QUICK START GUIDE

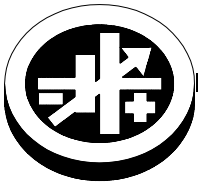**KEPCO** An ISO 9001 Company.

BIT 4886

BIT 4886
DIGITAL INTERFACE CARD

I — INTRODUCTION

SCOPE OF MANUAL. This Quick Start Guide covers the installation, checkout and operation of the Kepco BIT 4886 Card installed in a BOP power supply. Full specifications and operating procedures are listed in the Operator Manual that can be downloaded from the Kepco web site:

• www.kepcopower.com/support/opmanls.htm#bit

DESCRIPTION. The Kepco BIT Card Series were designed as an accessory for the Kepco BOP series bipolar power supplies. The BIT 4886 card acts as an interface between the digital data bus and the BOP, accepting the digital input data and converting it to an analog signal, which in turn, controls the BOP output.

II — INSTALLATION

CAUTION: If the BIT card was not pre-installed in a BOP at Kepco, you must install and calibrate the card by following the instructions in the Operator Manual which can be downloaded from the Kepco website (see above). Failure to calibrate the unit could impact the accuracy of settings and readbacks. It will not impact remote operation of the unit.

STARTUP DEFAULT. The Device Address (GPIB address) for the interface card is set by means of DIP switch S1, positions 1 through 5 (Figure 1) which can be accessed through the top cover of the BOP. It is factory preset to address 6. If a different Device Address is required in your system, there are 31 (1-31) possible choices (see Table 1).

TABLE 1. DEVICE ADDRESS SELECTION

DECIMAL ADDRESS	SELECTOR SWITCH S1 SECTION (SIGNAL LINE)				
	A5	A4	A3	A2	A1
1	0	0	0	0	1
2	0	0	0	1	0
3	0	0	0	1	1
4	0	0	1	0	0
5	0	0	1	0	1
6	0	0	1	1	0
7	0	0	1	1	1
8	0	1	0	0	0
9	0	1	0	0	1
10	0	1	0	1	0
11	0	1	0	1	1
12	0	1	1	0	0
13	0	1	1	0	1
14	0	1	1	1	0
15	0	1	1	1	1
16	1	0	0	0	0
17	1	0	0	0	1
18	1	0	0	1	0
19	1	0	0	1	1
20	1	0	1	0	0
21	1	0	1	0	1
22	1	0	1	1	0
23	1	0	1	1	1
24	1	1	0	0	0

ADDRESS SELECTION SEE DETAIL "A"

REAR PROGRAMMING CONNECTOR

RS 232 CONNECTOR

GPIB (IEEE) CONNECTOR

BOP POWER SUPPLY

NOTE: REAR PROGRAMMING CONNECTOR MUST BE INSTALLED FOR BOP TO OPERATE.

CARD EDGE

S1   5 4 3 2 1

0 = CLOSED (ON)
1 = OPEN (OFF)

ADDRESS SELECTION (ADDRESS 6 SHOWN)
DETAIL "A"

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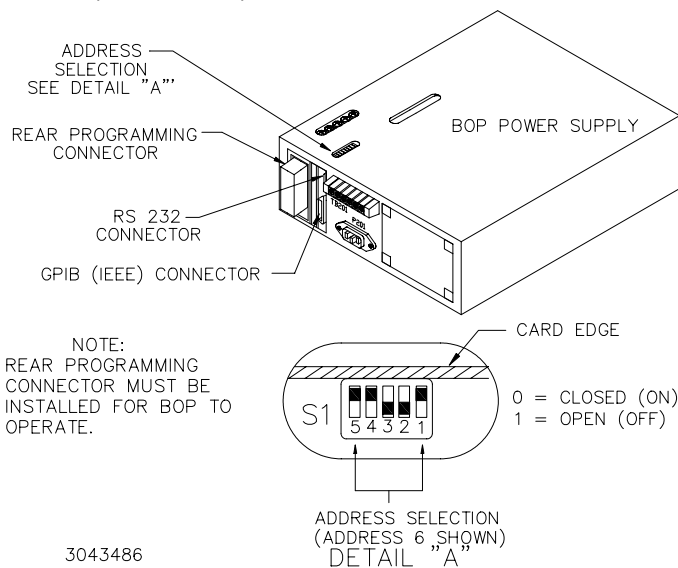
FIGURE 1. SETTING THE GPIB ADDRESS

TABLE 1. DEVICE ADDRESS SELECTION (CONT)

DECIMAL ADDRESS	SELECTOR SWITCH S1 SECTION (SIGNAL LINE)				
	A5	A4	A3	A2	A1
25	1	1	0	0	1
26	1	1	0	1	0
27	1	1	0	1	1
28	1	1	1	0	0
29	1	1	1	0	1
30	1	1	1	1	0
31	1	1	1	1	1

NOTE:
0 = CLOSED (ON) (Towards printed circuit board)
1 = OPEN (OFF) (Away from printed circuit board)

CHECKOUT PROCEDURE.

1. Connect the BOP-BIT 4886 Interface Card to either:
   a) the GPIB bus using a standard GPIB cable connected to the BIT 4886 24-pin GPIB connector (J1) or
   b) to an external RS-232 controller with a DB9 type connector (male pins) by connecting the RJ45 patch cord to the BIT 4886 RS 232 port (J2), then using the RJ45 to DB9 adapter supplied (see Figure 2) to connect the RJ45 patch cord to the external controller. On the RJ45 patch cord, the 6-pin connector plugs into the BIT 4886 RS 232 port, and the 8-pin connector plugs into the RJ45 to DB9 adapter (see Table 2 and Figure 2).
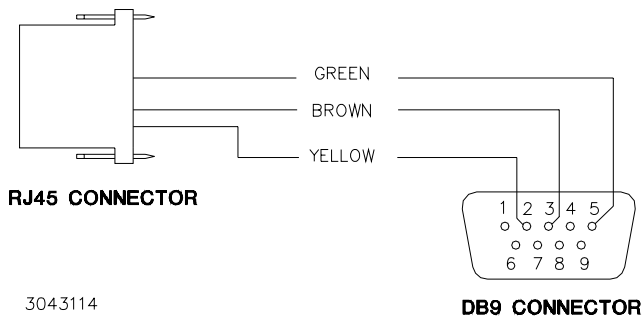
GREEN
BROWN
YELLOW

RJ45 CONNECTOR

3043114

1 2 3 4 5
6 7 8 9

DB9 CONNECTOR

FIGURE 2. RJ45 TO DB9 ADAPTER WIRING

TABLE 2. RJ45 TO DB9 ADAPTER WIRE FUNCTIONS

Wire	DB9 Pin	Purpose
Green	5	Return for pins 2 and 3.
Brown	3	Carries data from the Kepco power supply to the controller.
Yellow	2	Carries data from the controller to the Kepco power supply.

2. Apply power to BOP power supply. The BOP-BIT 4886 will beep for less than 1 second, then will be ready for use.

3. Send the ***IDN?** query via either the GPIB or RS 232 port.

   Assuming the BIT 4886 card is installed in a BOP 72-6 as an example, verify that the unit responds with **KEPCO,BIT488-6 72-6,A38621 11/10/98,1.81-1.81**.

   If the unit responds with **KEPCO,BIT488-6 200-20,A38621 10/01/98,1.81-1.81**, it means that the card was not initialized; refer to Operator Manual to initialize the card. Note that date **10/01/98** is the initial calibration date performed at the factory and indicates the card has never been calibrated by the user.

4. Send **VOLT?** Verify that unit responds with **0** (indicating voltage is set to 0, the power-up condition).

5. Send **OUTPUT ON;VOLT MAX**. Verify that the BOP power supply provides maximum output voltage (e.g., 72V d-c. for BOP 72-6).

6. Send **FUNC:MODE CURR**. Verify that BOP front panel current LED lights.

7. Send **FUNC:MODE VOLT**. Verify that BOP front panel voltage LED lights.

8. Send ***TST?** and verify response is 0. This verifies the bit 4886 microprocessor is operating correctly.

9. With no load connected, send **DIAG:TST?** and verify response is 0. **CAUTION:** This test swings the output to Volt MAx and Volt Min at full power. If a Load is connected, damage to the load may occur, or the test may fail due to the load effect on unit output voltage

III — OPERATION

The BOP can now be controlled via either the RS 232 or GPIB ports using IEEE 488 and SCPI commands. The applicable commands and queries are listed in Table 3 and 4, respectively. For a full description of all commands as well as remote programming information, refer to the BIT 4886 Operator Manual listed on page 1 of this guide.

TABLE 3. IEEE 488.2 COMMANDS/QUERIES

COMMAND	Function
*CLS	Clear Status Command - clears status data.
*ESE, ?	Standard Event Status Enable Command programs Standard Event Status Enable register, Query returns register mask.
*ESR?	Event Status Register Query returns register contents, then clears register.
*IDN?	Identification Query returns identification character string.
*OPC, ?	Operation Complete Command causes power supply to set status bit 0 (Operation Complete) when pending operations are complete When Query returns "1" operations are complete.
*OPT?	Options Query lists option functionality.
*RCL	Recall Command restores power supply to previously saved settings.
*RST	Rest Command resets power supply to power on default state.
*SAV	Save Command saves present power supply settings for later recall.
*SRE, ?	Service Request Enable Command sets the condition of Service Request Enable register. Query reads register.
*STB	Status Byte Register Query reads Status Byte Register without clearing it.
*TRG	Trigger Command triggers power supply to preprogrammed values of output current and voltage.
*TST?	Self Test Query Initiates power supply self test.
*WAI	Wait-To-Continue Command requires completion of previously issued commands and queries before continuing.

TABLE 4. SCPI COMMANDS/QUERIES

COMMAND	Function
INIT[:IMM]	INITiate[:IMMediate] Command enables a single trigger.
INIT:CONT, ?	INITiate:CONTinuous Command enables/disables continuous triggers; query shows trigger enabled/disabled status.
MEAS:CURR?	MEASure[:SCALar]:CURRent[:DC]? Query measures actual current.
MEAS:VOLT?	MEASure[:SCALar]:VOLTage[:DC]? Query measures actual voltage.
OUTP, ?	OUTPut[:STATe] Command enables (1 or ON) or disables (0 or OFF) the power supply output. Query shows if output is on (1) or off (0).
FUNC:MODE, ?	[SOURce:]FUNCtion:MODE Command establishes operating mode of power supply VOLT = voltage, CURR = current. Query shows mode.
FUNC:MODE :TRIG, ?	[SOURce:]FUNCtion:MODE:TRIGger establishes operating mode of power supply when TRIGger command is sent. Query returns mode programmed.
LIST:CLE	[SOURce:]LIST:CLEar Command Clears all list entries by setting all pointers to 0.
LIST:COUN, ?	SOURce:]LIST:COUNt Command establishes how many times the list is executed. Query shows programmed setting.
LIST:COUN :SKIP	[SOURce:]LIST:COUNt:SKIP Command allows beginning steps of list-generated waveform to be run once, then ignored. Query shows how many steps to skip after the first time.
LIST:CURR, ?	SOURce:]LIST:CURRent Command adds current value (in Amps) to list. Query identifies parameters (main channel) entered for list.
LIST:CURR :POIN?	[SOURce:]LIST:CURRent:POINts? Query identifies the total number of points in a list and next location to be filled.
LIST:DIR, ?	[SOURce:]LIST:DIRection Command establishes which direction to run list. Query shows programmed direction.
LIST:DWEL, ?	[SOURce:]LIST:DWELl Command determines how long the main channel parameters will be active. Query shows programmed dwell times.
LIST:DWEL :POIN?	[SOURce:]LIST:DWELl:POINts? Query identifies number of locations with dwell times.
LIST:GEN, ?	[SOURce:]LIST:GENeration Command establishes the order for executing the list. Query shows selection of either default or user sequence.
LIST:QUER, ?	[SOURce:]LIST:QUERy Command determines first location to be queried by LIST:SEQ?; Query shows programmed location.
LIST:MODE, ?	[SOURce:]LIST:MODE Command determines dwell time resolution SLOW (default) or FAST. Query shows mode.
LIST:SEQ, ?	[SOURce:]LIST:SEQuence Command determines execution order for list data points (not recommended for new designs). Query shows user execution sequence for list.

TABLE 4. SCPI COMMANDS/QUERIES (CONT)

COMMAND	Function
LIST:VOLT, ?	SOURce:]LIST:VOLTage Command adds voltage value (in Volts) to list. Query identifies parameters (main channel) entered for list.
LIST:VOLT :POIN?	SOURce:]LIST:VOLTage:POINts? Query identifies total number of points in a list.
CURR, ?	SOURce:]CURRent[:LEVel][:IMMediate][:AMPlitude] Command programs output current (actual current depends on load). Query shows programmed current or maximum/minimum current allowed.
CURR:MODE, ?	SOURce:]CURRent:MODe Command allows user to execute (LIST) or stop (FIX) a list, or to execute a transient (TRAN). Query identifies active current mode.
CURR:RANG, ?	[SOURce:]CURRent[:LEVel]RANGe Command sets output current range, 1 = full scale, 4 = 1/4 scale. Query shows programmed current range.
CURR:RANG :AUTO	[SOURce:]CURRent[:LEVel]RANGe:AUTO Command sets current range to automatic.
CURR:TRIG, ?	SOURce:]CURRent[:LEVel]TRIGgered[:AMPlitude] Command programs current value of trigger. Query shows programmed value.
VOLT, ?	[SOURce:]VOLTage[:LEVel][:IMMediate][:AMPlitude] Command programs output voltage (actual voltage depends on load). Query returns programmed value.
VOLT:MODE	SOURce:]VOLTage:MODE Command allows user to execute (LIST) or stop (FIX) a list, or to execute a transient (TRAN). Query identifies active voltage mode.
VOLT:RANG, ?	[SOURce:]VOLTage[:LEVel]:RANGe Command sets output voltage range, 1 = full scale, 4 = 1/4 scale. Query shows programmed voltage range.
VOLT:RANG :AUTO	[SOURce:]VOLTage:[:LEVel]RANGe:AUTO Command sets voltage range to automatic.
VOLT:TRIG, ?	SOURce:]VOLTage[:LEVel]TRIGgered[:AMPlitude] Command programs voltage value of trigger. Query shows programmed value.
STAT:OPER :COND?	STATus:OPERation:CONDition Query returns value of the Operation Condition Register.
STAT:OPER :ENAB	STATus:OPERation:ENABle Command sets Operation Enable Register mask. Query reads register.
STAT:OPER?	STATus:OPERation[:EVENt] Query returns the value of the Operation Event register.
STAT:PRES	STATus:PRESet Command disables reporting of all status events.
STAT:QUES?	STATus:QUEStionable[:EVENt]? Query returns value of Questionable Event register.
STAT:QUES :COND?	STATus:QUEStionable:CONDition? Query returns value of Questionable Condition Register.

TABLE 4. SCPI COMMANDS/QUERIES (CONT)

COMMAND	Function
STAT:QUES :ENAB, ?	STATus:QUEStionable:ENABle Command programs Questionable Condition Enable register. Query reads register.
SYST:BEEP	SYSTem:BEEP Command causes the unit to emit a brief audible tone.
SYST:COMM :SER:ECHO, ?	SYSTem:COMMunication:SERial:ECHO Command enables (ON) or disables (OFF) echo mode. Query indicates if echo is on or off.
SYST:COMM :SER:PACE, ?	SYSTem:COMMunication:SERial:PACE Command enables (XON) or disables (NONE) data flow control via the serial interface. Query shows enabled or disabled.
SYST:ERR?	SYSTem:ERRor? Query posts error messages to the output queue.
SYST:ERR :CODE?	SYSTem:ERRor:CODE? Query returns 3-character error code without the ASCII definition string.
SYST:ERR :CODE:ALL?	SYSTem:ERRor:CODE:ALL? Query returns a comma-separated list of all error codes.
SYST:PASS :CEN	SYSTem:PASSword:CENable Command Sets password enable if password matches.
SYST:PASS :CDIS	SYSTem:PASSword:CDISable Command disables password access if password matches.
SYST:PASS :NEW	SYSTem:PASSword:NEW Command establishes new password.
SYST:PASS :STAT?	SYSTem:PASSword:STATe? Query shows password state: enabled (1) or disabled (0).
SYST:REM,	SYSTem:REMote Command sets unit to remote (1 or ON) or local (0 or OFF) mode if using RS 232. Query shows programmed mode.
SYST:SEC:IMM	SYSTem:SECurity:IMMediate Command initializes all NVRAM variables to factory defaults.
SYST:SET, ?	SYSTem:SET Command establishes Device Clear, Line Feed, and Reset functions. Query shows programmed functions.
SYST:VERS?	SYSTem:VERSion? Query identifies SCPI Version implemented.