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1. INTRODUCTION

Polyspede's Iso-Volt II has been developed as a second generation replacement of the old Iso-Volt option board (E1476). Iso-Volt II utilizes more contemporary design techniques to achieve higher input impedance and lower output impedance than what was available in the original Iso-Volt board.

Figure 1 shows a typical system diagram of a control process line utilizing a master reference voltage supply with individual follower drive ratio potentiometers. Notice the fact that when reference signal isolation is not provided between drives, all motor controls except one must be supplied with isolation transformers. In Figure 2 the same control process line is depicted except this time signal isolation is provided by means of Polyspede's Iso-Volt II PC board. The result is that bulky isolation transformers are no longer needed for any of the drives.

The only limitation to the number of drives which can be run from a single master reference supply is the current and voltage output capabilities of the supply. Each added drive would require an additional Iso-Volt II assembly to provide the necessary electrical isolation

There are two additional features that deserve mentioning. Iso-Volt II is capable of handling both 115VAC and 230VAC power inputs. The PC board mounted "AUTO-MANUAL" relay comes as a standard feature with Iso-Volt II. This enables the board to channel either a process signal or a signal from a manual speed pot, as desired during different modes of system operation. While additional wiring is required to implement the new "Auto-Manual" feature, no additional wiring or changes are necessary for field replacement of the old Iso-Volt (E1476) with Iso-Volt II.

Iso-Volt II has been designed so that its mounting centers match other Polyspede options such as LOAD-TROL, LOAD-SHARE, Speed Activated Relay, etc. Common mounting centers allow different options to be stacked in multiple layers, hence saving panel space. An adapter kit B9030-ML, which may be ordered separately from Polyspede, simplifies field mounting of Iso-Volt II in

place of the old Iso-Volt board. The adapter kit eliminates the need of drilling a new set of mounting holes in the panel..

2. DESCRIPTION OF OPERATION OF ISO-VOLT II

Signal isolation in the Iso-Volt II board is accomplished by means of integrated circuit opto-isolator. For achieving better linearity and zero offset error, the analog signal is first converted to pulses of proportional frequency which then is transferred through the opto-isolator to an integrator circuit. The output of the integrator is a voltage signal which varies linearly with the variation of the input voltage or current signals.

The front end of the circuitry is comprised of a scaling resistor network, followed by a low-pass active filter, which again is followed by an absolute –value circuit. This makes the Iso-Volt II highly insensitive to AC noise and the output signal is insensitive to the input signal polarity.

Functionally, the board is so designed that with maximum current or voltage input signal, a "CAL" potentiometer can be adjusted for 6 volts maximum output. Another potentiometer, "RATIO", can then be used to set for any desired lower output-to-input voltage ratio.

Signal isolation boards are available for process follower controls have an output of 1-5 ma, 4-20 ma, and 10-50 ma ranges, enabling a conversion to a 0 to 6 VDC output voltage level. Signal isolator boards are also available for 0 to 6 VDC and 0 to 4 VDC input voltage signals. In addition, boards have been designed to follow armature voltage signals, 90V, 180V, 240V, or 550V, and line tachometer signals ranging in maximum voltage signals anywhere from 10 to 150 VDC.

The boards can be powered by means of other 115 VAC or 230 VAC, 50/60 Hz power. Refer to Section 4. for proper identification.

Three adjustments, "Zero", "Cal", and "Ratio" are provided on each board to adjust zero offset, to calibrate maximum output, and to set the desired tracking ratio.

3. COMPATIBILITY WITH POLYSPEDE CONTROLS

The Iso-Volt II board is compatible with SPARTAN II, OC1, OC2-500, and HP3 motor control units. No internal modifications need to be made to these basic power units when using the Iso-Volt II board.

4 IDENTIFICATION

All Standard Iso-Volt II boards are completely identified by means of a board assembly number, E1536-XXX. The first digit after the dash identifies AC input power specification. A "1" scribed for the first digit implies 115 VAC power application, while "2" stands for 230 VAC applications. The input power capability is selected via PC board jumpers at the factory. The second and third digits define current or voltage input signal rating. Refer to Table I in schematic E1536-00-ES for proper input signal rating.

Non-standard boards have an additional "MXXXXX" number typed on an Avery label, in which case one must refer to the special documentation that accompanies the board for proper application.

5. SPECIFICATIONS

Power Input ……. (Selected via PC board jumpers at factory)	115 VAC +/- 10 VAC or 230 VAC +/- 20 VAC
Power Input Frequency ……..	50/60 Hz
Signal Input Voltage or Current Ranges ……..	See E1536-000-ES for various possibilities.
Input noise Attenuation……	20 db/decade above 2.5 Hz cutoff frequency
Input impedance…….	See E1536-000-ES for scaling resistors
Output Voltage Swing…….	0 to 6 VDC
Output Current Capability……..	8 ma
Linearity…….	+/- 0.5% of full scale
Temperature coefficient……	+ 0.02%/ Cof full scale output
Line Voltage Coefficient……..	+0.01% of maximum output per volt change in line voltage
Physical Dimensions:	
Board Size……	5.6” x 4.5”
Component Clearance…….	1.3” above the board 0.2” under the board
Mounting Centers……	5.0” x 4.0”

6. INSTALLATION AND WIRING

The Iso-Volt II PC board is normally provided as a factory installed sub-assembly, which is wired to related motor-control units that require reference signal isolation. Occasionally the Iso-Volt II PC board is supplied separately for user installation and wiring, either for new designs or as replacement spare part for old Iso-Volt board E1476. Refer to Section 6.1 or 6.2 respectively.

6.1 Installation and Wiring in New Designs

The mounting centers of the Iso-Volt II PC boards are 5.0" x 4.0". The board should be mounted on a panel using minimum 0.5" spacer and #6 hardware. Figure 3 illustrates typical wiring of Iso-Volt II in new designs.

6.2 Replacement of Original Iso-Volt Board (E1476) with Iso-Volt II

The mounting centers of Iso-Volt boards are 5.0" x 4.0", different from those of the original Iso-Volt board (E1476). Therefore a new set of mounting holes is necessary for field replacement with Iso-Volt II. Drilling new holes on the panel may be avoided by using an adapter kit (part no. B9030-ML). The adapter kit comes with instructions and can be ordered separately from Polyspede Electronics.

It is highly recommended that whenever possible the new board be wired according to the diagram shown in Figure 3. This is compatible with the normal usage of the E1536 PC board. However, if wire lengths and the position of the cable bundle do not permit rewiring according to Figure 3, then the wiring scheme shown in Figure 4 may be used.

The wiring diagram described in Figure 4 is basically an "identical" terminal-for-terminal replacement of wiring done on the old Iso-Volt (E1476) PC board. (Some wiring is redundant and has been left in the diagram for the sake of uniformity.) The only exception is the 500V or 550V input signal applications, where the input wires went to terminals 3 and 4. On the Iso-Volt II terminal 3 is no longer an unassigned tie point, as it was on the old Iso-Volt (E1476).

Therefore, like all other input applications, the input signal wires for 500 or 550 volt applications should be routed to terminals 4 and 5 of the Iso-Volt board. It should be noted that if the new board is wired per Figure 4, neither does the onboard relay 850CR energize, nor does the "AUTO" LED light up. Hence the process signal is continuously channeled to the output through the normally closed (N.C.) contacts of 850CR.

7. ADJUSTMENT

Adjustment potentiometers are set per customer requirements at the factory if the Iso-Volt II is provided as part of a system, but additional field adjustment might be necessary since input current or voltage ranges may vary somewhat from the figures submitted to the factory. A digital voltmeter should be used for measuring voltages while adjusting Iso-Volt II.

7.1 "Zero" Adjustment

The zero adjustment should be made first. This should be done by first setting the internal "RATIO" potentiometer fully clockwise. In process follower systems set minimum operating current from the process control instrument, and adjust the "ZERO" potentiometer so that zero VDC appears at terminal 8 with respect to (W.R.T.) terminal10. In all other applications (master reference, armature voltage follower, or tachometer voltage follower) set zero input voltage and adjust the "ZERO" potentiometer so that zero VDC appears at terminal 8 W.R.T. terminal 10.

7.2 "Cal" Adjustment

After properly zeroing according to Section 7.1, the "CAL" potentiometer should be set so that 6 volts DC appears at terminal 8 W.R.T. terminal 10, when maximum input voltage or current is applied between input terminals 4 and 5.

7.3 "Ratio" Adjustment

After calibrating for +6 VDC output for maximum input signal, the internal "RATIO" pot can be adjusted for any lower desired voltage at terminal 8 W.R.T terminal 10. If external ratio potentiometer is used, then the internal "Ratio" pot should be set fully clockwise.

8. TROUBLE –SHOOTING

Field repair of circuit board is not recommended. The following procedure may be used to isolate the cause of malfunctions and determine if the fault lies in the Iso-Volt II board. Return faulty circuit boards to the factory for repair.

8.1 Visual Inspection

Check for loose or faulty wire connections at the circuit board terminal block 850TB. With power off, identify all wires, remove circuit board, and inspect the bottom of the board for burned or broken printed circuit conductors. Replace the board and reconnect wiring if it is visually free of fault.

8.2 Test Voltages

Using a DVM (digital voltmeter), verify correct voltages at the test points as indicated in Figure 5. When measuring DC voltages, use correct meter polarity, i.e., the common meter lead should be connected to the reference terminals 850TB-3 or 850TB-10 as indicated in Figure 5.
CAUTION: Do not ground or short any of the test ponts during measurement.
Interpretation is as follows:

8.2.1 If reading (1) is zero, fault is external.

8.2.2 If readings (2) through (5) are not specified, remove all wires from terminal block 850TB except the AC power lines going to lugs 1 and 2. Re-check readings (2) through (5). If the readings are now within specification then the

fault is external to the board. But if the readings are still off, then the board is faulty.

8.2.3 If reading (6) is outside the specification range indicated in Figure 5, check the input signal between terminal 4 and 5 on 850TB. Refer to Table I in schematic E1536-000-ES and verify that the input signal is within range for the particular assembly number. If the input signal is appropriate then it is likely that the board is faulty and may not calibrate properly.

8.3 Checking "AUTO-MANUAL" Feature

When +12 VDC is applied at terminal 11 by means of a jumper or an external auto-manual switch (refer to Figure 3), the "AUTO" LED should light up and the relay 850CR should energize, hence channeling the isolator output from terminal 7 to terminal 9 through the normally open contacts of 850CR. But if this +12 VDC signal is removed form terminal 11, the LED should go off and 850CR should de-energize. This will allow the manual speed reference to be channeled from terminal 6 to terminal 9 through the normally closed contacts of 850CR. NOTE: Voltage applied at terminal 11 is designated as ISO+12 VDC and should be measured with reference to terminal 3, while the voltages at terminals 6, 7, 8, and 9 are designated "HOT" and should be measured with reference to terminal 10.

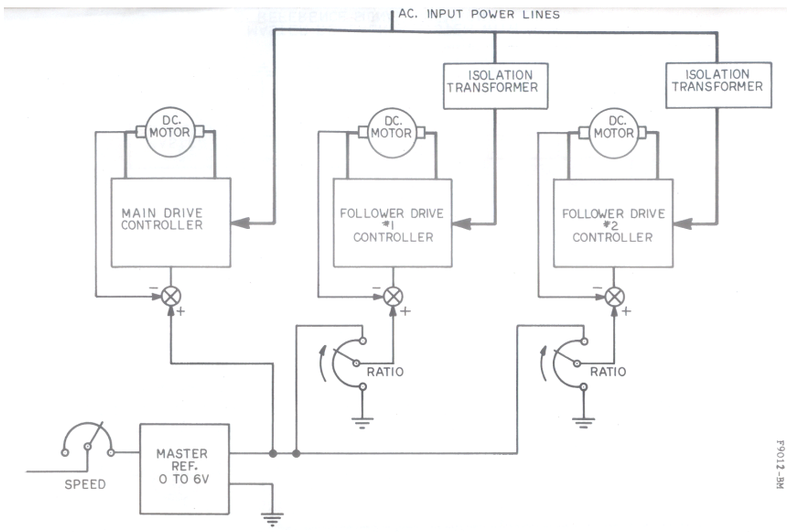


FIGURE 1.
MASTER REFERENCE SYSTEM WITHOUT REFERENCE SIGNAL ISOLATION

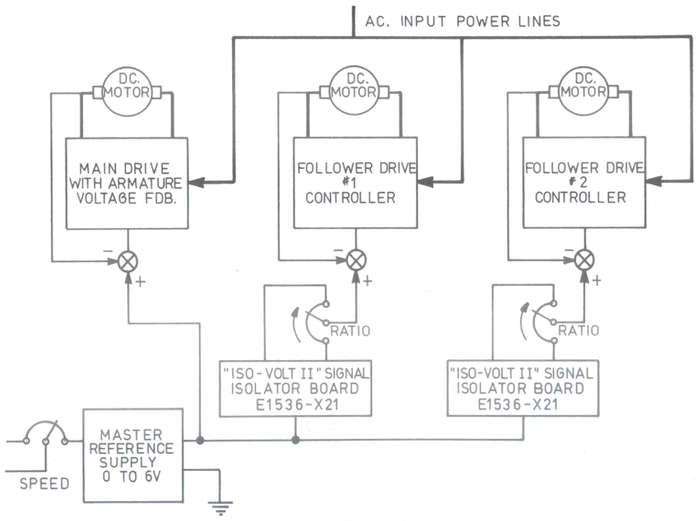


FIGURE 2.
MASTER REFERENCE SYSTEM WITH REFERENCE SIGNAL ISOLATION

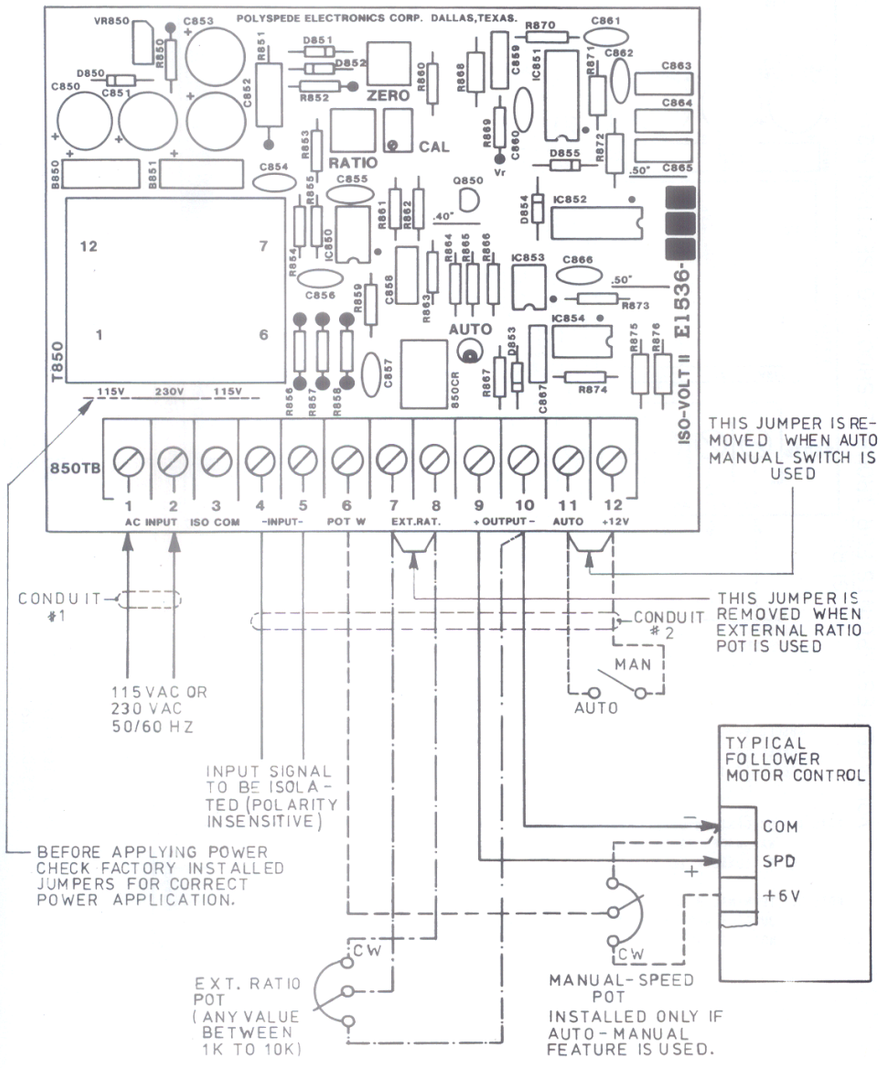
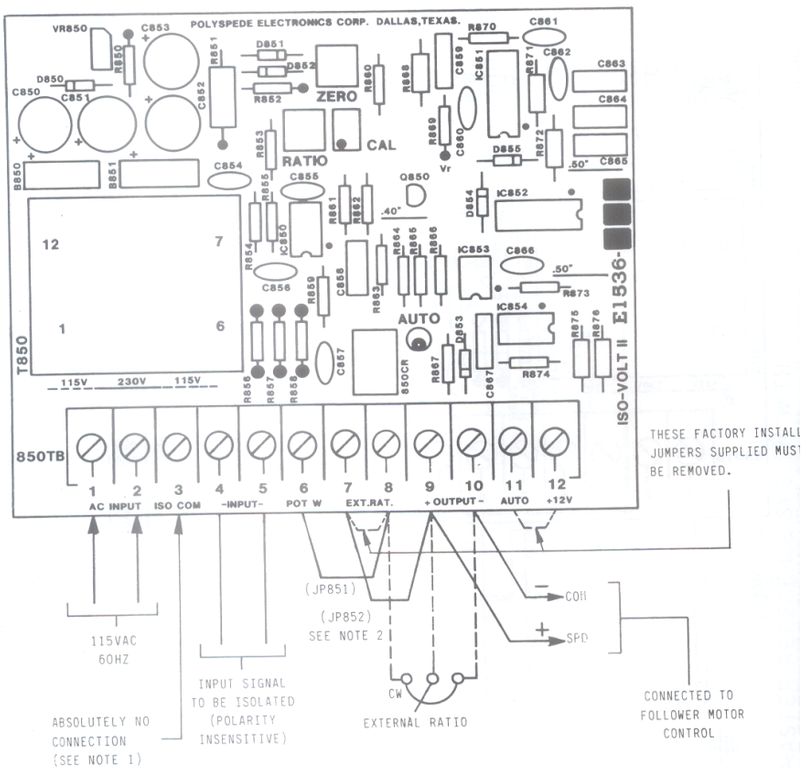


FIG. 3
TYPICAL EXTERNAL WIRING FOR ISO-VOLT II BOARD.



NOTE 1: ON CERTAIN E1476 PC BOARDS, SET UP FOR 500 OR 550 VOLT APPLICATIONS, INPUT SIGNAL WAS WIRED TO TERMINALS 3 AND 4. WHEN REPLACING SUCH BOARDS WITH ISO-VOLT II RE-CONNECT THE INPUT SIGNAL TO TERMINALS 4 AND 5.

NOTE 2: TERMINAL BLOCK JUMPERS JP851 & JP852 WERE SUPPLIED WITH E1476 PC BOARD. THESE JUMPERS WERE REMOVED IF EXTERNAL RATIO POT WAS USED. IGNORE THE SILKSCREEN NOTATION AND REWIRE IDENTICALLY TERMINAL FOR TERMINAL.

FIG. 4
WIRING DIAGRAM USED ONLY FOR FIELD REPLACEMENT OF E1476 PC BOARD WITH ISO-VOLT II

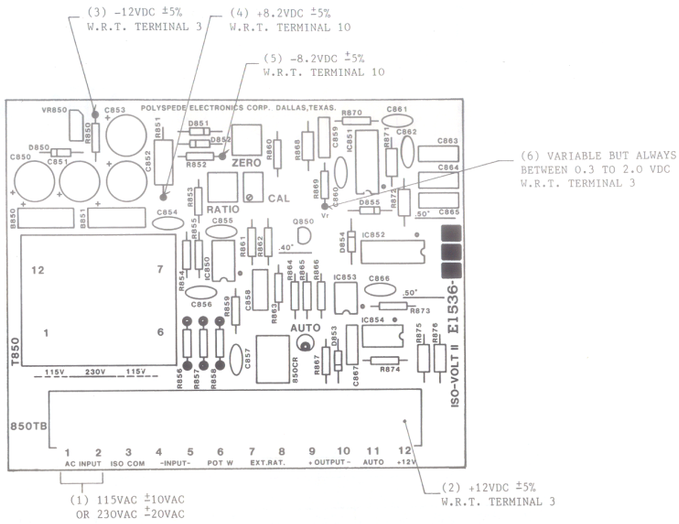


FIGURE 5
VOLTAGE TEST POINTS FOR TROUBLE-SHOOTING (SECTION 8.2)

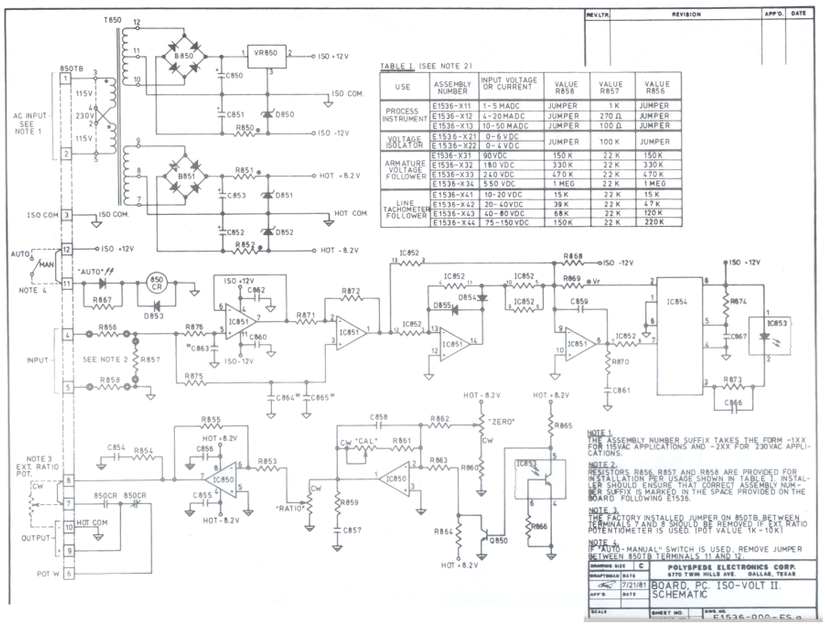


TABLE 1 (SEE NOTE 2)

USE	ASSEMBLY NUMBER	INPUT VOLTAGE OR CURRENT	VALUE R858	VALUE R857	VALUE R856
PROCESS INSTRUMENT	E1536-X11	1-5 MADC	JUMPER	1 K	JUMPER
	E1536-X12	4-20 MADC	JUMPER	270 Ω	JUMPER
	E1536-X13	10-50 MADC	JUMPER	100 Ω	JUMPER
VOLTAGE ISOLATOR	E1536-X21	0-5 VDC	JUMPER	100 K	JUMPER
	E1536-X22	0-4 VDC			
ARMATURE VOLTAGE FOLLOWER	E1536-X31	90 VDC	150 K	22 K	150 K
	E1536-X32	180 VDC	330 K	22 K	330 K
	E1536-X33	240 VDC	470 K	22 K	470 K
	E1536-X34	550 VDC	1 MEG	22 K	1 MEG
LINE TACHOMETER FOLLOWER	E1536-X41	10-20 VDC	15 K	22 K	15 K
	E1536-X42	20-40 VDC	39 K	22 K	47 K
	E1536-X43	40-80 VDC	68 K	22 K	120 K
	E1536-X44	75-150 VDC	150 K	22 K	220 K

REV. LTR.	REVISION	APP'D.	DATE

NOTE 1
THE ASSEMBLY NUMBER SUFFIX TAKES THE FORM -1XX FOR 115VAC APPLICATIONS AND -2XX FOR 230VAC APPLICATIONS.

NOTE 2
RESISTORS R856, R857 AND R858 ARE PROVIDED FOR INSTALLATION PER USAGE SHOWN IN TABLE 1. INSTALLER SHOULD ENSURE THAT CORRECT ASSEMBLY NUMBER SUFFIX IS MARKED IN THE SPACE PROVIDED ON THE BOARD FOLLOWING E1536.

NOTE 3
THE FACTORY INSTALLED JUMPER ON 850TB BETWEEN TERMINALS 7 AND 8 SHOULD BE REMOVED IF EXT. RATIO POTENTIOMETER IS USED. (POT VALUE 1K-10K)

NOTE 4
IF "AUTO-MANUAL" SWITCH IS USED, REMOVE JUMPER BETWEEN 850TB TERMINALS 11 AND 12.

DRAWING SIZE	C	POLYSPEDE ELECTRONICS CORP. 5170 TWIN HILLS AVE. DALLAS, TEXAS
DRAFTSMAN	DATE	
	7/21/81	BOARD, PC. ISO-VOLT II. SCHEMATIC
APP'D.	DATE	
SCALE	SHEET NO.	DWG. NO. E1536-000-ES-0