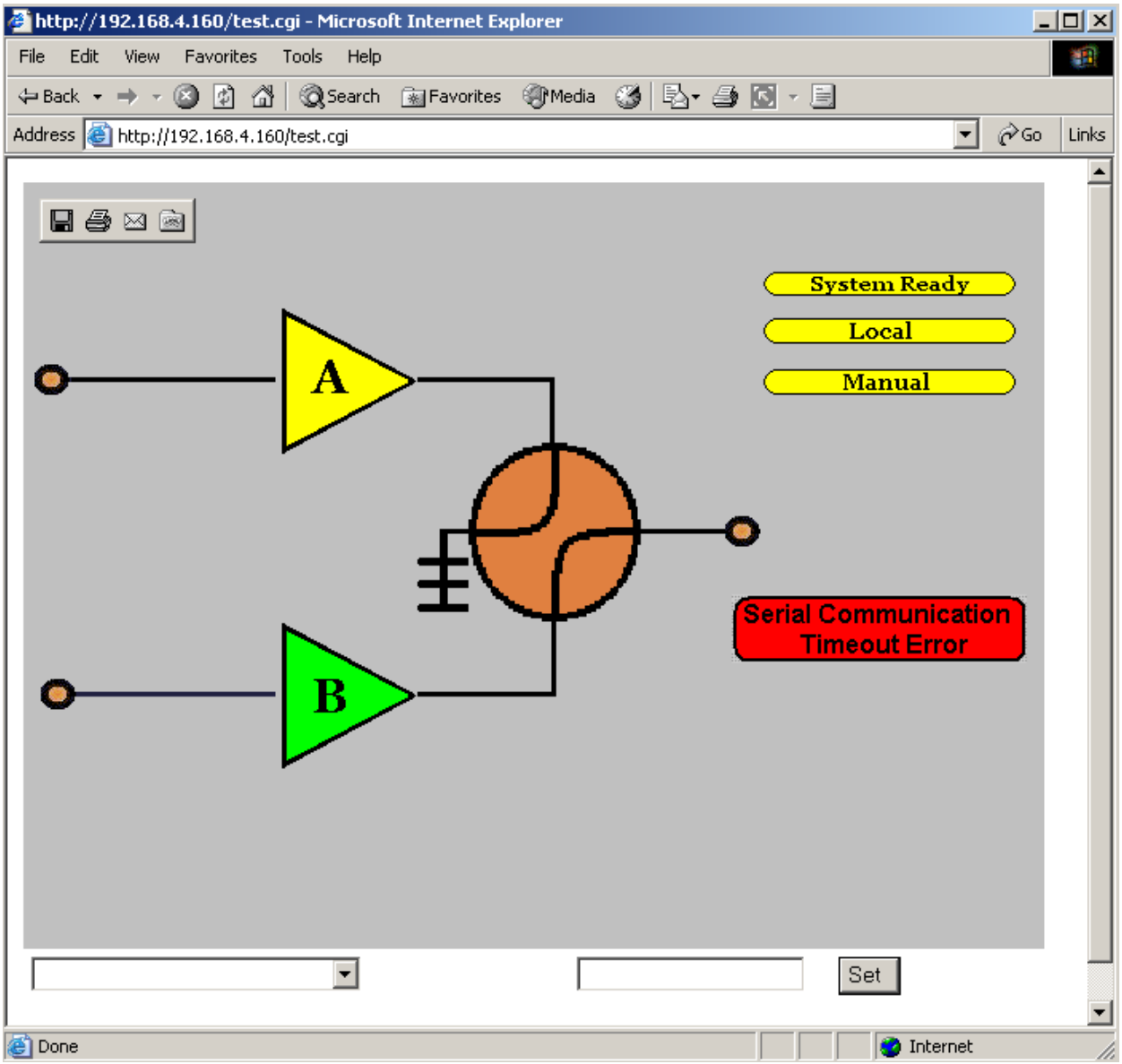


Figure 16: Graphical User Interface Display (serial communications error)

7. REDUNDANCY

The 1:1 redundant system has two RF Systems, one working on-line (A or B) and one in stand-by.

The Control Panel has two operating modes: LOCAL and REMOTE. The switching between LOCAL and REMOTE modes of operation is achieved only from the front panel of the Control Panel or via the RS-232 serial interface.

In LOCAL mode the system is monitored and controlled by the operator from the front panel or/and from RS-232 serial interface. The RS-485 serial interface and the ETHERNET interface may be used only for monitoring when the LOCAL mode is activated.

In REMOTE mode the system is monitored and controlled by the operator from the RS-485 serial interface or/and the ETHERNET interface. The front panel and the RS-232 serial interface may be used either to set the LOCAL mode or only for monitoring when the REMOTE mode is activated.

The 1:1 redundant system has two working modes: MANUAL and AUTO. The switchingbetween MANUAL and AUTO modes may be achieved from the front panel of the ControlPanel or via the RS-232 serial interface when the Control Panel is in LOCAL operating mode. When the Control Panel is in REMOTE operating mode, the switching between MANUAL and AUTO may be achieved via the RS-485 serial interface or the ETHERNET interface.

When the 1:1 redundant system is set in MANUAL working mode, the operator may set any unit ON-LINE, regardless the unit alarms; consequently the other unit will be in STAND-BY (with its output directed to the 50 Ω termination).

Before switching from MANUAL to AUTO working mode, the operator must verify that all units are in good working condition.

When the 1:1 redundant system is set in AUTO working mode, the system will work automatically (the operator has no control over the switching). If the ON-LINE unit failed, the STAND-BY unit will replace the failed unit. The failed unit will be switched in the STAND-BY position. This automatic switching is performed provided the stand-by unit and the switch have no alarm.

Once a redundancy switching occurred, the switching is latched and the replaced unit will not be set ON-LINE again, even if the respective unit recovered from its alarm state. However, if the failed unit recovered (while in stand-by position) and the on-line unit failed, an appropriate switching will be performed automatically.

8. APPENDIX B: SAFETY AND EMC COMPLIANCE

SPACEBRIDGE INC products are compliant with following standards:

SAFETY: IEC 60950-1 second edition 2005

EMC: EN301489-1 2004 (EMC for radio equipment and services, common technical requirements):

EN 55022: 1998 / A1: 2000 - Class A
EN61000-4-4 Transient/burst 0.5kV Signal Lines, 1 kV Power Lines
EN61000-4-2 Electrostatic discharge 4kV CD, 8 kV AD
EN61000-4-5 Surge 1kV, 0.5 kV
EN61000-4-11 AC port dips 70%, 40%, 0%
EN 61000-4-3 Radiated Immunity 80-1000 MHz @ 3 V/m

SUPPLEMENTARY INFORMATION:

The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC and of the EMC Directive 89/336/EEC and may carry the CE-marking accordingly.