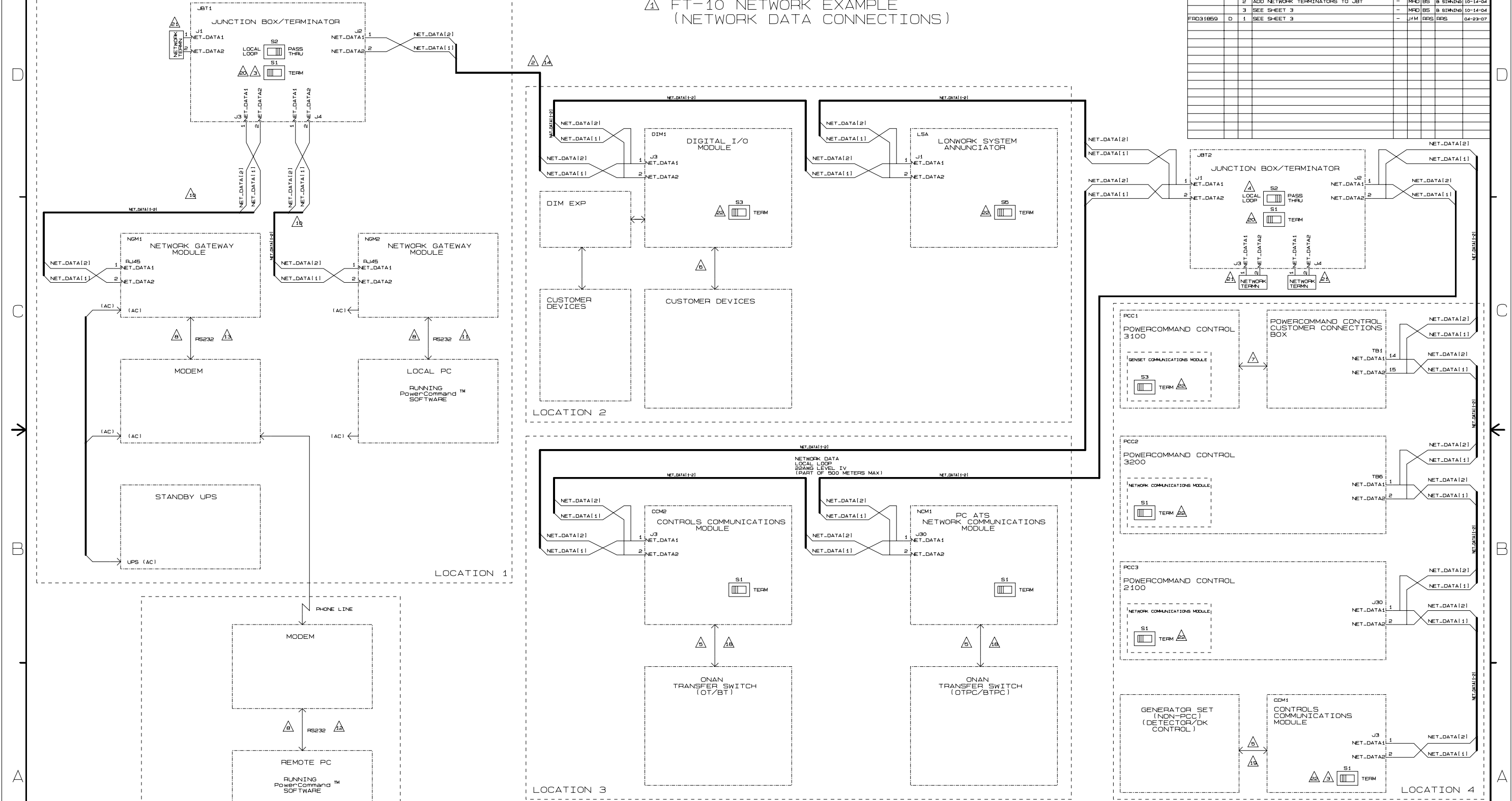


0630-2293

TYPICAL PowerCommand
FT-10 NETWORK EXAMPLE
(NETWORK DATA CONNECTIONS)

REL. NO.	LTR.	NO.	REVISION	ZONE	DR.	CHKD.	APPROVED	DATE
FR011847	A	1	PRODUCTION RELEASE	-	MFO	RFS	TAW	03-22-02
FR013521	B	1	CLARIFIED NOTES & SPECS	-	JFM	RFS	RFS	09-04-02
FR021610	C	1	PLACE S1 OF JBTS TO "OFF"	-	MFO	BS	B SIMOND	10-14-04
		2	ADD NETWORK TERMINATORS TO JBTS	-	MFO	BS	B SIMOND	10-14-04
		3	SEE SHEET 3	-	MFO	BS	B SIMOND	10-14-04
FR031859	D	1	SEE SHEET 3	-	JFM	RFS	RFS	04-23-07



TOLERANCES UNLESS OTHERWISE SPECIFIED		QTY	ITEM	PART NO.	DWG. SIZE	DESCRIPTION OR MATERIAL	REP. DES.
mm	Inch		DR	MARK R. DALSKO	03-06-02		CUMMINS POWER GENERATION
0.09-4.99	+0.15/-0.08		CHKD.	TRICH SCROGGINS	03-22-02		1420 73rd AVE NE MINNEAPOLIS, MN 55432
5.00-9.99	+0.20/-0.10		APPROVED	TROY WINSAND	03-22-02	SITE CODE	TITLE: WD-INTERCONNECTION (POWER COMMAND NETWORK)
10.00-17.49	+0.25/-0.13			PCS		PGA	DWG. NO.: 0630-2293
17.50-24.99	+0.30/-0.15						SHEET 1 OF 3

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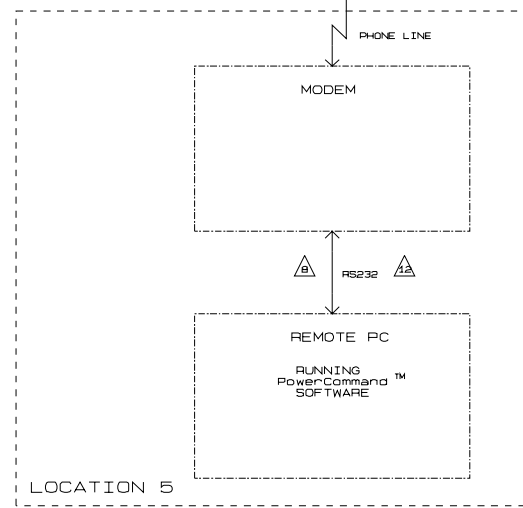
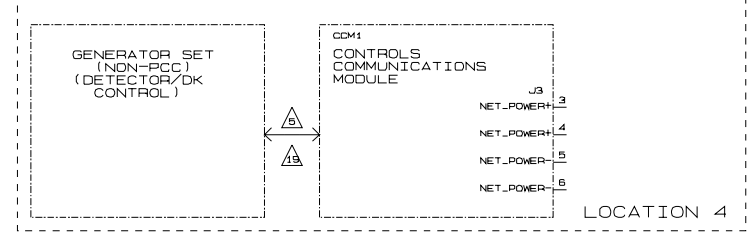
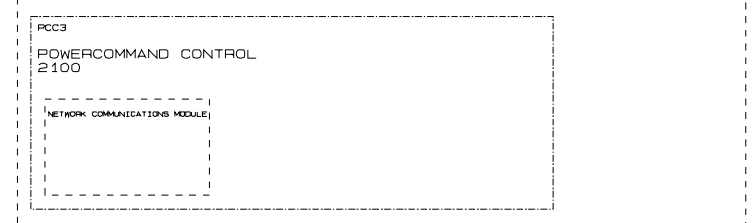
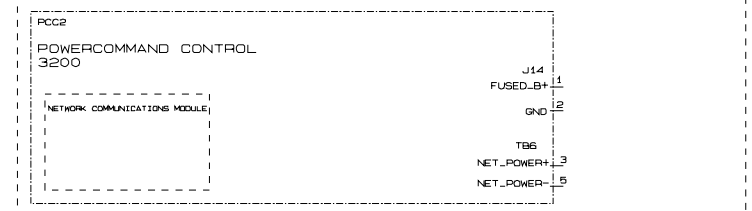
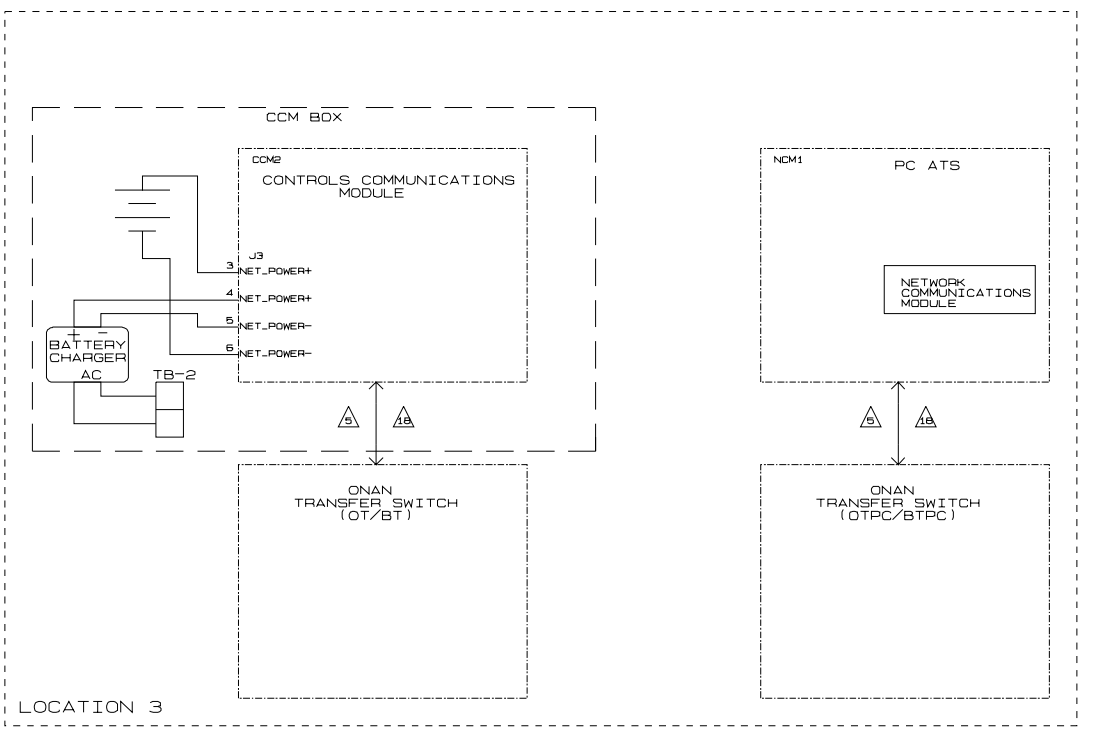
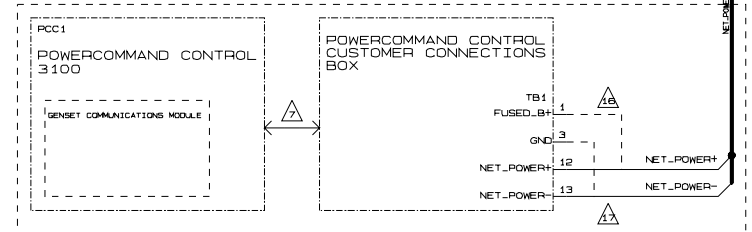
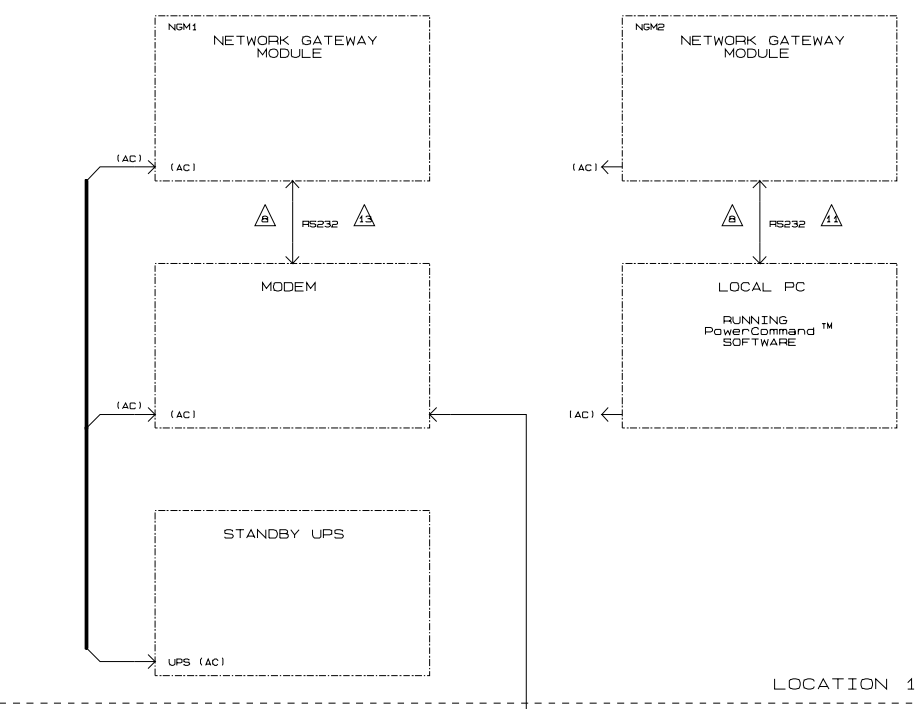
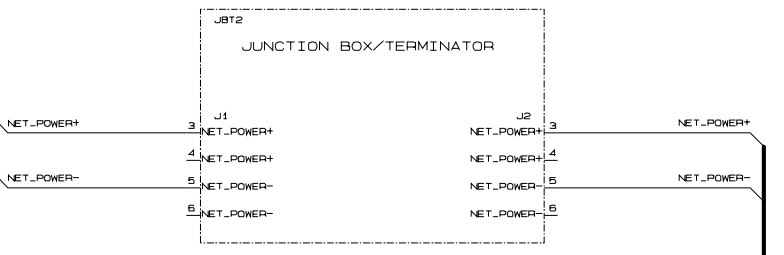
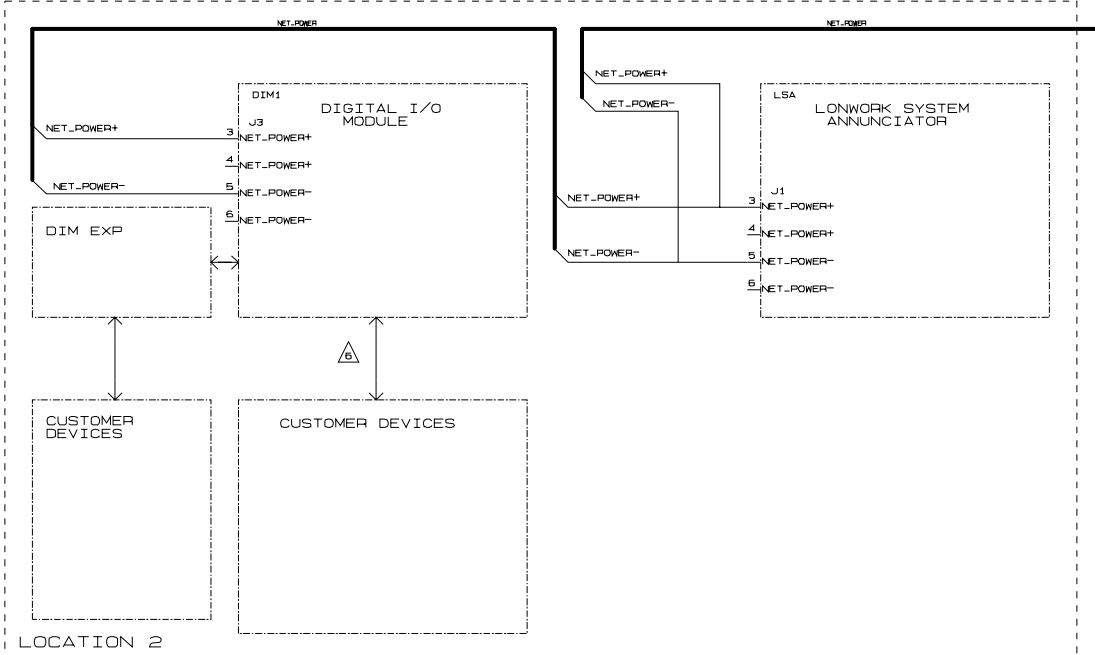
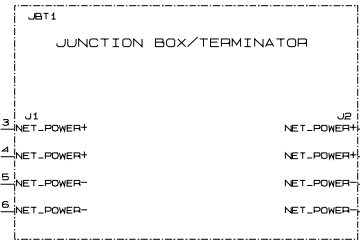
THIRD ANGLE PROJECTION
PROPERTY OF CUMMINS POWER GENERATION
ALL RIGHTS RESERVED
NO PART OF THIS DRAWING IS TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, WITHOUT PERMISSION IN WRITING FROM CUMMINS POWER GENERATION.
DATE: 03-22-02
BY: TROY WINSAND

CUMMINS POWER GENERATION
1420 73rd AVE NE
MINNEAPOLIS, MN 55432
TITLE: WD-INTERCONNECTION
(POWER COMMAND NETWORK)
DWG. NO.: 0630-2293
SHEET 1 OF 3

0630-2293 D

1 TYPICAL PowerCommand FT-10 NETWORK EXAMPLE (NETWORK POWER CONNECTIONS)

REV. NO.	DATE	BY	CHKD	APP'D	DATE
FRO11647	A	JFM	RFS	RFS	03-22-02
FRO13521	B	JFM	RFS	RFS	09-04-02
FRO21610	C	JFM	RFS	RFS	
FRO31959	D	JFM	RFS	RFS	04-23-07



TOLERANCES UNLESS OTHERWISE SPECIFIED		SIM TO		QTY	ITEM	PART NO.	DWG. SIZE	DESCRIPTION OR MATERIAL	REF. DES.
mm	Inch	COPIED FROM	DATE		DR	MARK R. DALSKE	03-06-02		
0.09-4.99	± .004	THIRD ANGLE PROJECTION	03-22-02		CHKD BY	FRICH SCROGGINS	03-22-02		
5.00-9.99	± .005	CONFIDENTIAL INFORMATION UNLESS OTHERWISE INDICATED			APPROVED	TROY WINSAND	03-22-02		
10.00-17.49	± .007	FOR INTERPRETATION OF DIMENSIONS AND TOLERANCES SEE			MODEL FIRST USED ON	PCS			
17.50-24.99	± .010	GENERATION OF ITS REPRESENTATIVE.							

ZUKEN DO NOT SCALE PRINT ANG. TOL. 1:1 DWG. NO. 0630-2293 SHEET 2 OF 3

CUMMINS POWER GENERATION
1420 73rd AVE NE
MINNEAPOLIS, MN 55432

TITLE: WD-INTERCONNECTION (POWER COMMAND NETWORK)

DR: MARK R. DALSKE DATE: 03-06-02
CHKD BY: FRICH SCROGGINS DATE: 03-22-02
APPROVED: TROY WINSAND DATE: 03-22-02

FOR INTERPRETATION OF DIMENSIONS AND TOLERANCES SEE MODEL FIRST USED ON PCS

SITE CODE: PGA

0630-2293 D

REV. NO.	LTN	NO.	REVISION	ZONE	DR	CHKD	APPROVED	DATE
FR011847	A	1	PRODUCTION RELEASE	-	MFD	RSS	TAM	03-22-02
FR013821	B	1	CLARIFIED NOTES & SPECIFICATIONS	-	JFM	RSS	RSS	09-04-02
FR021610	C	3	ADD NOTES 20, 21, 22	-	MFD	BS	B SIMING	10-14-04
FR031859	D	1	ADD SPECIFICATION 6	-	JFM	RSS	RSS	04-23-07

TYPICAL PowerCommand FT-10 NETWORK EXAMPLE

SPECIFICATIONS

1. NET DATA
 - 1.1 TYPE = ECHELON LONTALK™ FT10 TRANSFORMER COUPLED
 - 1.2 WIRING TOPOLOGY = FREE TOPOLOGY
 - 1.3 POLARITY = POLARITY INSENSITIVE
 - 1.4 MAX CHANNEL LENGTH = 500 METERS
 - 1.5 TERMINATION = ONE TERMINATOR REQUIRED PER SEGMENT
 - 1.6 MAX NUMBER OF NODES = 64 PER SEGMENT
128 PER CHANNEL
2. NET DATA WIRE
 - 2.1 TYPE
 - 2.1.1 UNSHIELDED 22AWG UL LEVEL IV STRANDED
 - 2.2 COLOR CODES
 - 2.2.1 BLUE/WHITE = PRIMARY WIRE PAIR FOR DATA
 - 2.2.2 GREEN/WHITE = SECONDARY WIRE PAIR FOR DATA (USE WITH LOCAL LOOP)
3. CONNECTIONS
 - 3.1 TYPE
 - 3.1.1 ONAN NODES = 6 POSITION PLUGGABLE SCREW TERMINAL BLOCK
 - 3.1.2 ONAN JUNCTION BOX/TERMINATOR = PLUGGABLE SCREW TERMINAL BLOCK AND RJ45
 - 3.1.3 NETWORK GATEWAY(SLTA-10) = 2 POSITION PLUGGABLE SCREW TERMINAL BLOCK
4. NET POWER
 - 4.1 REFER TO THE POWERCOMMAND NETWORK INSTALLATION AND OPERATION MANUAL, 0900-0529, FOR DETAILS.
5. NETWORK CABLE SELECTION:

THE FOLLOWING CABLES ARE QUALIFIED FOR USE WITH FT-10 NETWORKS:

 - NEMA LEVEL IV CABLE (ONAN P/N 334-1350(PVC) OR 334-1351 (PLENUM))
 - BELDEN 85102 OR BELDEN 8471 (BOTH ARE SINGLE TWISTED PAIR, 16 AWG)
 - TIA CATEGORY 5 (CAT5) (STRANDED).

NETWORK WIRING SHOULD BE RUN IN SEPARATE CONDUIT AND INSTALLED FOLLOWING LOCAL ELECTRICAL CODES. ANY WIRE CONNECTED TO GENERATOR SETS MUST BE STRANDED WIRE (NFPA110, PARA. 7.12.4.1). EXCEPT WHEN USING RING TOPOLOGY, CABLING IS NOT POLARITY SENSITIVE. THE AVERAGE TEMPERATURE OF THE WIRE SHOULD NOT EXCEED +55 C(+131 F). CABLE DISTANCE MUST COMPLY WITH TRANSMISSION SPECIFICATIONS LISTED BELOW. THE MAXIMUM TOTAL WIRE LENGTH IS THE TOTAL LENGTH OF WIRE WITHIN A SEGMENT. THE MAXIMUM NODE-TO-NODE DISTANCE IS THE MAXIMUM ALLOWABLE DISTANCE BETWEEN EACH INDIVIDUAL NODE OR THE TERMINATOR.

NOTE ANY COMMUNICATIONS CONNECTED TO THE GENSET SHOULD BE STRANDED CABLE

TABLE 1 FREE TOPOLOGY

	MAXIMUM NODE-TO-NODE DISTANCE (FT)	MAXIMUM TOTAL WIRE LENGTH (FT)
BELDEN 8471	1300	1600
BELDEN 85102	1600	1600
NEMA LEVEL IV	1300	1600
TIA CATEGORY 5 STRANDED	800	1400

TABLE 2 DOUBLE-TERMINATED BUS TOPOLOGY

	MAXIMUM BUS LENGTH (FT)
BELDEN 8471	8800
BELDEN 85102	8800
NEMA LEVEL IV	4500
TIA CATEGORY 5 STRANDED	2900

A DOUBLE-TERMINATED BUS MAY HAVE STUBS OF UP TO 10 FEET FROM THE BUS TO EACH DEVICE.

CABLE TERMINATION

FTT-10 NETWORK SEGMENTS REQUIRE TERMINATION FOR PROPER DATA TRANSMISSION PERFORMANCE. FREE TOPOLOGY AND DOUBLE-TERMINATED BUS TOPOLOGY NETWORKS DIFFER IN THEIR TERMINATION REQUIREMENTS.

FREE TOPOLOGY SEGMENTS ONLY REQUIRE ONE TERMINATOR PER SEGMENT. THIS TERMINATOR CAN BE PLACED ANYWHERE IN THE SEGMENT, BUT IS RECOMMENDED TO BE PLACED NEAR THE MIDDLE OF THE SEGMENT. ALL POWERCOMMAND NETWORK INTERFACE MODULES (i.e. GCM, NCM, GLC), CONTROL COMMUNICATIONS MODULES (CCM), DIGITAL I/O MODULES (DIM) AND LONWORKS ANNUNCIATORS HAVE AN ON-BOARD FREE TOPOLOGY TERMINATOR. IT IS RECOMMENDED THAT THIS BE USED ON A FREE TOPOLOGY SEGMENT. OPTIONALLY AN EXTERNAL FREE TOPOLOGY TERMINATOR (ONAN P/N 0300-5669) CAN BE USED.

DOUBLE-TERMINATED BUS SEGMENTS MUST BE TERMINATED AT BOTH ENDS OF THE SEGMENT. AN FT-10 BUS TERMINATOR (ONAN P/N 0300-5729) MUST BE USED.

NOTES

- 1 THIS IS A SAMPLE APPLICATION REPRESENTING DEVICE TYPES AND TYPICAL NETWORK WIRING ARRANGEMENTS. REFER TO THE POWERCOMMAND NETWORK INSTALLATION AND OPERATION MANUAL, 0900-0529, FOR DETAILS.
- 2 NETWORK DATA WIRE SHALL BE 22AWG LEVEL IV STRANDED TWISTED PAIR COMMUNICATIONS CABLE (MAXIMUM TOTAL NETWORK LENGTH 500 METERS). NETWORK DATA WIRING TOPOLOGY IS CRITICAL TO RELIABILITY. REFER TO THE POWERCOMMAND NETWORK INSTALLATION AND OPERATION MANUAL, 0900-0529, FOR DETAILS. REFER TO ECHELON'S FT-10A LONWORKS FREE TOPOLOGY TRANSCEIVER USER'S GUIDE FOR MORE INFORMATION ON WIRING LIMITATIONS.
- 3 TO ENSURE RELIABLE COMMUNICATIONS, SET TERMINATOR SWITCH TO 'TERM' ON ONE DEVICE PER CHANNEL. ALL OTHERS SET TO POSITION OPPOSITE OF 'TERM'.
- 4 S2 ON JUNCTION BOX SHOULD BE SET TO 'PASS-THRU' ONLY AND THE JBT SHOULD NOT BE TERMINATED IN AN FT-10 NETWORK.
- 5 FOR GENERIC CUSTOMER CONNECTION DETAILS FOR THE CONTROLS COMMUNICATIONS MODULE (CCM), REFER TO INTERCONNECT DIAGRAM 0630-2390 AND POWERCOMMAND NETWORK INSTALLATION AND OPERATION MANUAL, 0900-0529.
- 6 FOR GENERIC CUSTOMER CONNECTION DETAILS FOR THE DIGITAL I/O MODULE (DIM), REFER TO INTERCONNECT DIAGRAM 0630-2276 AND POWERCOMMAND NETWORK INSTALLATION AND OPERATION MANUAL, 0900-0529.
- 7 FOR CUSTOMER CONNECTION DETAILS FOR THE POWERCOMMAND CONTROL (PCC), REFER TO SYSTEM DIAGRAM 0612-2389 (NON-PARALLELING) OR 0612-2388 (PARALLELING).
- 8 FOR CONNECTION DETAILS BETWEEN MODEMS, NETWORK GATEWAY MODULES (NGM), AND PC'S, REFER TO POWERCOMMAND NETWORK INSTALLATION AND OPERATION MANUAL, 0900-0529.
- 9 FOR GENERIC CUSTOMER CONNECTION DETAILS FOR THE LONWORK SYSTEM ANNUNCIATOR (LSA), REFER TO INTERCONNECT DIAGRAM 0630-2293 AND POWERCOMMAND NETWORK INSTALLATION AND OPERATION MANUAL, 0900-0529.
- 10 ONAN PART NUMBER 0338-3240 (10 FT PATCH CABLE WITH RJ45 PLUGS AT THE ENDS).
- 11 ONAN PART NUMBER 0338-3277 (6 FT NULL MODEM CABLE, DB9P TO DB9S).
- 12 ONAN PART NUMBER 0338-3278 (6 FT STANDARD MODEM CABLE, DB9S TO DB25P).
- 13 ONAN PART NUMBER 0338-3279 (6 FT MODEM CABLE, DB9P TO DB25P).
- 14 ONAN PART NUMBER 0334-1351 (PLENUM) OR 0334-1350 (PVC).
- 15 NETWORK POWER WIRING SHALL BE SIZED IN ACCORDANCE WITH THE CHART LOCATED IN THE POWERCOMMAND NETWORK INSTALLATION AND OPERATION MANUAL, 0900-0529.
- 16 IF NO B+ IS PRESENT AT TB1-12 & TB1-13, USE TB1-1 & TB1-3 (EARLY SPECS OF PCC DO NOT HAVE B+ AT TB1-12 & TB1-13).
- 17 NET_POWER IS FUSED AT 10A. FUSE IS LOCATED ON GOVERNOR MODULE.
- 18 FOR SPECIFIC INTERCONNECT DIAGRAM REFER TO 0630-2385.
- 19 FOR SPECIFIC INTERCONNECT DIAGRAM REFER TO 0630-2384.
- 20 THE TERMINATOR SWITCHES ON THESE JBTs ARE ONLY FOR USE IN A MULTI-DROP BUS NETWORK USING ONLY TP/XF-78 DEVICES
- 21 THESE TERMINATOR DEVICES ARE USED ONLY IN A MULTI-DROP BUS FT-10 NETWORK, AND THERE MUST BE TWO OF THEM TO OBTAIN THE 4,600 FOOT NETWORK DISTANCE AND 44 DEVICES.
- 22 WHEN THE NETWORK DEVICES ARE USED IN A FREE-TOPOLOGY NETWORK, THE NETWORK DISTANCE IS LIMITED TO 500 METERS (1625 FT) AND 64 DEVICES.

TOLERANCES UNLESS OTHERWISE SPECIFIED		SIM TO	QTY	ITEM	PART NO.	DRG SIZE	DESCRIPTION OR MATERIAL	REF DES
mm	Inch	COPIED FROM		DR	MARK R. DALSKA	03-06-02		CUMMINS POWER GENERATION 1420 73rd AVE NE MINNEAPOLIS, MN 55432
±.015	±.0005	THIRD ANGLE PROJECTION		CHKD BY	TRICH SCROGGINS	03-22-02		TITLE WD-INTERCONNECTION (POWER COMMAND NETWORK)
±.030	±.0010	APPROVED		APPROVED	TROY WINSAND	03-22-02	SITE CODE	DWG NO. 0630-2293
±.075	±.0025	FOR INFORMATION OF DIMENSIONING AND TOLERANCING SEE TYPICALS AND TOLERANCING SEE TYPICALS		FOR INFORMATION OF DIMENSIONING AND TOLERANCING SEE TYPICALS AND TOLERANCING SEE TYPICALS	PCS		PGA	SHEET 3 OF 3

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