



**SUPERVISORY NETWORK
INSTALLATION AND SETUP
MANUAL
February 1, 2002**

This manual provides information for installation, operation and preventive maintenance. The user should observe the guidelines and procedures presented herein to promote satisfactory performance.

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1 - INTRODUCTION

This document covers the installation and setup of a supervisory network between the microprocessor controllers and a Host computer or network gateway. The supervisory network is a serial communication that allows the Host computer to monitor the actions of the microprocessor, remotely command the microprocessor, and remotely change the configuration of the microprocessor. This manual does not cover the setup of the host software.

1.1 Applicable Documents

<u>PART NUMBER</u>	<u>DESCRIPTION</u>
PL800159	Supervisor Program Operations and Maintenance Manual

2 - INSTALLATION

2.1 Overview

Up to 200 units may be connected in series to a device that interfaces with the host system. The host system may be a PC or it may be one of the popular building management networks. For more than 200 units, multiple cables are required.

The series connection is made on a field terminal board mounted in each unit located in an 8" x 4" box outside of the main electrical panel. The communications between the controller and the host is done over RS-422/485 level signals on a multi-drop supervisory network segment. Bit error detection is accomplished through checksums in the messages passed between the microprocessor and the host. The RS-422/485 transceiver devices are optically isolated from the controller's interface board for improved noise immunity. The network can be set up for either RS422 or for RS485.

2.2 Unit Requirements

Each unit on the supervisory network must be equipped with the supervisory network option. This may be called out as a factory installed option or it may be field installed. It consists of an RS422 or an RS485 Serial board that plugs into the microprocessor's interface board, a field terminal board and box and a cable assembly that goes between the serial board and the terminal board. The field terminal board and box must be located outside of the electrical panel (required by code) and is usually located in the mechanical section of the unit. Refer to drawings at the end of this document for wiring and installation of the terminal board. Once these parts have been installed in the unit, connections may be made in the field to link together the units to the host system.

2.3 Field Connections

The RS-422 cable consists of two twisted pairs in a shield grounded at both ends to logic ground. The RS-485 cable consists of one twisted pair in a shield grounded at both ends to logic ground. The pin out for the 9 pin connector for RS422 and the 3 pin connector for RS485 are given in the tables below:

9 Pin Connector on RS422 Board

Pin #	RS422
1	Ground & Shield
2	TX+ from Controller
3	TX- from Controller
4	RX+ from Controller
5	RX- from Controller
6	n.c.
7	n.c.
8	n.c.
9	n.c.

3 Pin Connector on RS485 Board

Pin #	RS485
1	Ground & Shield
2	TX+/RX+ from Controller
3	TX-/RX- from Controller

2.3.1 Cable Routing

If using RS422 the APC part number for the cable is "RT280004" and may be purchased in bulk quantities in multiples of 100 feet. Connection to the terminal block is done with this cable with one pair used for the XMIT +/- signal and the other pair for the RCV +/- signal. The cable shield is connected to the GND pin. Maximum total length of all wires between controllers must be no more than 1000 ft. If using RS485 the APC part number for the cable is "RT280003" and may be purchased in bulk quantities in multiples of 100 feet. Connection to the terminal block is done with this cable with one pair used for the TX+/RX+ and the TX-/RX- signals. The cable shield is connected to the GND pin. Maximum total length of all wires between controllers must be no more than 5000' for proper communication.

Run a cable from the host converter to the nearest unit. Run a cable from that first unit to the next closest unit and so on. Make sure that the outer jacket insulation is not broken. If the shield comes into contact with AC ground, communications will be erratic. All four wires and the shield for RS422, and both wires and the shield for RS485, of each cable are connected at each unit per the following tables.

Field Wiring for RS422 Cable Unit to Unit

Terminal	Wire
GND	Shield connected at both ends
XMT +	Pair (1) BLK to XMIT + at both ends
XMT -	Pair (1) RED to XMIT - at both ends
RCV +	Pair (2) BLK to RCV + at both ends
RCV -	Pair (2) WHT to RCV - at both ends

Field Wiring for RS485 Cable Unit to Unit

Terminal	Wire
GND	Shield connected at both ends
TX+/RX+	Black wire to TX+/RX+ at both ends
TX-/RX-	White wire to TX-/RX- at both ends

2.4 Unit Configuration

The following sections cover the configuration of the microprocessor controller.

2.4.1 Controller Setup

Communications	pg.4
Unit Name	> APC 01
ID Number	> 000
Baud Rate	> 1200

Each supervisor network communication line may have up to 200 controllers connected to it. Each controller determines its address from the base "Custom Setup" of the controller. To access this setup on the microprocessor, press the CONFIG key. If a password has been installed, enter the password. Otherwise scroll down to the "Custom Setup" pages using the ENTER button. Press the DOWN ARROW

button to access the “Custom Setup”. Continue pressing the DOWN ARROW button until page 4 (Communications) of the “Custom Setup” appears. Press the ENTER button until the cursor is under the “Ident Number” field. Press the UP ARROW or DOWN ARROW to change the identification number of the unit as desired. The identification number may be any number from 1 to 200. Press the ENTER button to move the cursor to the “Baud Rate” field. Select the baud rate as desired by using the UP ARROW or DOWN ARROW button.

2.5 Converters

A converter must be used to interface between the RS422 or RS485 supervisor network and the host system. The converter translates the signal levels to RS232 for use by a PC, a modem or other systems. APC will only provide the converter (APC Part Number PB132629) when the user purchases APC’s Local or Remote Site Supervisor Program. If using one of the other popular building management systems, the BMS manufacturer must provide their own converter. Please see the charts below for proper interface between the Unit RS422 or RS485 Terminal Strip and the Converter Connector. Diagrams are also provided in the rear of this manual for additional reference.

Unit to Converter Wiring RS422

Wire Indent	Unit Terminals RS422	Converter RS422 to RS232
Ground	Ground & Shield	Ground & Shield
BLK Pair (1)	XMT+ from Controller	RCV- to Converter
RED Pair (1)	XMT- from Controller	RCV+ to Converter
BLK Pair (2)	RCV+ to Controller	XMT- from Converter
WHT Pair (2)	RCV- to Controller	XMT+ from Converter

Unit to Converter Wiring for RS485

Wire Indent	Unit Terminals RS485	Converter RS485 to RS232
Ground	Ground and Shield	Ground and Shield
Black	TX+/RX+ from Controller	TX+/RX+ to Converter
White	TX-/RX- from Controller	TX-/RX- to Converter

3 – REVISION HISTORY

Revision

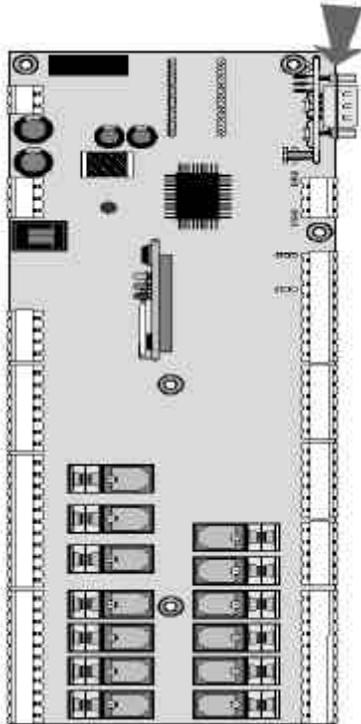
Supervisory Installation and Setup

February 1, 2002

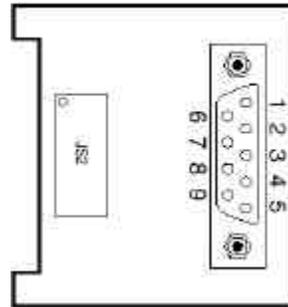
<u>Date</u>	<u>Revision</u>	<u>Description</u>
	N.C.	Initial Release
08/08/96	A	Update Converter Wiring Instructions and Add Site Cable Diagram
08/20/96	B	Updated Assembly drawing and added cable sub assembly drawing
02/16/99	C	Update manual to include DataGuard 5.0 information.
08/26/99	D	Add drawings to Manual Word97 file & correct table of contents
02/01/02	S.B	Reformatted Text

Step 1: Select Communications Type (RS232 / RS422 / RS485)

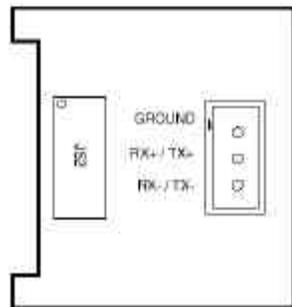
The type of serial communications to be used is usually dictated by the type of serial port available on the network or device you need to connect to. The controller has optional plug-in cards:



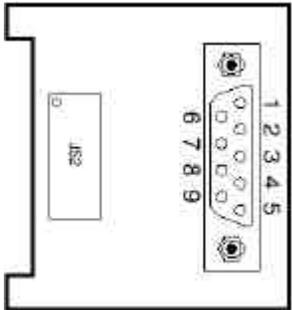
RS-422



RS-485

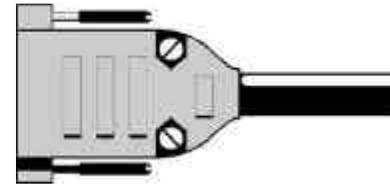


Step 2: Connect Network Wiring to Controllers

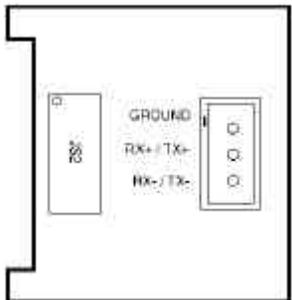


2 - TX+
3 - TX-
4 - RX+
5 - RX-

RS-422



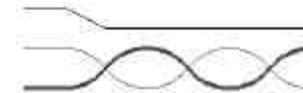
TX+ & RX+ = 1st pair, TX- & RX- = 2nd pair.



2 - RX+/TX+
3 - RX-/TX-

RS-485

Use shielded cable (20 AWG minimum) with one twisted pair of wires.

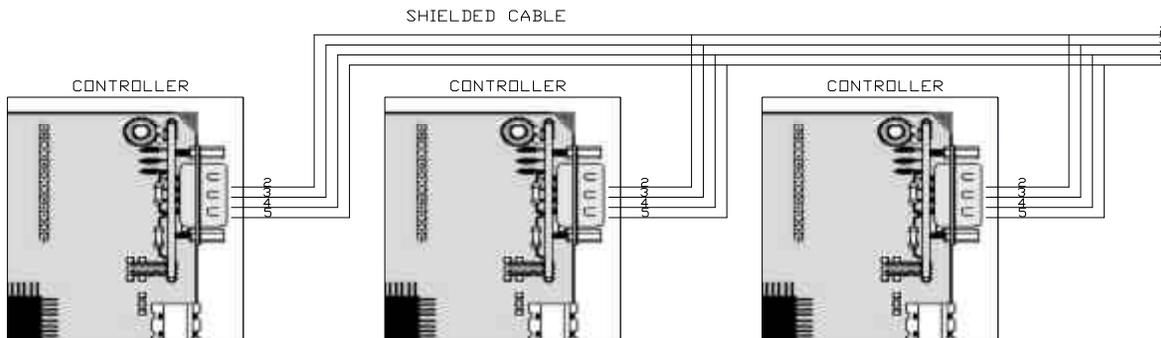


Step 3: Complete Network Wiring

Connect the wires from the first unit's serial card to the next closest (physical location) unit's serial card in a straight-through daisy chain. This means connecting terminal #2 from the first unit to terminal #2 in the next unit and then terminal #2 in the next unit and so on until all microprocessors are connected on the network. NOTE: the controllers do NOT need to be connected together in any specific order. Maximum length of the network wiring is 3,000 feet.

RS422 serial network wiring:

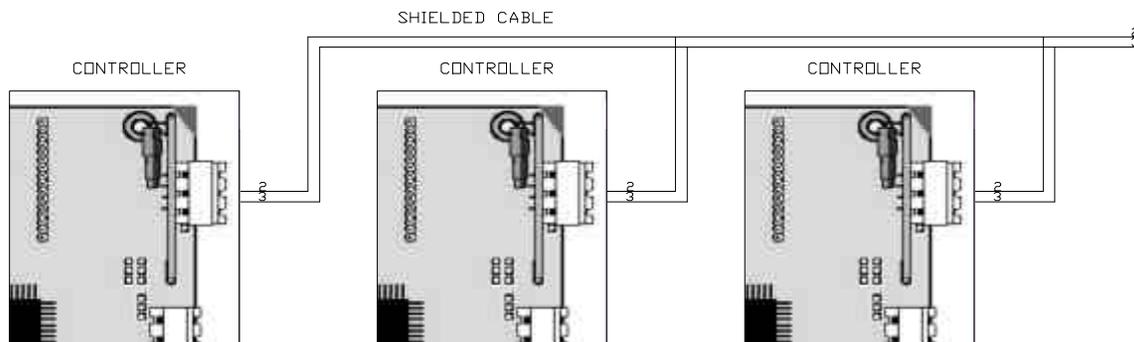
The end of the network wiring then connects to a PC, gateway translator, or gateway translator and modem.



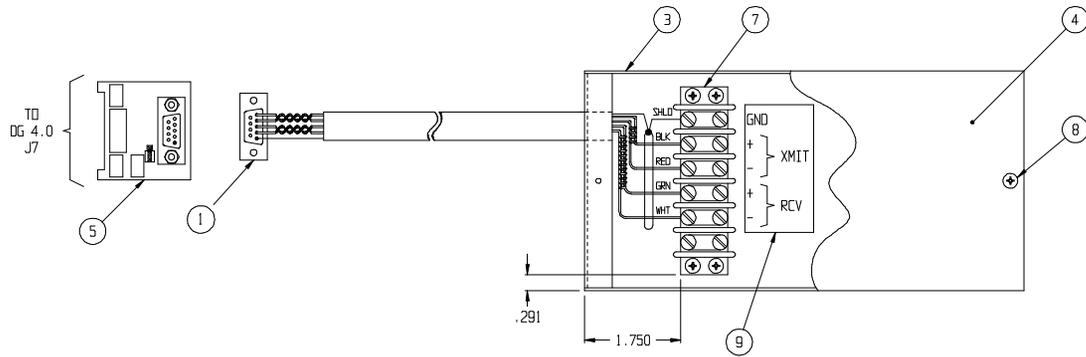
RS485 serial network

wiring:

The end of the network wiring then connects to a PC, gateway translator, or gateway translator and modem.



4 - Supervisor Network Unit Assembly Drawing



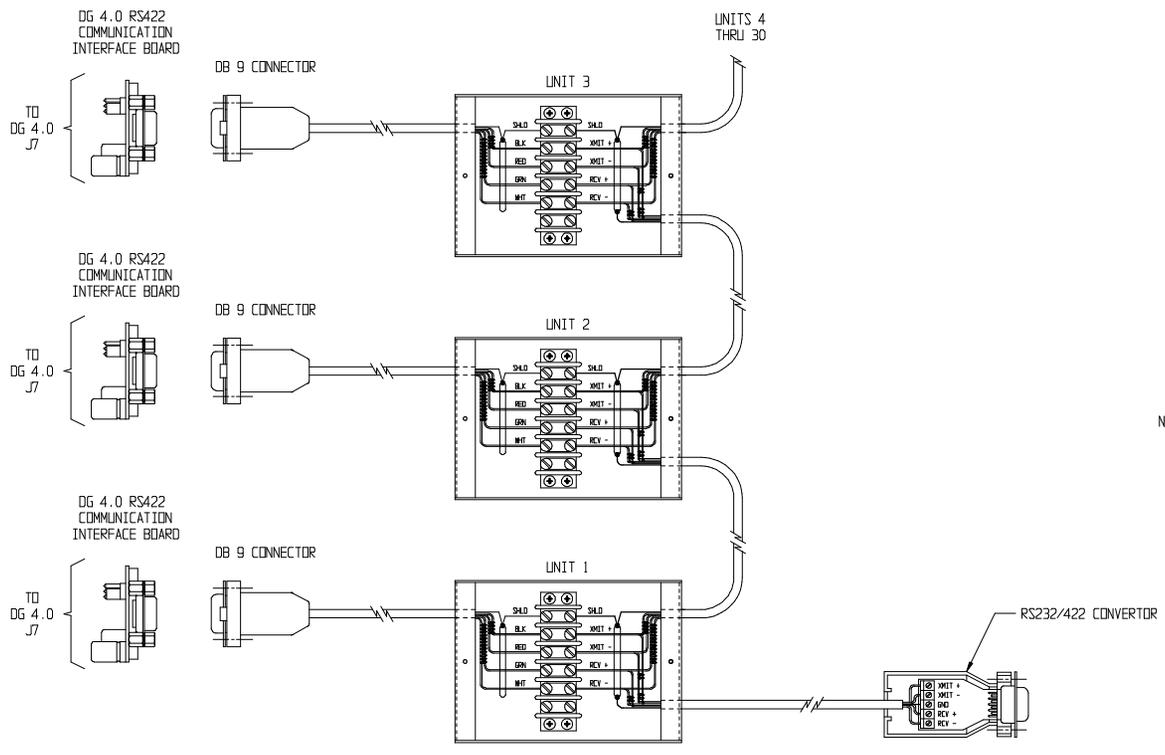
REVISIONS				
LTR	DESCRIPTION	DRAWN	APPROVED	ECN #
A	REVERSED THE POLARITY OF THE TRANSMIT & RECEIVE WIRES AT TERMINAL BLOCK	JHB 9-1-95	RLB 9-3-95	3147
B	REVERSED THE PIN NUMBERS OF THE TRANSMIT & RECEIVE WIRES AT THE 9-PIN CONNECTOR	JHB 12-18-95	JHB 12-20-95	3229
C	REVERSED THE PIN NUMBERS OF THE TRANSMIT & RECEIVE WIRES AT THE 9-PIN CONNECTOR	JHB 12-18-95	JHB 12-20-95	3229
C	REVERSED THE PIN NUMBERS OF THE TRANSMIT & RECEIVE WIRES AT THE 9-PIN CONNECTOR	JHB 12-18-95	JHB 12-20-95	3229
D	WHITE/GREEN TWISTED PAIR WAS WHITE/BLACK	VT 08-09-96	JHB	3366
D	WHITE/GREEN TWISTED PAIR WAS WHITE/BLACK	VT 10-18-96	JHB	3366

9	PB220619	1	LABEL, SUPERVISOR CONNECTIONS
8	PMR38204	6	SCREW, PAN HD, PHIL, S/M, 6-32 X 1/4"
7	PC030205	1	TERMINAL BLOCK, 6 POSITION
-	-	-	-
5	PB111026	1	RS422/485 INTERFACE BOARD
4	3-105-3-094	REF	COVER
3	3-105-3-093	REF	BOX
-	-	-	-
1	6-100-8-038	1	CABLE ASSEMBLY, RS422/485 TO SUPERVISOR NETWORK
ITEM	SYM	PART NO.	QTY

BILL OF MATERIALS PARTS LIST				
NEXT ASSY	USED ON	DWG	DATE	REV
-	-	VT 08-09-96		
		ENGR		
		APPR		
		JOB#		
MATERIAL:		TOLERANCES		
FINISH:		2 PLACE: +/- .06	CODE IDENT #	SIZE
		3 PLACE: +/- .030	10018	0
		ANGLE: +/- .50°	SCALE: 1.00	DO NOT SCALE THIS DWG
				SHEET 1 OF 1


 295 BATES LANE
 FREDERICK, MARYLAND
**ASSEMBLY,
 SUPERVISOR NETWORK**

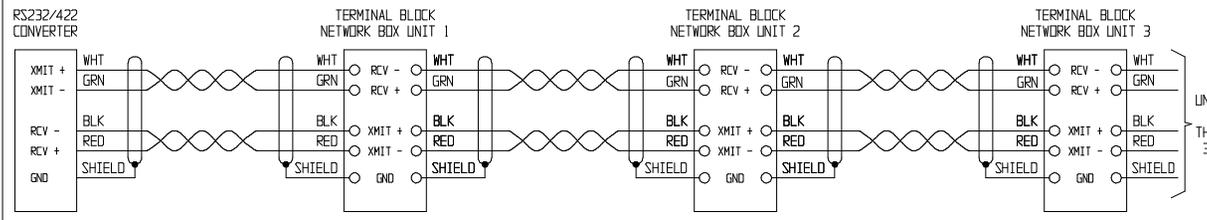
5- Unit Internal Cable Assembly Drawing



REVISIONS				
LTR	DESCRIPTION	DRAWN	APPROVED	ECN #
A	WHITE/GREEN TWISTED PAIR WAS WHITE-BLACK	VT 10-18-96	-	-

NOTES:
 1. CABLE LENGTH TO DETERMINED PER SITE REQUIREMENTS.
 MAXIMUM OVER ALL CABLE LENGTH IS 4,000 FT. (12,192 M).

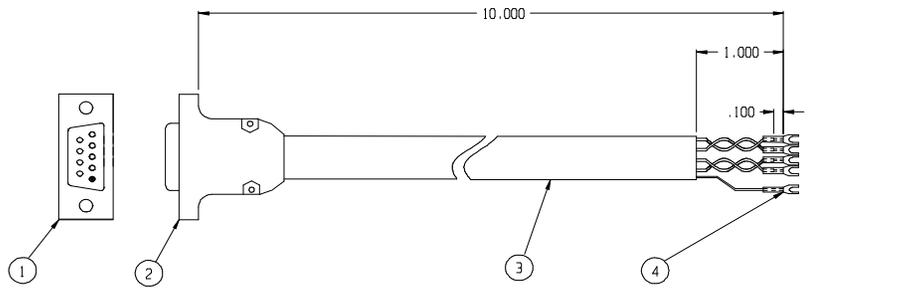
CONNECTION CHART



ITEM	SYN	PART NO.	QTY	NAME & DESCRIPTION
BILL OF MATERIALS PARTS LIST				
NEXT ASSY		USED ON	ENGR	JMB 8-7-96
			APPR	JMB 9-4-96
			JOB#	-
			ENC	-
TOLERANCES				
2 PLACE: ± .06				
(1.52)				
3 PLACE: ± .030				
(1.76)				
FINISH:				
ANGLE: ± .50°				
			SCALE: NONE	DO NOT SCALE THIS DWG
			CODE IDENT #	SIZE
			10018	D
			6-100-1-062	REV A
			295 BATTLES LANE	FREDERICK, MARYLAND
			WIRING DIAGRAM	
			DG 4.0 SITE COMMUNICATION CABLING	
			(ONE OR MORE UNITS)	
			SHEET 1 OF 1	

6- Unit Interconnect Cable Assembly Drawing

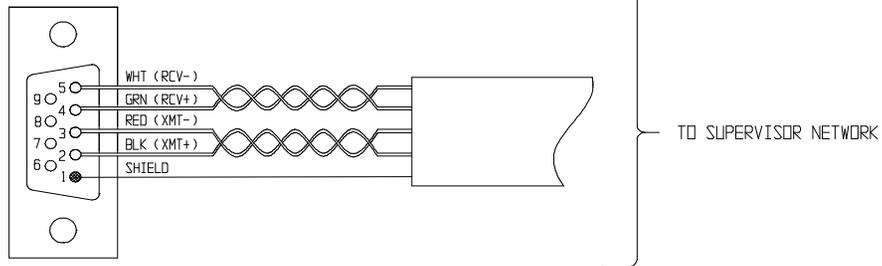
REVISONS				
LTR	DESCRIPTION	DRWN	APPROVED	ECN #
A	WHITE/GREEN TWISTED PAIR WAS WHITE-BLACK	VT 10-18-96	-	-
-	-	-	-	-



NOTE:

- CUT CABLE TO REQUIRED LENGTH, REMOVE 1.00" OF CABLE SHEATH FROM DB-9 CONNECTOR END (ITEM#1).
- STRIP .100" OF INSULATION FROM EACH WIRE, AND SOLDER TO CONNECTOR PINS OF DB-9 (ITEM#1). CONNECT ACCORDING TO CONNECTION CHART.
- REMOVE 1.00" OF CABLE SHEATH FROM THE SUPERVISOR NETWORK CONNECTION END AND STRIP .100" OF INSULATION FROM EACH WIRE AND CRIMP SPADE LUG (ITEM#4) TO EACH WIRE.

CONNECTION CHART



-	-	-	-	-
-	-	-	-	-
4	PC2606101	5	# 6 SPADE LUG 18	
3	RT260004	10'	CABLE, 2 TWISTED PAIR, SHIELDED	
2	PB132663	1	HOOD, 9 PIN D-SUBMIN CONNECTOR	
1	PB132662	1	CONNECTOR, 9 PIN D-SUBMIN, PLUG	
ITEM	SYM	PART NO.	QTY	NAME & DESCRIPTION
BILL OF MATERIALS PARTS LIST				
NEXT ASSY	USED ON	DN	VT 08-08-96	 295 BAILES LANE FREDERICK, MARYLAND CABLE ASSEMBLY, R422/485 TO SUPERVISOR NETWORK
-	-	ENGR	VT	
-	-	APPR	-	
-	-	JTB#	-	
MATERIALS:		TOLERANCES		
FINISH:		2 PLACE: +/- .06	CODE IDENT #	REV
		3 PLACE: +/- .030	10018	A
		ANGLE: +/- .50°	SCALE: 1.00	DO NOT SCALE THIS DWG
				SHEET 1 OF 1