A66P1

Installation and Programming Manual

This Manual describes the A66P1 Communications Adapter for the Altivar® 66 Variable Frequency Drive, its uses and set up.

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Introduction

The A66P1 communications adapter card connects an Altivar 66 variable frequency drive controller (see Figure 1 below) to a P1 multidrop network. It will allow the P1 field cabinet or other bus master to adjust drive operational parameters, command, control, and monitor drive operation, and diagnose drive fault conditions.

The A66P1 is a Type 3 PCMCIA card with an attached 3 meter cable terminated with a 15-pin D-Sub connector. The A66P1 is designed to operate in the PCMCIA slot of an I/O extension module (VW3A66201T or VW3A66202T) or communication carrier module VW3A66205 (not the drive's main PCMCIA slot), and requires drive firmware revision 3.2 or later.

NOTE: This manual is not intended to be used as a guide for drive operations. It is written to explain connection of the A66P1 to the P1 network, and to describe the mapping of the drive parameters into the P1 points list. For information on drive operation, refer to Instruction Bulletin VD0C06S304B (Altivar 66 User's Manual).

Figure 1: Altivar 66 variable frequency drive.
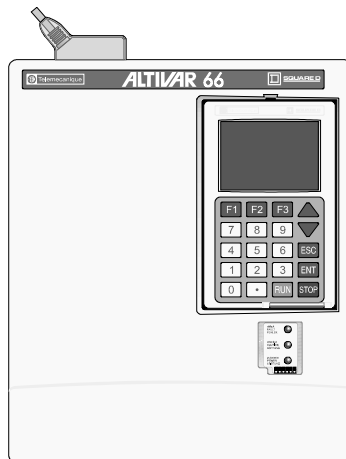
Refer to Section 1 of Instruction Bulletin VD0C06S308 for installation instructions for the A66P1 communication card in the Altivar 66 drive controller. Please note the following additions/modifications to the Square D installation instructions:

- For the A66P1 communications card to operate correctly, the drive into which it is installed must have revision 3.2 or later firmware. This may be viewed on the Drive Identification menu page, for example "ATV66U41N4, CT, **V3.2**"

- In the drive's communications setup (menu 11), set Protocol to Modbus+ and Address to the desired P1 LAN address. Set the Timeout to a value appropriate for the system's scan rate. When the drive is under Serial Link Control, this timeout value will determine how long the drive will run without receiving communications from the P1 bus master before shutting down. The Peer Cop and Global Data parameters are not used and should be set to NO and zero respectively. When the card is recognized by the drive, the drive's Comm. State menu (menu 12) will reflect the selected address and show a constantly changing token counter.

- The adapter supports the P1 serial protocol at 4800 bits per second, 8 data bits,1 start bit, 1 stop bit, and no parity. These settings cannot be changed in the field.

The A66P1 PCMCIA card has an attached cable which terminates in a 15-pin D-Subminiature male plug. LAN Connection to this plug is as shown in Figure 2 on page 8. Connection to this plug may be made using Phoenix Contact part number FLKM-D 15 SUB/B, or by building a cable to make the following connections:
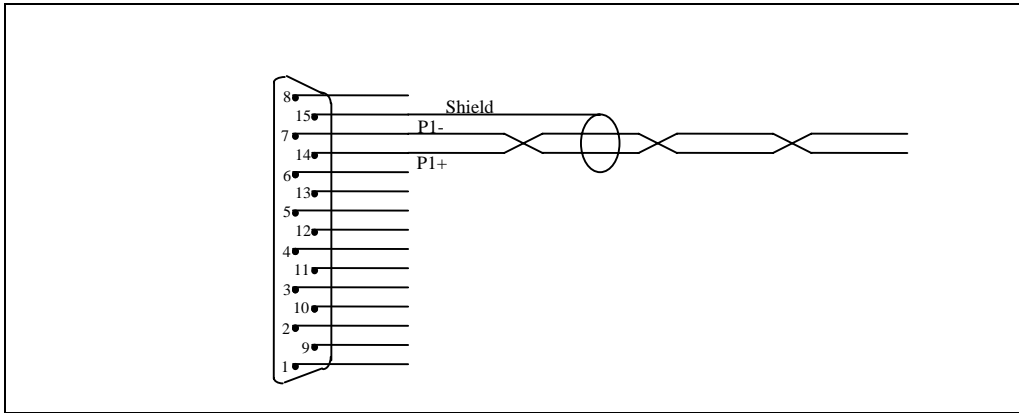
Figure 2: Connection of P1 LAN to A66P1 DB-15 connector.

Because the motor leads from a variable frequency drive transmit a lot of electrical noise, it is important to keep the network wiring as isolated as possible from the motor leads and any other high current wiring. If the VFD is mounted in a shielding enclosure, a minimum of network wiring should be inside the enclosure, with the remainder of the wiring done in a separately grounded enclosure.

Serial Link Control

The default configuration for the A66P1 communication card as described above will cause the drive to enter "SLC" or "Serial Link Control" when the PCMCIA card is initialized by the P1 host device. This means that the drive expects to get its operational parameters (run speed, direction, etc.) from the communications link.

In situations where it is not desirable to have the drive commanded over the serial network, the card can be configured to not automatically put the drive into SLC mode upon initialization. In order to disable the drive's automatically entering SLC mode on initialization, the configuration parameter "PEERCOP…" in the drive's Communications Setup menu (Menu 11) should be set to "YES". When this is done, the drive will prompt for further information: "Num. Registers" should always be set to 1 for use with this communications card. "Command Node" may be set to one of several values, to select different SLC startup behaviors. See Table 1 below for configurations available via the "Command Node" parameter.

Table 1: Configurations available through "Command Node" parameter

COMMAND NODE	SLC on Initialization
1	NO
33	YES

Fault Management

When the Altivar 66 drive is operating in Serial Link Control (SLC) mode, the timeout value set in Menu 11 controls how long the drive will continue to run after losing communications from the N2 master. When the timeout expires without receiving a message from the master, the drive will go into fault mode and stop the motor.

In order to enable fault recovery over the N2 network, set *Auto-Restart* in Menu 7.4 (*Fault Management*) to YES. In the *Auto-Restart* submenu, set *Restarts* and *Delay time* as appropriate for the system. If *Auto-Restart* is set to NO, the fault must be recovered at the drive control panel. With *Auto-Restart* set to YES, the drive will exit fault mode, and resume normal operations after the drive is re-initialized via the N2 network, and after *Delay time* has expired.

3
Operation

The essential command and monitoring parameters of the Altivar 66 drive controller are mapped into the Point list according to the P1 protocol (See Table 2 through Table 4, on pages 12 through 14). The inputs may be monitored for Changes Of Value (COVs), as provided by the P1 protocol.

The A66P1 card has two LED indicators. The green indicator will flash as P1 communications packets are received. The red indicator will flash if a packet or command is in error or otherwise not recognized by the card. If the last message sent to the card has an error, the red light may stay on until a new, good, packet is received. Errors which will light the red LED include: CRC error, inter-character timeout error, attempt to read, write, or characterize an unsupported or illegal point, an attempt to characterize a point before the characterize LLCTR command has been processed, or an illegal P1 opcode.

Table 2: A66P1 Point List

Point Number	Descriptor	Register Address	Factory Default (SI Units)	Engr. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
01	CTLR ADDRESS	N/A	--	--	1	0	--	--
02	APPLICATION	N/A	2705	--	1	0	--	--
{03}	FREQ OUTPUT	2041	--	HZ	0.0302	-494.7968	--	--
{04}	CMD FREQ OUT	2021	0	HZ	0.0302	-494.7968	--	--
{05}	SPEED	2060	--	RPM	2	-32768	--	--
{06}	CURRENT	2042	--	A	.1	0	--	--
{07}	TORQUE	2045	--	PCT	.1	0	--	--
{08}	POWER	2052	--	kW	.1	0	--	--
{09}	DRIVE TEMP	2057	--	PCT	1	0	--	--
{12}	RUN TIME	2058	--	HRS	1	0	--	--
{13}	DC BUS VOLT	2055	--	VOLT	1	0	--	--
{14}	OUTPUT VOLT	2053	--	VOLT	1	0	--	--
{15}	LINE VOLT	2054	--	VOLT	1	0	--	--
{16}	MOTOR TEMP	2056	--	PCT	1	0	--	--
{17}	STATUS 1	2047	--	--	1	0	--	--
{18}	STATUS 2	2048	--	--	1	0	--	--
{19}	STATUS 3	2049	--	--	1	0	--	--
20	OVRD TIME	N/A	0	HRS	1	0	--	--
{21}	FWD.REV	2040,9	FWD	--	1	0	REV	FWD
{22}	CMD FWD.REV	2031,1	FWD	--	1	0	REV	FWD
{23}	STOP.RUN	2040,8	STOP	--	1	0	RUN	STOP
{24}	CMD STP.STRT	2020,5	STOP	--	1	0	START	STOP
{25}	CMD DC BRAKE	2020,6	OFF	--	1	0	ON	OFF
{26}	ORIENT STOP	2020,7	OFF	--	1	0	ON	OFF
{27}	FREEWHEEL	2020,8	OFF	--	1	0	ON	OFF
{28}	FAST STOP	2020,9	OFF	--	1	0	ON	OFF
{29}	DAY.NIGHT	N/A	DAY	--	1	0	NIGHT	DAY
{30}	CURR LIM STG	2024	150	PCT	.1	0	--	--
{31}	ACCEL TIME 1	2002	3.0	SEC	.1	0	--	--
{32}	DECEL TIME 1	2003	3.0	SEC	.1	0	--	--
{33}	ACCEL TIME 2	2004	5.0	SEC	.1	0	--	--
{34}	DECEL TIME 2	2005	5.0	SEC	.1	0	--	--

NOTES:

1. Points not listed are not used in this application.

2. A single value in a column means that the value is the same in English units and in SI units.

3. Point numbers that appear in brackets { } may be unbundled at the field panel.

Table 3: A66P1 Point List (continued)

Point Number	Descriptor	Register Address	Factory Default (SI Units)	Engr. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
{35}	I LIMIT CMD	2031,0	OFF	--	1	0	ON	OFF
{36}	TORQ LIM ON	2031,3	OFF	--	1	0	ON	OFF
{37}	TORQUE LIMIT	2025	200	PCT	1	0	--	--
{38}	REGEN TORQUE	2026	200	PCT	1	0	--	--
{39}	VOLT REDUCE	2028	100	PCT	1	0	--	--
{40}	RELAY OUT 1	2043,11	OFF	--	1	0	ON	OFF
{41}	RELAY OUT 2	2043,12	OFF	--	1	0	ON	OFF
{42}	RELAY OUT 3	2043,13	OFF	--	1	0	ON	OFF
{43}	RELAY OUT 4	2043,14	OFF	--	1	0	ON	OFF
{44}	LO1 CMD	2022,1	OFF	--	1	0	ON	OFF
{45}	LO2 CMD	2022,2	OFF	--	1	0	ON	OFF
{46}	RELAY 2 CMD	2022,6	OFF	--	1	0	ON	OFF
{47}	RELAY 3 CMD	2022,7	OFF	--	1	0	ON	OFF
{48}	RELAY 4 CMD	2022,8	OFF	--	1	0	ON	OFF
{49}	IO STATE	2043,0	--	--	1	0	--	--
{50}	ANALOG OUT 1	2023	0	PCT	0.02442	0	--	--
{51}	ANALOG OUT 2	2029	0	PCT	0.02442	0	--	--
{52}	ANALOG OUT 3	2030	0	PCT	0.02442	0	--	--
{53}	ANALOG IN 1	2044	0	PCT	1	0	--	--
{54}	ANALOG IN 2	2063	0	PCT	1	0	--	--
{55}	ANALOG IN 3	2064	0	PCT	1	0	--	--
{56}	ANALOG IN 4	2065	0	PCT	1	0	--	--
{74}	CMD OVER LNK	2020,1	--	--	1	0	YES	NO
{75}	REF OVER LNK	2020,2	--	--	1	0	YES	NO
{76}	SLC TIMEOUT	2020,4	--	--	1	0	ON	NTO
{77}	COMMAND	2040,0	--	--	1	0	LOCAL	SLC
{78}	READY	2040,1	--	--	1	0	READY	NO
{79}	FAULT	2040,2	--	--	1	0	FAULT	OK
{80}	RESET	2040,3	--	--	1	0	AUTH	NO
{81}	BRAKE RELAY	2040,4	--	--	1	0	ON	OFF
{82}	FORCED LOCAL	2040,5	--	--	1	0	ON	OFF
{83}	TIME OUT	2040,6	--	--	1	0	OK	FAULT

NOTES:

1. Points not listed are not used in this application.

2. A single value in a column means that the value is the same in English units and in SI units.

3. Point numbers that appear in brackets { } may be unbundled at the field panel.

Table 4: A66P1 Point List (continued)

Point Number	Descriptor	Register Address	Factory Default (SI Units)	Engr. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	On Text	Off Text
{84}	RESETTABLE	2040,7	--	--	1	0	YES	NO
{85}	DC INJECTION	2040,10	--	--	1	0	ON	OFF
{86}	STEADY STATE	2040,11	--	--	1	0	YES	NO
{87}	THERMAL OVLD	2040,12	--	--	1	0	FAULT	OK
{88}	CURRENT LIM	2040,14	--	--	1	0	LIMIT	NO
{89}	PHASE LOSS	2040,15	--	--	1	0	FAULT	OK
{90}	FAULT NUM	2050	0	--	1	0	--	--
{91}	FAULT 1	2142	0	--	1	0	--	--
{92}	FAULT 2	2144	0	--	1	0	--	--
{93}	FAULT 3	2146	0	--	1	0	--	--
{94}	FAULT 4	2148	0	--	1	0	--	--
{95}	FAULT 5	2150	0	--	1	0	--	--
{96}	FAULT 6	2152	0	--	1	0	--	--
{97}	FAULT 7	2154	0	--	1	0	--	--
{98}	FAULT 8	2156	0	--	1	0	--	--
99	ERROR STATUS	N/A	0	--	1	0	--	--

NOTES:

1. Points not listed are not used in this application.

2. A single value in a column means that the value is the same in English units and in SI units.

3. Point numbers that appear in brackets { } may be unbundled at the field panel.

A66 card not responding

In most cases, this indicates faulty network wiring. With the drive powered and the A66 card connected to an active network, the LED indicators on the top of the card provide some information. If the GREEN LED flashes, it indicates that the card is seeing network traffic. If the RED LED flashes, it indicates the previously received message is in error. If the RED LED flashes on every message, it could mean the network wires could be switched (A for B, or + for -).

If the card is wired correctly but fails to communicate, double-check the Communication Setup in Menu 11. The A66P1 should have a unique network address. See the installation and configuration information on page 7.

Inconsistent communication

If communications can be established with the A66 card but the communication is inconsistent, network noise could be causing messages to be lost on the network. In this case, the RED LED on the top of the A66 card will be flashing occasionally indicating an incomplete message or one with a failed checksum.

The card does keep a running count of messages received with checksum errors. This statistic is reported on Menu 12 of the Altivar Drive, under "Token Good: X ms". X will be an integer counter of the number of messages the card has received with checksum errors. This counter counts up to 65535 and stops. The counter may be reset by cycling power on the drive.

When checksum errors on the network are interfering with communications, the network wiring must be evaluated for noise immunity.

The network wiring should be as isolated as possible from the inherently noisy motor leads from the VFD. Where Faraday (grounded metal) shielding cannot be between the motor leads and the network wiring, keep the wires as physically separate as possible. In as short a run as possible, get the network wiring into its own grounded metal enclosure, or out of the metal

enclosure containing the motor leads. All network wiring should be run through shielded conduit to avoid electromagnetic interference.