Globalstar MCM-4e

Single Antenna Multi Channel Modem

Installation & Operation Manual

GS-06-1095

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Your System Information:

MCM-4e Serial # : _____
Antenna Serial # : _____

VPN Tunnel Name: _____
IP Address: _____

Globalstar, Inc.
461 South Milpitas Blvd
Milpitas, CA 95035
USA

The MCM-4e System is manufactured in the United States by CornerTurn, LLC.

TRADEMARKS:

QUALCOMM® is a registered trademark of QUALCOMM Incorporated.
Globalstar™ is a trademark of Globalstar, Inc.
CornerTurn, LLC products are made in the USA

SAFETY ISSUES:

Your Multi Channel Modem System incorporates radio transmitters, receivers, and an antenna that receives and sends radio frequency (RF) energy.

RADIO FREQUENCY ENERGY

WARNING - The transmitted RF field intensity at the surface of the transmitting antenna is fairly high. Do not use when someone is within 29 inches (0.74 meters) of the antenna.

COMPLIANCE WITH REGULATIONS

Your Multi Channel Modem has been type approved by the FCC. Nonetheless, RF field intensity at the surface of the transmitting Globalstar antenna is fairly high.

- NCRP Report 86 (1986) National Council on Radiation Protection and Measurements
- FCC Radio Frequency Radiation Exposure Limits, 47 CFR Ch. 1 (10-1-98 Edition) Part 1,§1.1310
- ANSI/IEEE C95.1-1992 Standard, American National Standards Institute
- IRPA (1991) Guidelines on Protection Against Non-Ionizing Radiation, International Radiation Protection Association
- ICNIRP (1996), International Commission on Non-Ionizing Radiation Protection

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Operation

Your Multi Channel Modem System is easy to use, versatile, and dependable. When configured properly, all 4 channels can be combined to provide an aggregate Internet connection equivalent to a 28 Kbps modem. If two units are available and configured for cascaded operations you can achieve an aggregate Internet connection equivalent to a 56 Kbps modem. Internet access is available in all Globalstar™ network data services coverage areas except those for China and Nicaragua.

WARNING - The transmitted RF field intensity at the surface of the transmitting antenna is fairly high. Do not use when someone is within 29 inches (0.74 meters) of the antenna.

Basic Satellite Information

Globalstar satellites operate in an inclined orbit of 52 degrees. They come up over a point on the western horizon, move across the sky, and then drop behind the eastern horizon. The average user cannot predict the path of the satellites. Each satellite will pass from horizon to horizon in about 10-15 minutes. When the MCM-4e is located in moderate latitudes (22-52 degrees) it will communicate with at least TWO satellites passing over your geographic location.

This system uses high frequency microwave signals. Unlike television and AM or FM radio signals, or even cellular phone signals, microwave radio signals do not bend and are strictly line of sight. This means that these signals do not go through, or around, dense objects including the platform's own superstructure, wings or masts. It can not go through, or around, other objects adjacent to the platform either (trees, buildings, overhangs, cranes, tall hills or mountains). If something gets between the satellite and the antenna the data connection won't work until another satellite (which is not blocked) is received or the platform moves to a location where your antenna will no longer be blocked by the object. If the antenna is no longer pointed up toward the overhead location of the satellites, the data connection won't work until the antenna has a clear view of the sky above again.

If the MCM-4e antenna's view of the sky above 10° elevation is restricted, the unit will suffer temporary data rate reductions. If the antenna is completely blocked, the signal to/from the satellite will be lost until the signal path is unobstructed.

Key Points About Your Equipment

The MCM-4e provides you with data access over the Globalstar satellite network. In some geographic areas setup, configuration and usage may be slightly different. Subject to certain constraints, the MCM-4e is capable of dial up packet or asynchronous operation in any Globalstar service area. These constraints, and the service limitations, are described in Section 2.

The MCM-4e provides the ability to establish up to four concurrent satellite connections each providing 7.2 Kbps of raw symmetrical bandwidth. The MCM-4e provides the combined bandwidth to the user via a single standard Ethernet connection. The MCM-4e is a full duplex device and can be configured to allow other data terminals to initiate a data communications connection. For this purpose, any of the four SDMs may be configured to receive an incoming asynchronous data call from a PSTN modem. The MCM-4e unit can be connected to a second MCM-4e unit to provide the combined bandwidth of up to eight concurrent satellite connections.
The MCM-4e is comprised of two modules: the Antenna and the Multi Channel Modem (MCM-4e). The Antenna is mounted on an external surface. The MCM-4e contains an ML-IP ePipe 2188 and four

QUALCOMM GSP-1620 Satellite Data Modems (SDM). The MCM-4e also includes a Ethernet 10 Base-T port, power supplies, converters, and management functions.

The 10/100 BaseT Ethernet port can be connected to multiple remote client terminals through a suitable hub or switch. It provides the path through the Globalstar network for your remote client terminal(s) to communicate. Your connection may be to a public server site or you may be connected to a private site such as a Virtual Private Network (VPN).

In normal operation the MCM-4e provides you with a PATH to and from the Internet, which allows your mobile platform to be connected without having wires attached to it. You operate the remote client terminal exactly the same way you would if it were connected to any other Ethernet LAN. When the MCM-4e is operating normally, it provides the path to and from the Internet and will be transparent to you. Refer to figure 2-1 for an overview of the satellite connection.

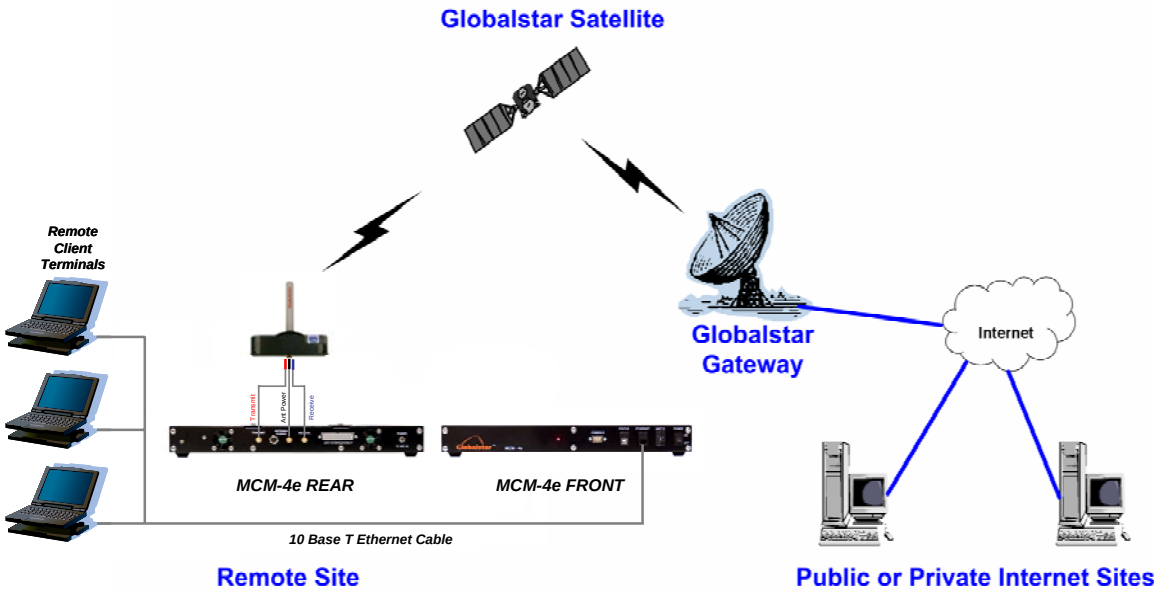


Figure 0-1 MCM-4e being used to connect to the Internet

System Start-Up From the Multi Channel Modem (MCM-4e)

Turn front panel power switch to ON. Note that the Red LED will light up and the fans will begin running. The system will initialize and automatically acquire satellite signals, if the antenna is not blocked. Initialization should take 30 to 45 seconds.

Figure 0-2 MCM-4e Multi Channel Modem – Front Panel

Using Internet Data Services

To set up the PC computer for data service use, refer to section 4.

1. To use the Internet Data services for Internet browsing, email and file transfers, open your Internet browser, email or other data program and proceed by operating that program as you normally would to browse, email or efax. Please refer to the accompanying Software and User Documentation for instructions on how to operate the ePipe and to turn the tunnel on. Additional documentation on the ePipe can be found on the ML-IP.com web site (http://ml-ip.com/).

When finished

Close your Internet browser, email or other data program.

Receiving Incoming Data Calls

The MCM-4e can receive incoming asynchronous data calls from a PSTN modem.
For simple connectivity (in either the 'stand-alone' mode or 'VPN tunnel' mode) the establishment of the incoming asynchronous data call to the MCM-4e can be used to convey the application data between the originating terminal within the customer's private data network and the remote terminal attached to the MCM-4e.

When used in conjunction with the VPN mode, the asynchronous data call to the MCM-4e can be used to force the MCM-4e to initiate the VPN tunnel back to the customer's private TCP/IP data network. In this way, the full bandwidth of the VPN tunnel may be used to transfer large data files more quickly. Once the VPN tunnel has been opened and the data transfer commenced the PSTN data call can be released.

Provisioning the Single Antenna MCM-4e

Service provisioning

Each of the four SDMs requires a Globalstar subscription. Note: The Globalstar subscription for each SDM includes the provision of a telephone number that also allows each SDM to receive incoming asynchronous data calls.

Roaming Outside of the 'Home' Service Area

Prior to delivery, the MCM-4e will have been configured to operate within the Globalstar service area designated to be you're the 'home' service area.

In addition to being able to operate anywhere within the designated 'home' service area, the MCM-4e is capable of operating within any Globalstar service area with which your Globalstar service provides roaming capabilities.

Although the MCM-4e has the inherent capability of operating within any Globalstar gateway, it may require some minor user configuration changes if it is subsequently required to operate within another Globalstar service area. Some Globalstar gateways support both 'packet data' calls and 'asynchronous data' calls while other Globalstar service areas support only 'asynchronous data' calls. The MCM-4e was designed to operate in 'Packet Data' mode. The MCM-4e can operate in a Globalstar service area that only supports the 'asynchronous data' mode, but at a lower data rate

Notes: For current details of Globalstar's 'packet data' and 'asynchronous data' service areas, refer to Globalstar's web site at http://www.globalstar.com/pages/coverage.html

A call is disconnected when the subscriber leaves the service area of the Globalstar gateway controlling the call. Although 'in-call hand-overs' between neighboring service areas are not supported on the Globalstar system, the MCM-4e has the ability to maintain any VPN tunnels having more than one Internet connection as the MCM-4e enters the neighboring service area. SDMs will disconnect and be automatically reconnected by the MCM-4e to the Globalstar gateway controlling the neighboring service area at different times. Thus, the VPN tunnel is likely to remain established (albeit with reduced bandwidth through the transition period as each satellite modem connection is re-connected via the Globalstar gateway serving the new service area).

Because certain Globalstar gateways have implemented Network Address Port Translation (1-N NAPT) while others have implemented 1-1 Network address translation, the user of the MCM-4e should ensure that the VPN tunnel does not use the IP(in IP) transport but instead uses TCP transport within Globalstar areas where Network address port translation (1-N NAPT) is performed.

Installation

This section explains the installation of the components of the Multi Channel Modem System and includes some details about the installed equipment.
Good planning of the installation will provide the best results. Below is some guidance on issues that are important to consider when planning the installation. The major steps in the installation and setup process are as follows:

1. Planning locations of the components
2. Preparing for the installation
3. Equipment and cable installation
4. Initial power-up and checkout

Components of the System

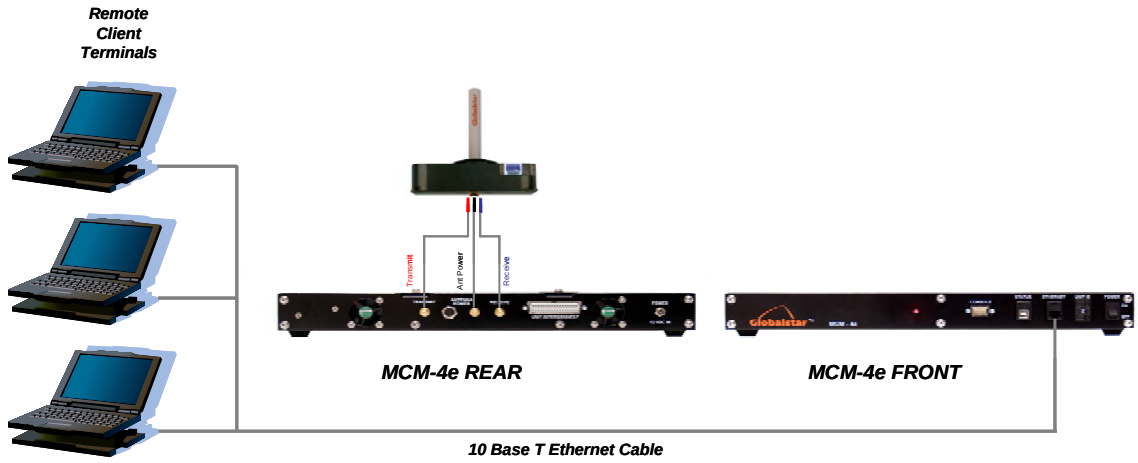


Figure 0-1 MCM-4e Remote Client Terminal Configuration

The system is shipped comprised of the following items:

1. Antenna –It is essential that the Antenna has a clear hemispheric view of the overhead sky above the platform from about 10 degrees above the horizon.
2. Multi Channel Modem (MCM-4e) – The Multi Channel Modem contains the ML-IP ePipe 2188 and four QUALCOMM GSP-1620 Satellite Data Modems (SDM). The MCM-4e also includes an Ethernet 10/100 Base-T port, power supplies, converters and provides the management functions. The MCM-4e is connected to the Antenna by two 30 foot coaxial and one 30 foot antenna power cable. The primary power supply is provided with the unit. The power supply provided is a 110 VAC 60 Hz unit with standard wall socket grounded plug.

You will need to provide the following items:

1. PC Computer/LAN Components and cables – The Remote Client Terminals, hub, RJ-45 Ethernet.

Planning Where to Position the Components

Determine where to position the components, how the cables will be routed and that the furnished cable lengths will be adequate.

Site Selection

Choosing the best mounting location on smaller platforms, where there are fewer possible locations to choose from, is frequently a compromise. The "best" location for the antenna is the one that has no blockage and is not in close proximity to other electronics or antennas that may interfere with the MCM-4e or that the MCM-4e will interfere with.

Sometimes there are situations that you just can't get around. In that case, do the best you can. At moderate latitudes (between latitude 22 degrees and 52 degrees) there will always be two satellites visible at any location. If an object blocking the antenna's view of the sky is small (that is, blocks only a small part of the sky), it should not cause an outage.

Single Piece Antenna

Determine the optimum mounting location, on top of the platform for the Antenna. Certain types of antennae used with Global Positioning Satellite (GPS) receivers do not have the appropriate band-pass filter (14.75MHz – 16.75MHz) fitted before the pre-amplifier stage. Use of this type of antennae may cause a GPS receiver to be susceptible to interference from the MCM-4e. Where it is found that a GPS receiver is experiencing interference from the MCM-4e, the distance between the GPS antenna and the MCM-4e should be increased (by relocating one or both). If no suitable alternative location can be found for either the GPS antenna or the MCM-4e, the GPS antenna should be replaced with one that includes the appropriate band-pass filter. The MCM-4e should be installed where:

- The antenna has a clear line-of-sight view to as much of the sky above the antenna as is practical, down to an elevation of 10 degrees above the horizon. Choose a location where masts or other structures do not block the satellite signal from the antenna as the platform turns.

- The antenna is at least 5 feet away from other transmitting antennas (HF, VHF, GPS and radar) that may generate signals which interfere with the Antenna, or that the Antenna may interfere with. Although radio and radar interference is not common, the further away the Antenna is from these other antennas, the less impact their operation could have on it.

- The Antenna assembly should be rigidly mounted to the platform. If necessary, reinforce the mounting area to assure that it does not flex due to platform motion or vibration

Multi Channel Modem (MCM-4e)

The Multi Channel Modem Unit can be mounted in a 19 inch equipment rack or used as a table top unit. The system is supplied with 30 foot transmit and receive coaxial cables and a 30 foot power cable for the remote powered antenna. A 110 VAC 60 Hz power supply and associated power cable to the unit is also provided.

Remote Client Terminals and Other Networking Equipment

All other equipment should be mounted in suitable locations per the individual customer's requirements.

Preparing for Installation

Inventory

Check the contents of the MCM-4e System package to assure all items on the packing list are received.

Other Materials Needed

Because each installation is different, some materials and supplies will need to be provided by the installer. These includes screws to mount any additional items, PC Computer(s), LAN components and associated interconnecting cables for these devices also must be provided.

Antenna Installation

After you have planned where the components will be installed, the cable routing paths and have inventoried all of the installation materials you will be ready to begin the installation.

Note: 1. Although the MCM-4e itself does not require any unique technical knowledge to install, the selection of the optimum route for the cabling the Multi Channel Modem (MCM) and the preparation of any cable-entry glands is best carried out by an experienced equipment installer.

Note: 2. If the MCM-4e is to be installed on an aircraft, it is recommended that only experienced technicians install the Antenna cabling.

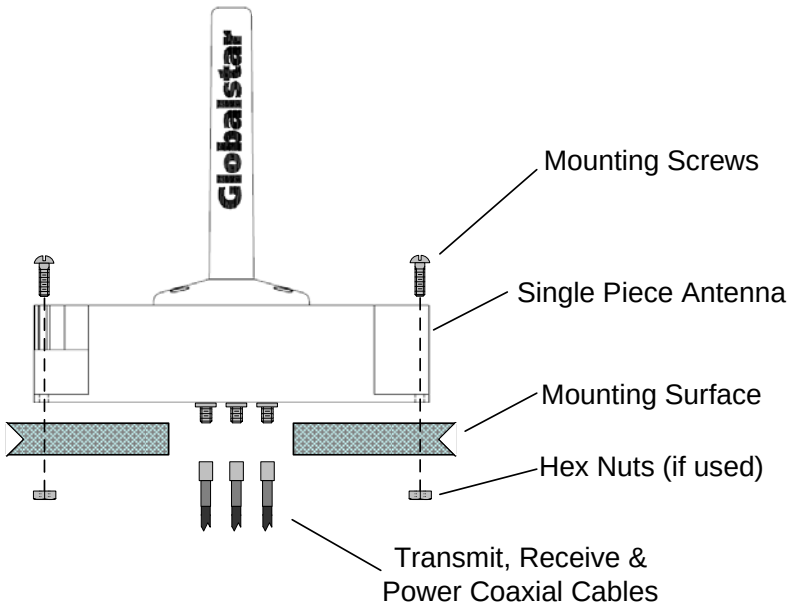


Figure 0-2 MCM-4e Single Piece Antenna Installation

Prepare the mounting surface and mount the Antenna.

1. Drill the mounting holes and cable passage in the mounting surface. The mounting hole may be clear drilled or drilled and tapped.
2. Apply one drop of Locktite to the threads on the end of each of the 4 screws.
3. Mount the Antenna from the outside surface of the platform using the four screws provided. If the mounting holes were drilled & tapped, tighten the 4 mounting screws. If the mounting holes were clear drilled attach hex nuts from inside the platform and tighten. An o-ring gasket is provided with the Antenna; however, silicone sealant (or other gasket material) may also be used if desired.
4. From inside the platform route the 30 foot Transmit (red marker) and Receive coaxial (blue marker) Cables and antenna power cable to the location where the MCM-4e will be installed.
5. Connect the Transmit coax to the TX connector of the Antenna. Connect the Receive Coax to the RX connector on the Antenna. Connect the antenna power cable to the Antenna.

Figure 0-3 MCM-4e Rear Panel

1. Install the MCM-4e in its preferred location.

At the MCM-4e Rear Panel

2. Connect the Receive Antenna coax to the RECEIVE connector on the MCM-4e.
3. Connect the Transmit Antenna coax to the TRANSMIT connector on the MCM-4e.
4. Connect the Power Antenna cable to the ANTENNA POWER connector on the MCM-4e.
5. Connect AC power cord to the 12 VDC Power Supply and connect the power supply to the 12 VDC input connector on the MCM-4e.
6. Route the Primary Power supply cable to the planned location of the AC Power.
7.

WARNING *- Do NOT connect, or disconnect, any of the coaxial cables to the MCM-4e while system power is ON. Assure that system power is OFF prior to connecting, or disconnecting, these cables.*

Figure 0-4 MCM-4e Front Panel

At the MCM-4e Front Panel

8. Route Ethernet Cable to planned locations of remote client equipment.
9. Connect the Ethernet cable to clients as necessary. The MCM-4e provides one 10/100 Base-T Ethernet (RJ45) port (**ETHERNET on front panel)**. Category 5 (Cat 5) unshielded twisted pair (UTP) cabling will be required to be run between the MCM and remote client terminal.

RJ-45 Ethernet Cable Routing

Route the CAT5 RJ-45 Ethernet cable from the PC computer/LAN hub, or switch, through the platform as needed to connect planned equipment.

Turn Power ON

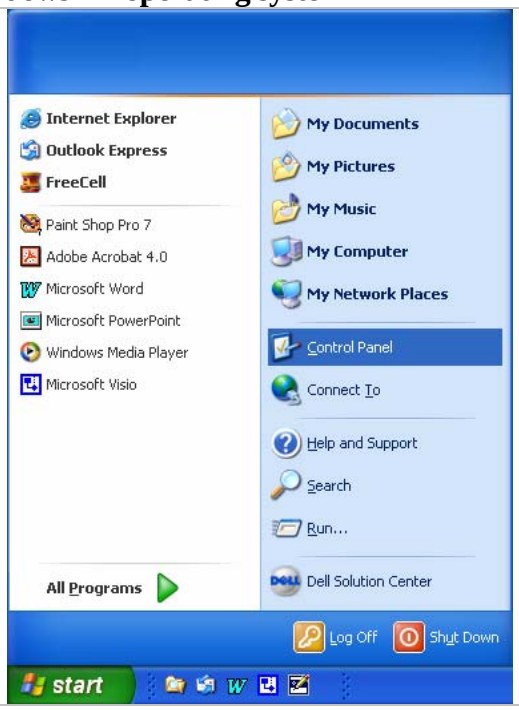
On MCM-4e front panel Turn power **ON.**
Observe the Red LED is lit.
Observe the fans running in the MCM-4e.
The system will initialize and automatically acquire satellite signals, if the antenna is not blocked.

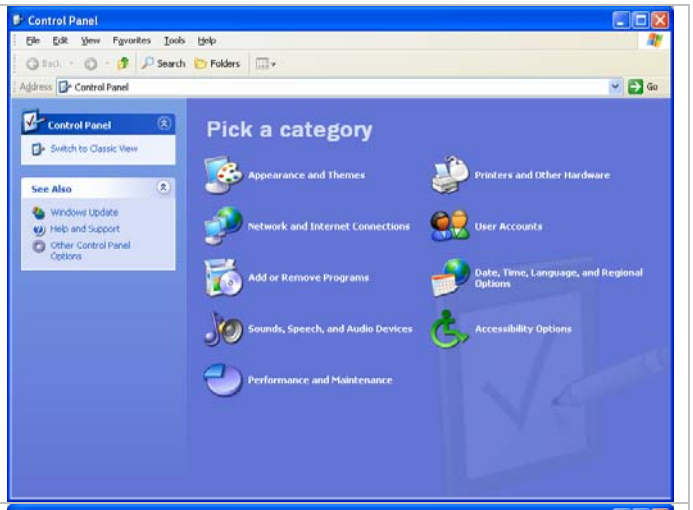
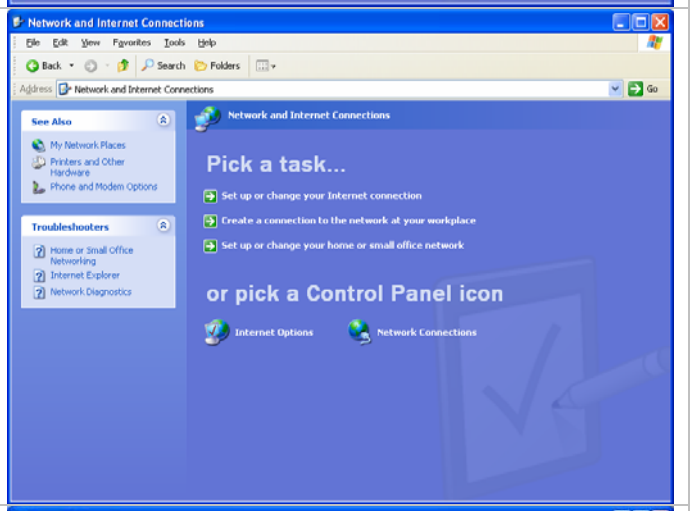
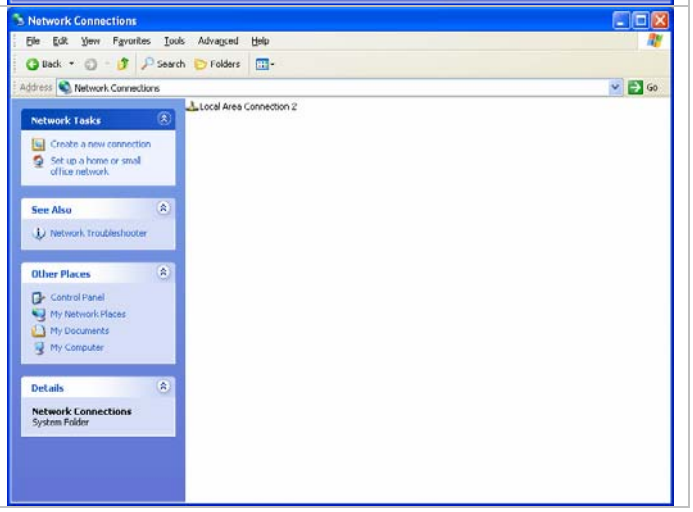
Install and Setup Remote Client Equipment

Continue with the installation and setup of any remote client terminals. This section assumes that the computers that will be used as the *remote client terminals* already have a LAN card and all required software (Operating System, drivers and Networking software) installed and configured in them. Therefore, the "Setup" instructions below are designed to have a remote client terminal automatically obtain an IP address.
The remote client terminals attached to the MCM-4e should have their IP stack configured to use Dynamic Host Configuration Protocol (DHCP) to obtain their IP address.
If you need to configure the remote client terminal(s) for specific IP Address or sub-address contact your Network Administrator for assistance in setting up the terminal(s).
Your screen may look different that the ones shown below.

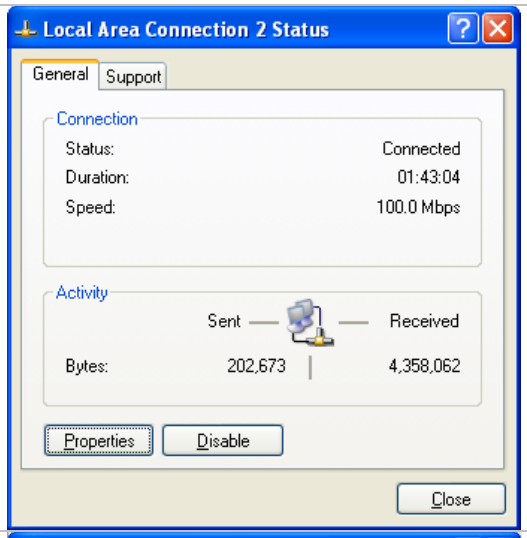
To configure remote client terminals with MS Windows *XP* operating system

1 Click on '***Start***'
2 Select '***Control panel***'



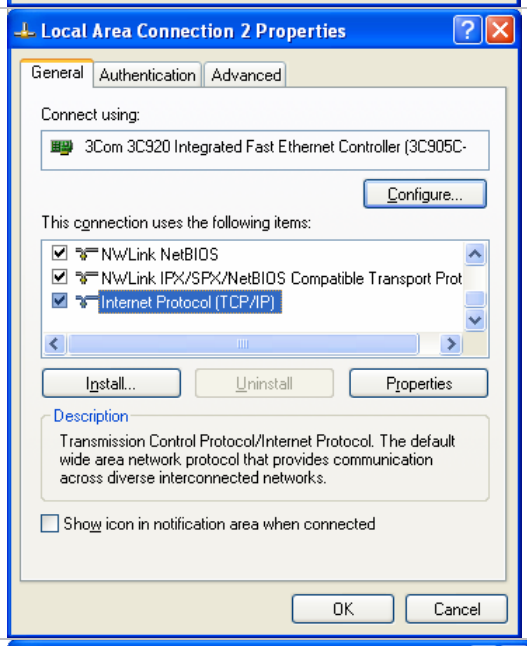
3 Click on the ***'Network and Internet Connections'*** icon	
4 Click on the ***'Network Connections'*** icon in the bottom portion of the screen	
5 Double click on the 'Local ***Area Connection***' icon	

6 Click the '***Properties***' box



7 Scroll down the This connection uses the following items list and select the '***Internet Protocol (TCP/IP)***' item

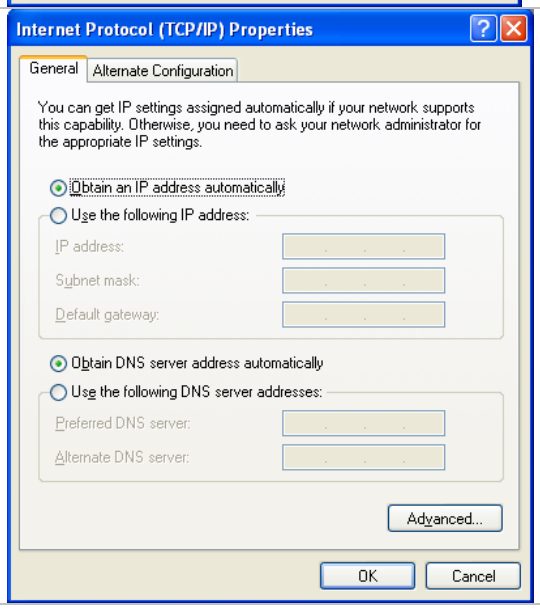
8 Click the '***Properties***' box



9 Select the radio button to '***Obtain an IP address automatically***'

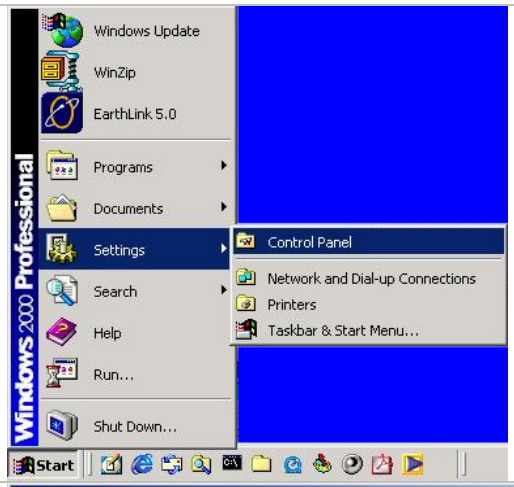
10 Click on '***OK***'.

11 Close all other previously opened dialogue windows.

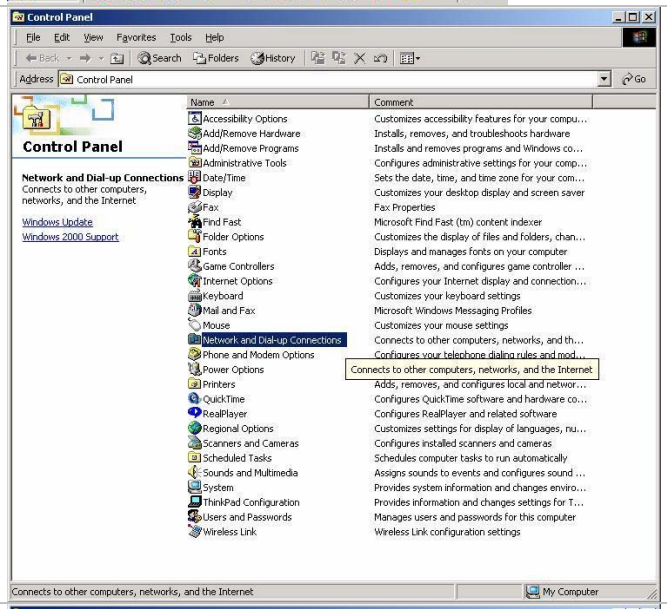


To configure remote client terminals with MS Windows 2000 operating system

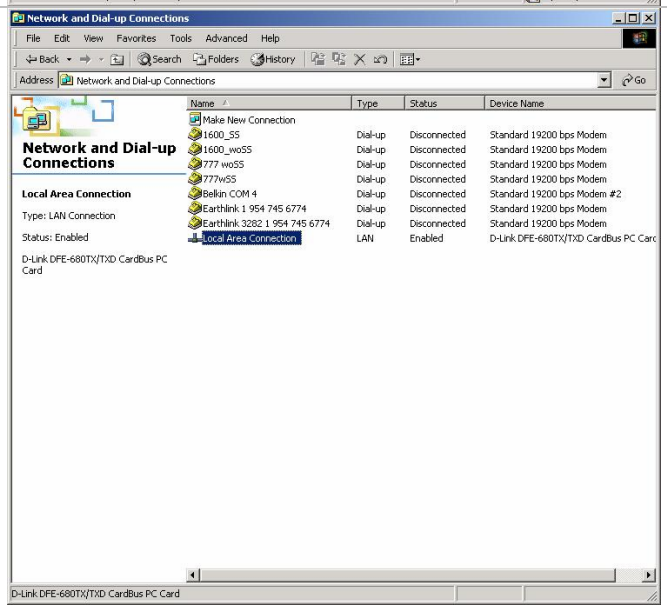
1 Click on '***Start***'
2 Select '***Settings***'
3 Select '***Control panel***'



4 Double click on the ***'Network and Dial-up Connections'*** icon



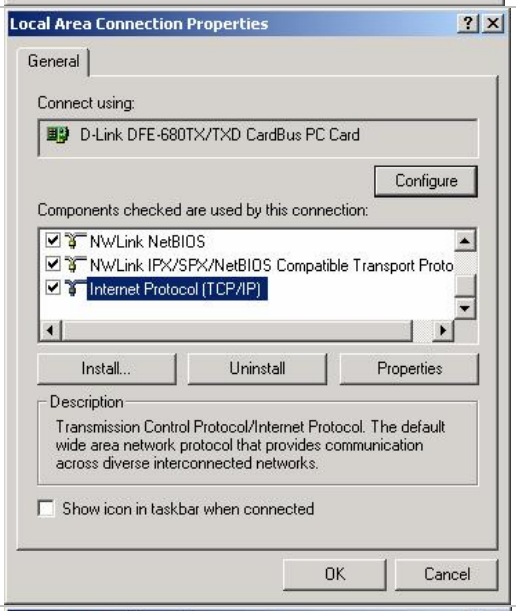
5 Double click on the '***Local Area Connection***' icon



6 Click the '***Properties***' box

7 Scroll down the Components checked are used by this connection list and select the '***Internet Protocol (TCP/IP)***' item

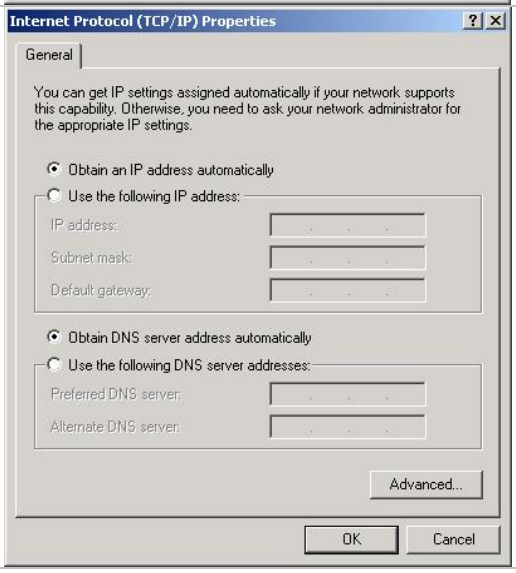
8 Click the '***Properties***' box



9 Select the radio button to '***Obtain an IP address automatically***'

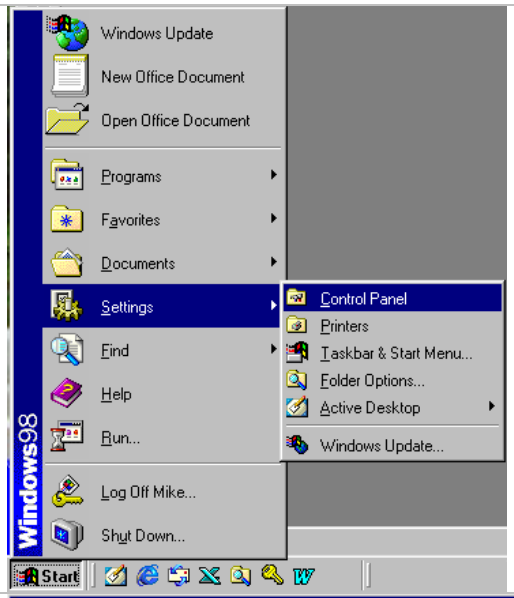
10 Click on '***OK***'.

11 Close all other previously opened dialogue windows.

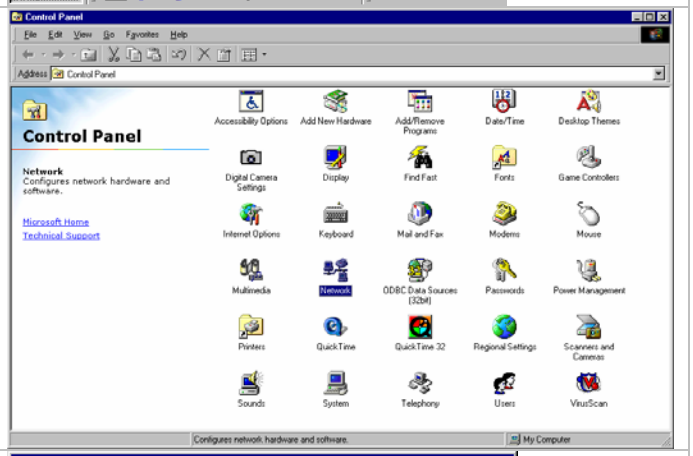


To configure remote client terminals with MS Windows 98 operating system;

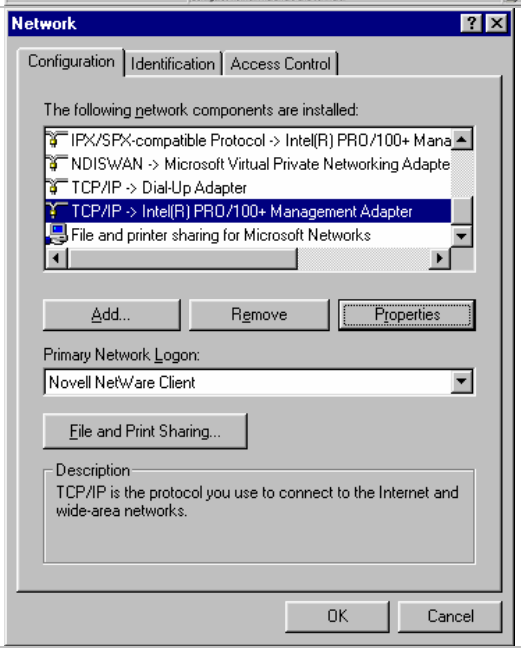
1. Click on '***Start***'
2. Select '***Settings***'
3. Select '***Control panel***'



4. Double click on the '***Network***' icon



5. Select the '***Configuration***' tab
6. Scroll down the "The following network components are installed" list and select the '***TCP/IP*** PC Ethernet LAN card entry item
7. Click the '***Properties***' box

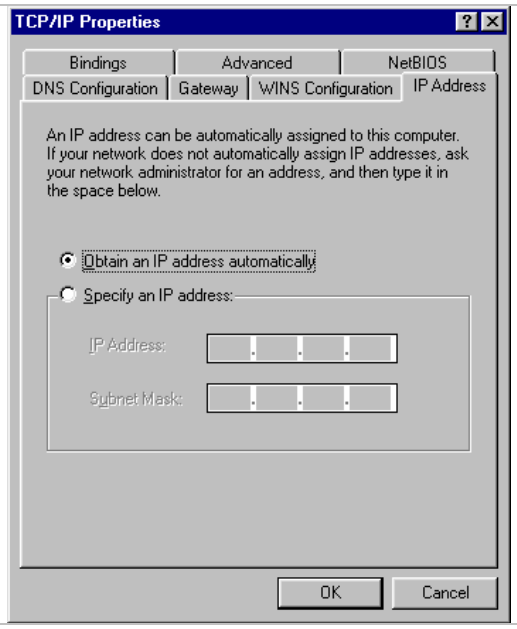


8 Select the '***IP Address***' tab,

9 Select the radio button to '***Obtain an IP address automatically***'

10 Click on '***OK***'.

11 Close all other previously opened dialogue windows.



Cascaded MCM-4e Set-up

1. Follow instruction above in Section 3.5 MCM-4e Installation for both MCM-4e units.
2. Install the second MCM-4e in its preferred location within 12 inches of the first MCM-4e unit. (see figure 4-1)
3. At the rear panel of both MCM-4e units Install the Cascade Cable to the "Unit Interconnect" Connectors as shown in Figure 4.2.
4. Set the "Thumbwheel Switch" to position 1 on the primary MCM-4e Unit.
5. Set the "Thumbwheel Switch" to position 2 on the secondary MCM-4e Unit.
6. Route Ethernet Cable to planned locations of remote client equipment from the Primary MCM-4e unit. The Ethernet port on the secondary MCM-4e unit must be left open. **Do not connect an Ethernet cable to the secondary unit while in cascade operations.**
7. Turn on power to both units. Primary unit will auto configure both units to use all 8 modems after a short initialization time(30-45 seconds)

Multi Channel Modem (MCM- 4e) Cascaded Set-up Front Panel

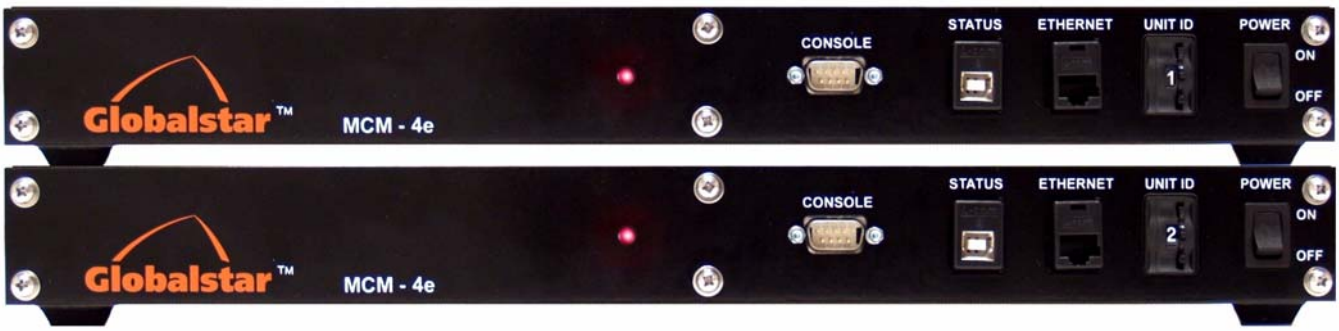


Figure 0-1 MCM-4e Front Panel

Multi Channel Modem (MCM- 4e) Cascaded Set-up Rear Panel

Figure 0-2 MCM-4e Rear Panel

Troubleshooting

CAUTION *- Allow only authorized personnel to install or service the Multi Channel Modem System components.*

General Troubleshooting

For other assistance contact your MCM-4e Technical Support Person (list below for future reference).

Name: _____ Phone _____

Problem	***Solution***
Red Power LED not illuminated, MCM-4e Fans not running	1 Verify Power switch on MCM-4e Front Panel is set to ON. 2 Check Power Supply connections and verify 110 VDC service is operational.

Other Problems

This section assumes that the reader is familiar with using MS-DOS prompt PING commands (ICMP messages) to test the responsiveness of network elements any intervening connections Troubleshooting the MCM-4e.

Problem:

"None of my remote client terminals are able to browse the World Wide Web".

1. Ping (continuous) the IP address of the browser's proxy server. Stop the test after 45 seconds. If PING replies were received, then check the Browser's proxy setting and retry. If the PINGs were not replied to, then go to step 2.
2. PING the IP address of the MCM-4e. If the PINGs were not responded to then go to step 3. If the PINGs were responded to go to step 5.
3. Check that the Multi Channel Modem (MCM-4e) unit is being supplied with main power if ON then go to step 4. If OFF, restore main power to the MCM-4e and retest.
4. Interact with the ePipe within the MCM-4e, using the HyperTerminal facility (contact your Technical Support Person). If the PINGs are not replied then go to step 5. If prompted for Username and password, then go to step 5.
5. The problem may either be the power supply to the ePipe, or due to a faulty ePipe within the MCM-4e.
6. Contact you Technical Support person.

Problem:

"I can't reach a particular VPN destination (but I can reach other VPN destinations or I can browse the World Wide Web)".

1. Ping (continuous) the FIXED IP address of the browser's proxy server. Stop the test after 45 seconds. If PING replies were received, then the problem is likely to be somewhere at the other end of the VPN tunnel. However, whether the PINGs were replied to or not, contact your Technical Support person.

Problem:

"Browsing to destinations the World Wide Web is slower than usual".

1. Contact your Technical Support person.

Specifications

Power Specifications	
Power source	115VAC
Power consumption	60 Watts maximum
Operating Frequencies	
Transmit	1610-1626.5 MHz
Receive	2483.5-2500 MHz
Mechanical Specifications	
Antenna	
Height	8.83 inches
Width	4.12 inches
Length	8.87 inches
Weight	4.5 lbs
Multi Channel Modem	
Height	1.75 inches
Width	17.12 inches
Depth	17.25 inches
Weight	11.0 lbs
Environmental Specifications	
Operating temperature	–30 to +60 degrees C
Storage temperature	–40 to +85 degrees C
Humidity	100% non-condensing

Drawings

Drawing	Description	
ANCT0601-021	MCM-4e Parts List	2
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ANCT0601-021	MCM-4e Top and Side View	4
ANCT0601-021	MCM-4e Top View Cover Removed	5
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ANCT0601-021	MCM-4e RF Cable Diagram	9
ANCT0601-021	MCM-4e Chassis and Power Supply Wiring Diagram	10
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ANCT0601-030	MCM-4e Antenna Power Cable Drawing	12

ANCT0601-021 MCM-4e Parts List

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	ANCT0601-015	MCM-4e SERIAL SWITCH CCA
2	4	ANCT0601-003	TYPE 1620 TRANSITION CCA
3	1	DDCT0601-004	ENCLOSURE
4	1	DDCT0601-011	FRONT PANEL – (e-VERSION)
5	1	DDCT0601-012	REAR PANEL – (e-VERSION)
6	1	DDCT0601-007	TOP PANEL
7	2	DDCT0601-008	MOUNTING BLOCK
8	3	DDCT0601-009	SPACER BLOCK
9	1	ANCT0601-024	E-PIPE CCA
10	4	GSP-1620	SATELLITE DATA MODEM
11	1	DDCT0601-013	INDICATOR PANEL
12	1	TBD	RF COMBINER
13	1	TBD	RF SPLITTER
14	2	TBD	FAN, AXIAL
15	1	TBD	TERMINAL BOARD, 3 - POSITION
16	1	TBD	CIRCUIT BREAKER
17	1	TBD	SMA FEMALE REV POL/FEEDTHRU
18	2	TBD	CONNECTOR, RJ-45
19	1	TBD	CONNECTOR, USB TYPE B JACK
20	1	TBD	THUMBWEEL SWITCH
21	2	TBD	SWITCH END PLATES
22	2	TBD	SWITCH LIMIT PINS
23	1	TBD	POWER SWITCH
24	1	TBD	12 VDC POWER SUPPLY
25	4	ANCT0601-016-1	RF CABLE ASSEMBLY, MODEM
26	4	ANCT0601-016-2	RF CABLE ASSEMBLY, MODEM
27	2	ANCT0601-017	RF CABLE ASSY, COMB / SPLITTER
28	2	ANCT0601-029	RF CABLE ASSY, ANTENNA
29	1	ANCT0601-030	CABLE ASSY, ANTENNA POWER
30	1	ANCT0601-019	CABLE ASSY, E-PIPE CONSOLE
31	1	TBD	DC POWER JACK
32	1	DDCT0601-023	SERIAL NUMBER PLATE
33	1	TBD	USB TO QUAD RS-232 CONVERTER
34	1	TBD	CABLE ASSY, MODEM A
35	1	TBD	CABLE ASSY, MODEM B
36	1	TBD	CABLE ASSY, MODEM C
37	1	TBD	CABLE ASSY, MODEM D
38	1	TBD	CONNECTOR HOUSING, 4 PIN
39	4	TBD	CONTACTS
40	TBD	TBD	RING TERMINAL (#4)
41	1	TBD	RING TERMINAL, 0.250
42	4	TBD	PUSH ON TERMINAL (1/8)
43	1	TBD	CABLE ASSY, ETHERNET (2' BK)
44	TBD	TBD	CABLE ASSY, ETHERNET (1' RD)
45	TBD	TBD	CABLE ASSY, ETHERNET (1' OR)
46	1	TBD	CABLE ASSY, ETHERNET (1' YEL)
47	1	TBD	CABLE ASSY, ETHERNET (1' GR)
48	1	TBD	CABLE ASSY, ETHERNET (1' BL)
49	1	TBD	CABLE ASSY, ETHERNET (1' PR)
50	1	TBD	CABLE ASSY, ETHERNET (1' GREY)
51	1	TBD	CABLE ASSY, ETHERNET (1' WH)
52	1	ANCT0601-027	CABLE ASSY, UNIT I/O
53	*	ANCT0601-028	CABLE ASSY, UNIT INTERCONNECT
54	1	TBD	CONNECTOR, USB TYPE A JACK
55	1	DDCT0601-014	ADAPTER BRACKET, E-PIPE
56	1	DDCT0601-020	ADAPTER BRACKET, SWITCH CCA
57	1	ANCT0601-025	CABLE ASSY, E-PIPE & LED
58	1	ANCT0601-026	CABLE ASSY, ID SWITCH

ITEM	QTY.	PART NO.	DESCRIPTION
101	4		PAN HD MACH SCREW, 4-40 X 0.25
102	32		PAN HD MACH SCREW, 4-40 X 0.38
103	4		PAN HD MACH SCREW, 4-40 X 0.63
104	6		PAN HD MACH SCREW, 4-40 X 0.75
105	2		PAN HD MACH SCREW, 4-40 X 1.50
106	6		PAN HD MACH SCREW, 8-32 X 0.38
107	12		PAN HD MACH SCREW, 8-32 X 0.50
108	6		PAN HD MACH SCREW, 10-32 X 0.31
109	2		FLAT HD MACH SCREW, 6-32 X 0.50
110	50		FLAT WASHER, NO. 4
111	2		FLAT WASHER, NO. 6
112	18		FLAT WASHER, NO. 8
113	6		FLAT WASHER, NO. 10
114	44		LOCK WASHER, NO. 4
115	2		LOCK WASHER, NO. 6
116	18		LOCK WASHER, NO. 8
117	6		LOCK WASHER, NO. 10
118	6		HEX NUT, 4-40
119	2		HEX NUT, 6-32
120	2	TBD	JACKSCREW ASSEMBLY
121	A/R	TBD	WIRE, 22 AWG - WHITE
122	A/R	TBD	WIRE, 22 AWG - BLACK
123	A/R	TBD	WIRE, 22 AWG - RED
124	A/R	TBD	SHRINK SLEEVE, 1/8 IN
125	A/R	TBD	WIRE TIES
126	A/R	TBD	HOLD DOWN, WIRE TIES

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
		PRE-RELEASE	3/20/06	

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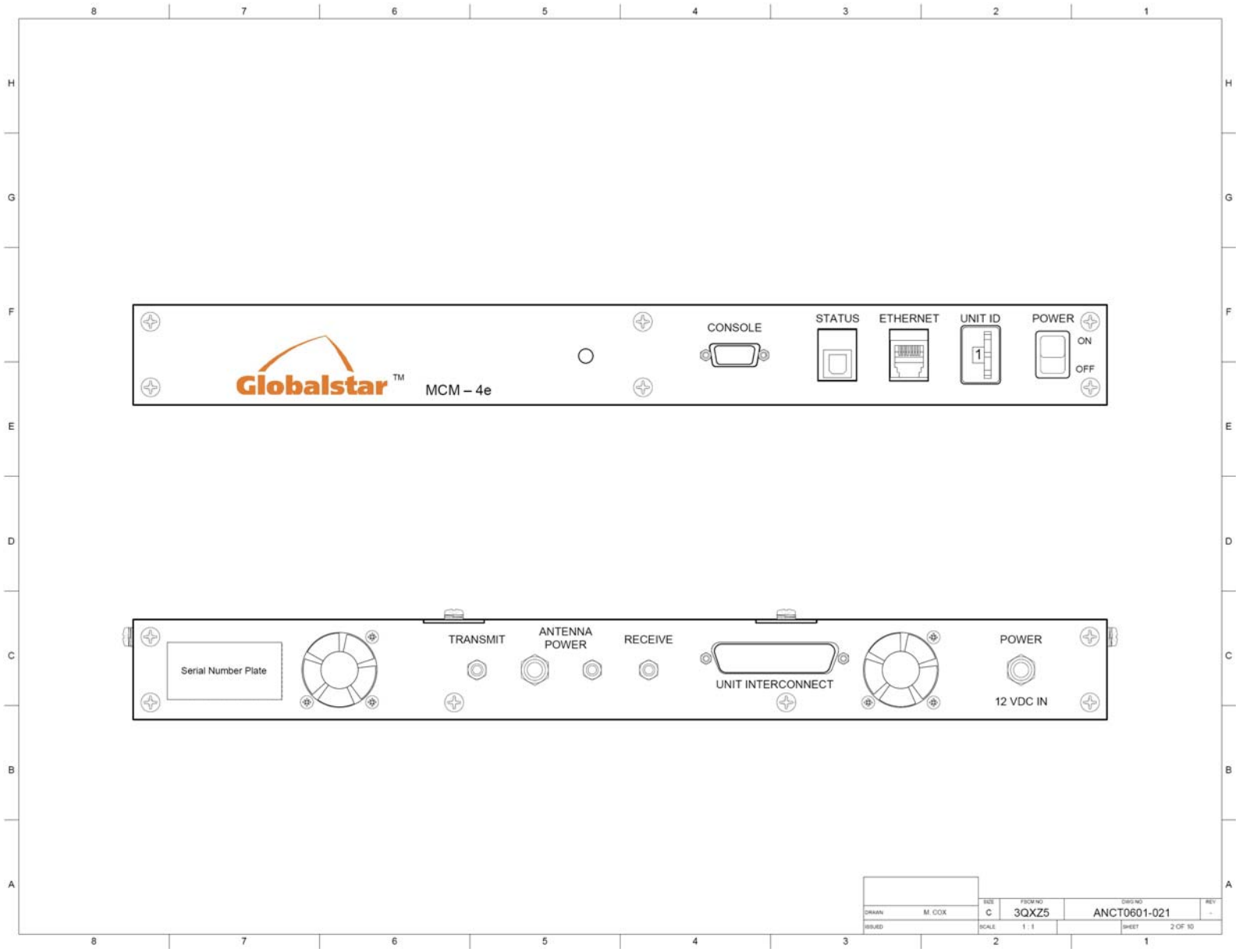
DIMENSIONS IN INCHES
TOLERANCES UNLESS OTHERWISE SPECIFIED
2 PLC DEC ± 0.020
3 PLC DEC ± 0.005
4 PLC DEC ± 0.001

CORNERTURN LLC

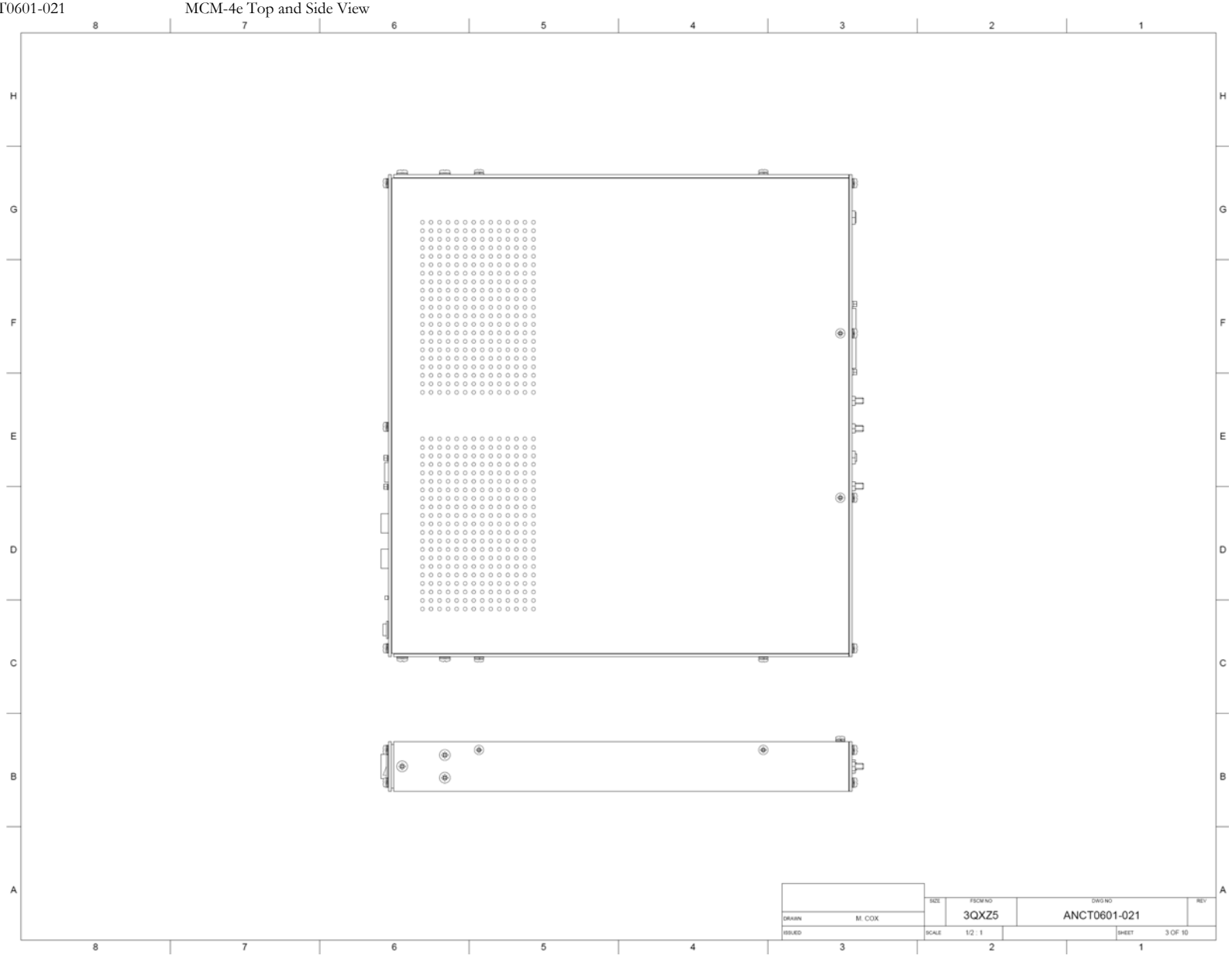
MODEM ASSEMBLY, MCM-4e

DRAWN BY	SIZE	FSCM NO	DWG NO	REV
M.COX	C	3QXZ5	ANCT0601-021	-
FILENAME: MCM4E ASSY REV 3-21.TM.VSD	SCALE: 1 : 1		SHEET: 1 OF 10	

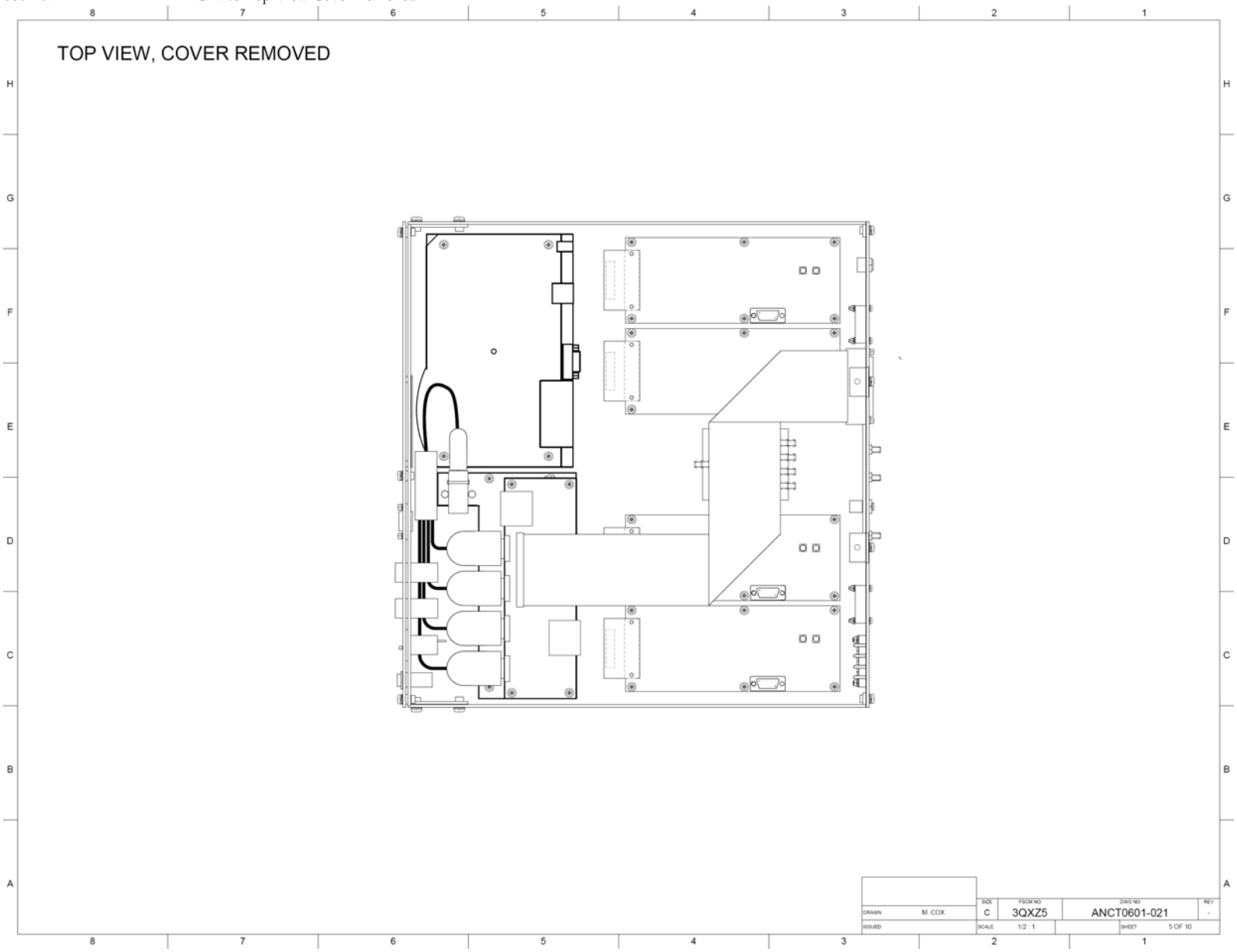
ANCT0601-021 MCM-4e Front and Rear Panel



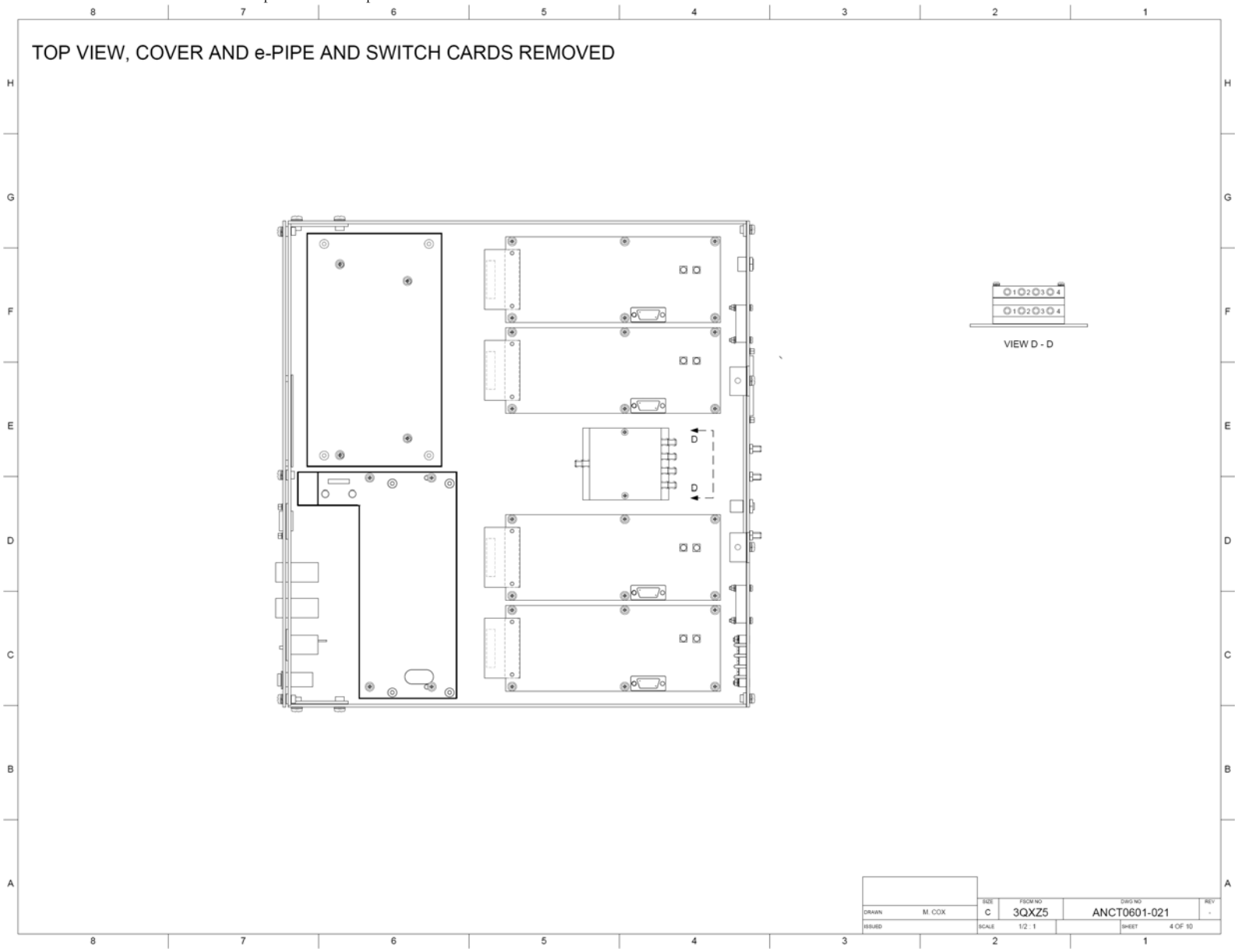
ANCT0601-021 MCM-4e Top and Side View



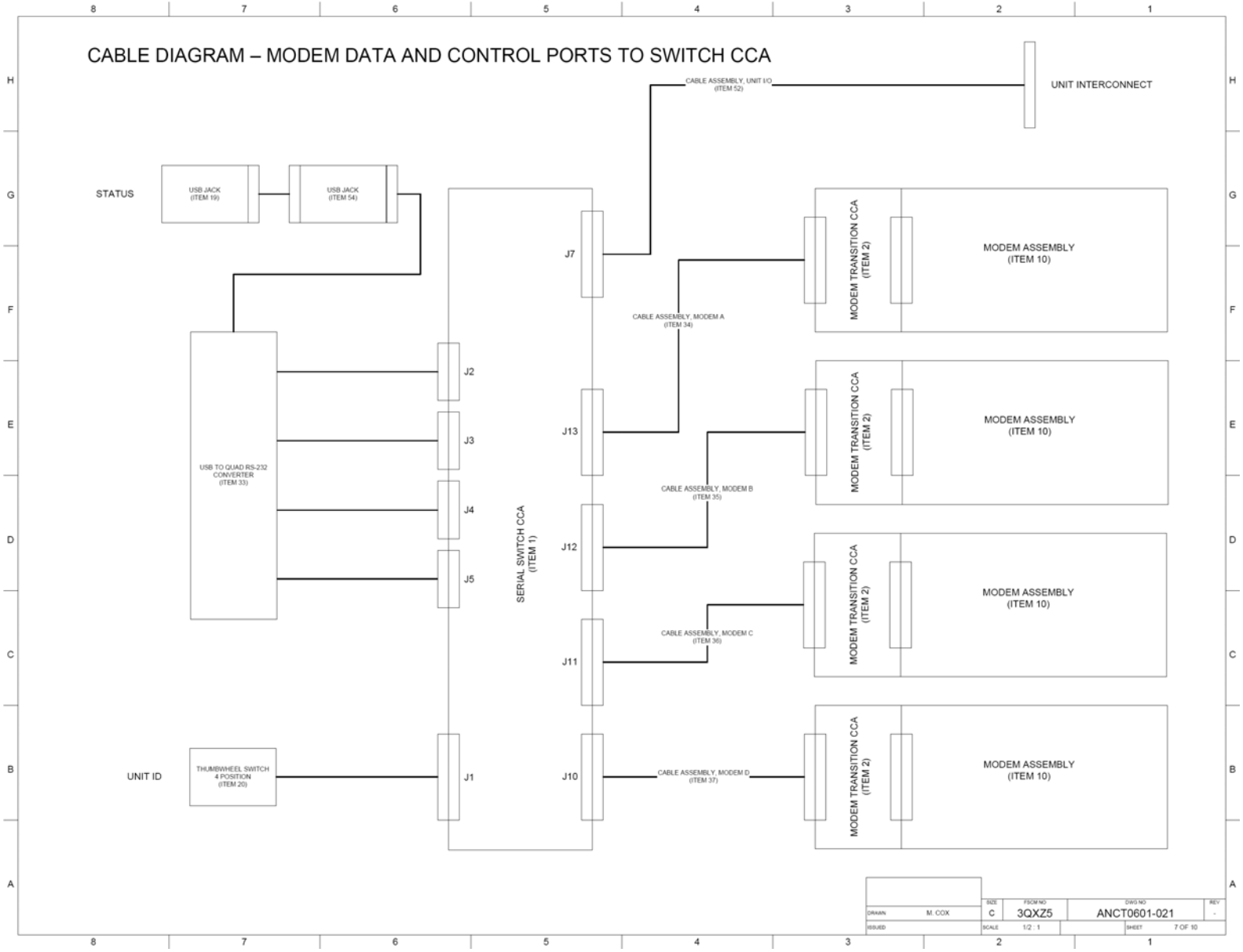
ANCT0601-021 MCM-4e Top View Cover Removed



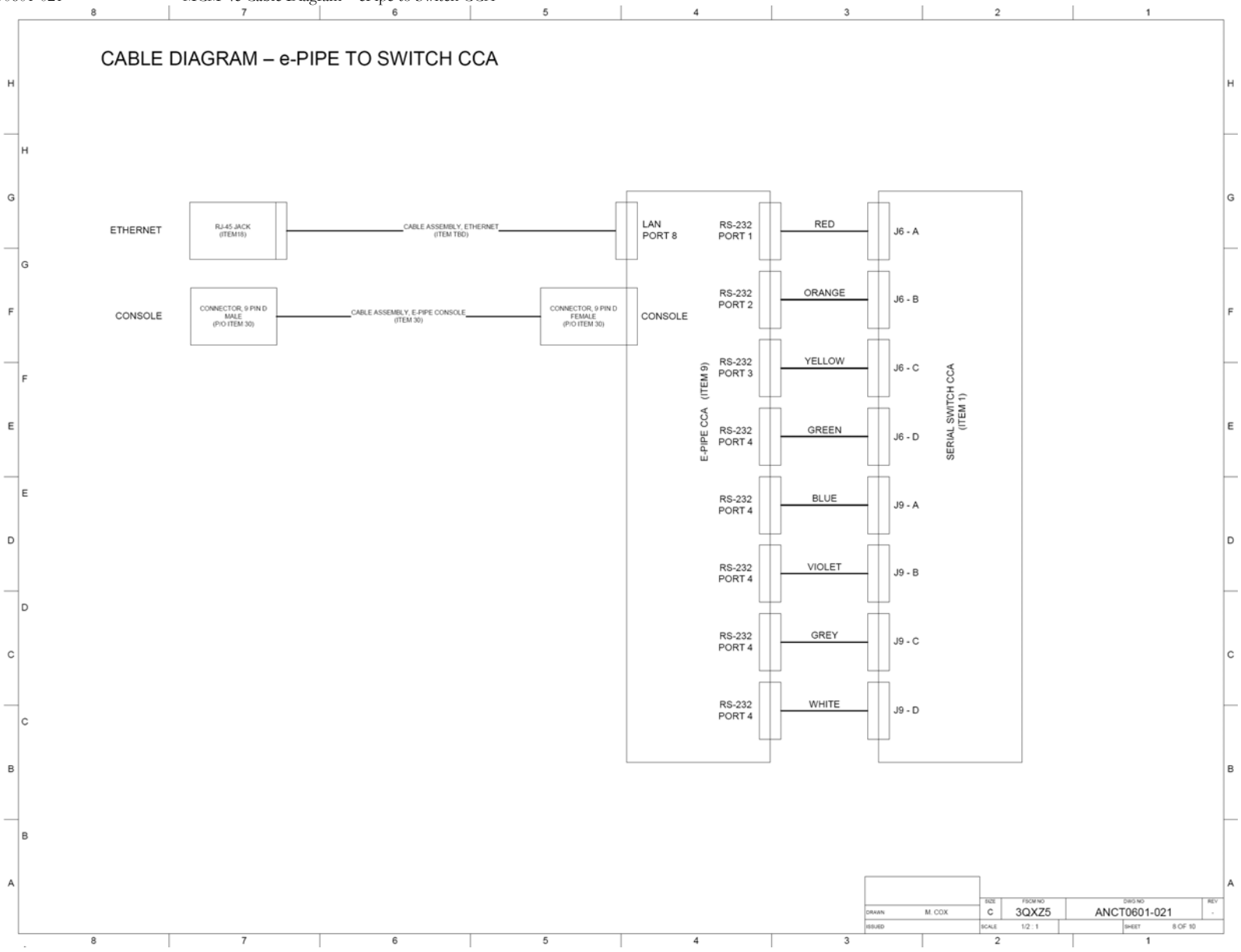
ANCT0601-021 MCM-4e Top View with ePipe and Switch Card Removed



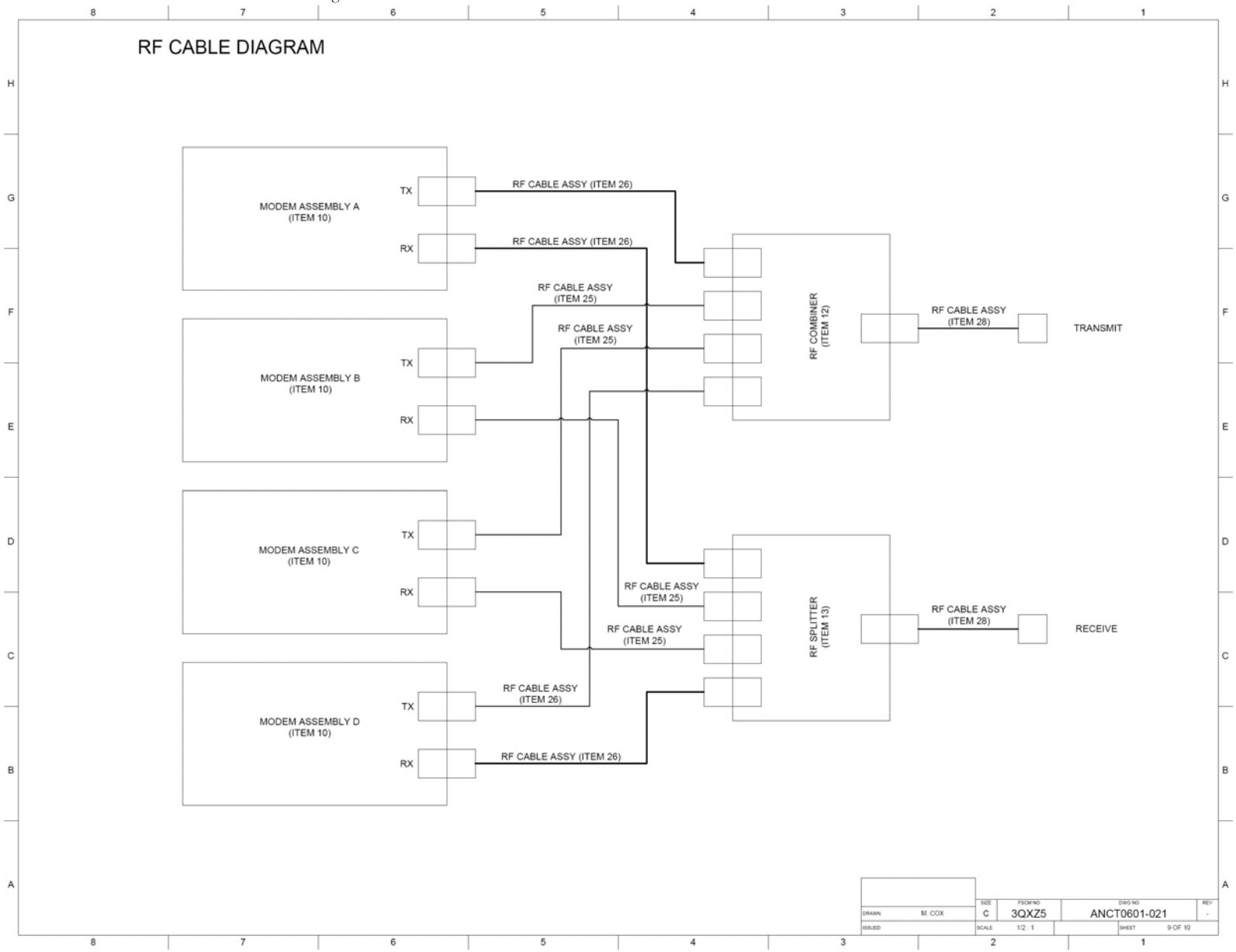
ANCT0601-021 MCM-4e Cable DWG – Modem Data and Cntl Ports to Switch CCA



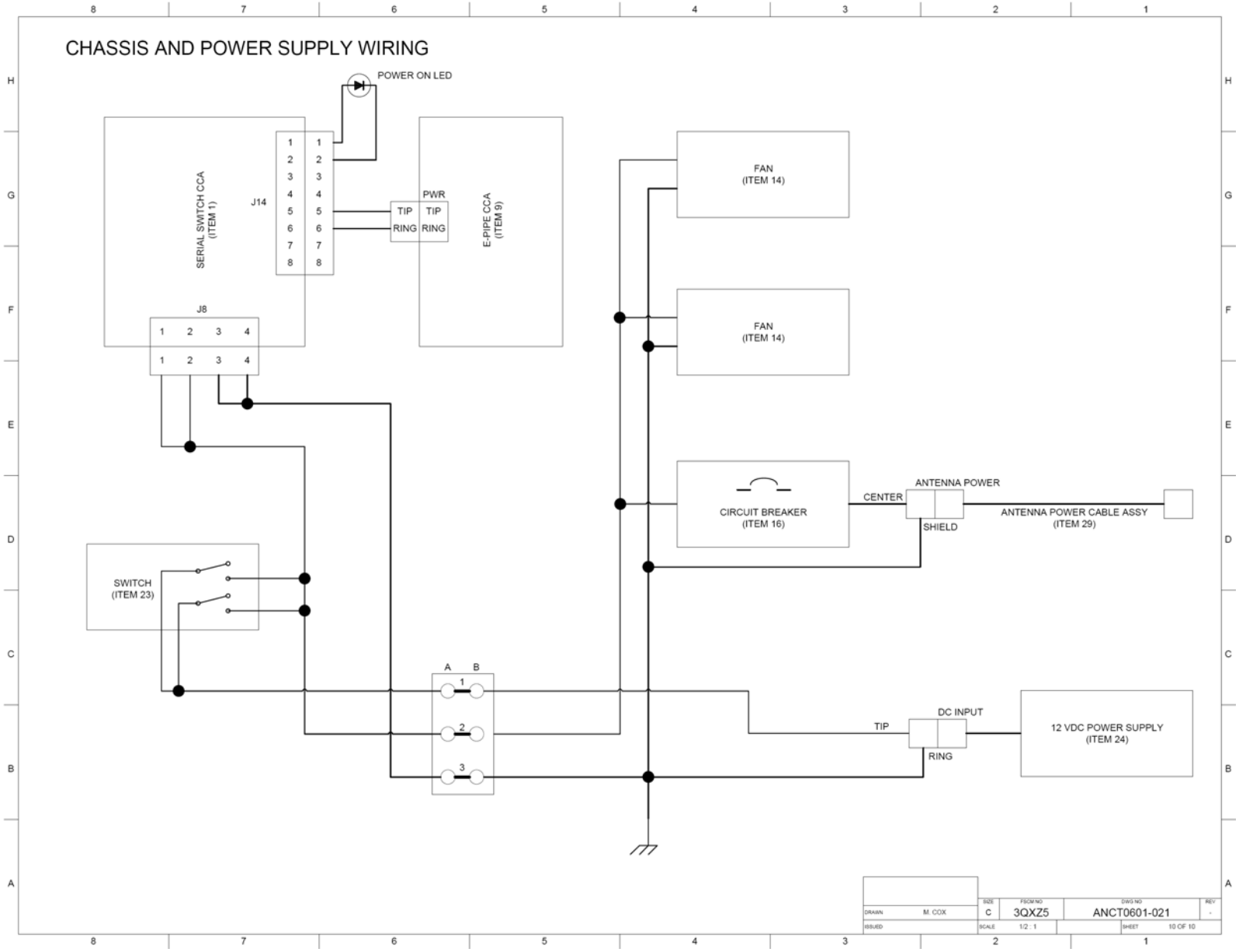
ANCT0601-021 MCM-4e Cable Diagram – ePipe to Switch CCA



ANCT0601-021 MCM-4e RF Cable Diagram



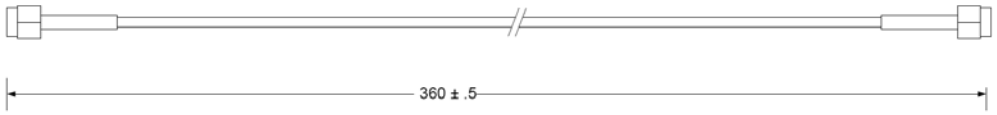
ANCT0601-021 MCM-4e Chassis and Power Supply Wiring Diagram



ANCT0601-029 MCM-4e External RF Cable Drawing

ITEM	QTY.	PART NO.	DESCRIPTION
1	2		PLUG, SMA MALE
2	A/R		COAXIAL CABLE, LMR-195

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
		PRE-RELEASE	3/13/06	



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DIMENSIONS IN INCHES
TOLERANCES UNLESS OTHERWISE SPECIFIED
2 PLC DEC ± 0.020
3 PLC DEC ± 0.005
4 PLC DEC ± 0.001

CORNERTURN LLC

RF CABLE ASSEMBLY, ANTENNA

DRAWN BY	SIZE	FSCM NO	DWG NO	REV
M. COX	B	3QXZ5	ANCT0601-029	-

FILENAME

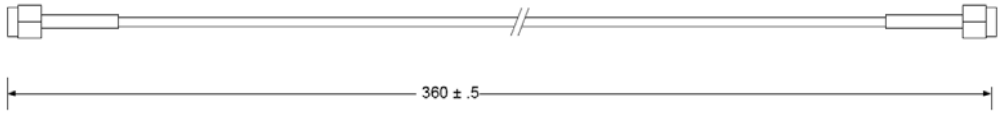
SCALE

SHEET 1 OF 1

ANCT0601-030 MCM-4e Antenna Power Cable Drawing

ITEM	QTY.	PART NO.	DESCRIPTION
1	2		PLUG, REVERSE POLARITY SMA MALE
2	A/R		COAXIAL CABLE, LMR-200

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
		PRE-RELEASE	3/13/06	



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DIMENSIONS IN INCHES
TOLERANCES UNLESS OTHERWISE SPECIFIED
2 PLC DEC ± 0.020
3 PLC DEC ± 0.005
4 PLC DEC ± 0.001

CORNERTURN LLC

CABLE ASSEMBLY, ANTENNA POWER

DRAWN BY	SIZE	FSCM NO	DWG NO	REV
M. COX	B	3QXZ5	ANCT0601-030	-
FILENAME	SCALE		SHEET 1 OF 1	

ANCT0601-030	MCM-4e Antenna Power Cable Drawing