VMIVME-PSS500
SWING OUT POWER SUPPLY

INSTRUCTION MANUAL

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RECORD OF REVISIONS

REVISION LETTER	DATE	PAGES INVOLVED	CHANGE NUMBER
A	3/18/94	Release	94-0289
B	4/22/94	Cover, page ii and Appendix A	94-0378

VMIC
SAFETY SUMMARY

THE FOLLOWING GENERAL SAFETY PRECAUTIONS MUST BE OBSERVED DURING ALL PHASES OF THE OPERATION, SERVICE, AND REPAIR OF THIS PRODUCT. FAILURE TO COMPLY WITH THESE PRECAUTIONS OR WITH SPECIFIC WARNINGS ELSEWHERE IN THIS MANUAL VIOLATES SAFETY STANDARDS OF DESIGN, MANUFACTURE, AND INTENDED USE OF THIS PRODUCT. VME MICROSYSTEMS INTERNATIONAL CORPORATION ASSUMES NO LIABILITY FOR THE CUSTOMER'S FAILURE TO COMPLY WITH THESE REQUIREMENTS.

GROUND THE SYSTEM

To minimize shock hazard, the chassis and system cabinet must be connected to an electrical ground. A three-conductor AC power cable should be used. The power cable must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the system in the presence of flammable gases or fumes. Operation of any electrical system in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must not remove product covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT SERVICE OR ADJUST ALONE

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT SUBSTITUTE PARTS OR MODIFY SYSTEM

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to VME Microsystems International Corporation for service and repair to ensure that safety features are maintained.

DANGEROUS PROCEDURE WARNINGS

Warnings, such as the example below, precede only potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

WARNING

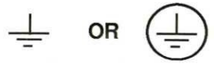
DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS SYSTEM. USE EXTREME CAUTION WHEN HANDLING, TESTING, AND ADJUSTING.

SAFETY SYMBOLS

GENERAL DEFINITIONS OF SAFETY SYMBOLS USED IN THIS MANUAL

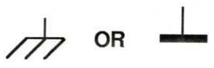
Instruction manual symbol: the product is marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect against damage to the system.

Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1000 volts are so marked).



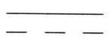
Protective conductor terminal. For protection against electrical shock in case of a fault. Used with field wiring terminals to indicate the terminal which must be connected to ground before operating equipment.

Low-noise or noiseless, clean ground (earth) terminal. Used for a signal common, as well as providing protection against electrical shock in case of a fault. Before operating the equipment, terminal marked with this symbol must be connected to ground in the manner described in the installation (operation) manual.

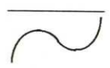


Frame or chassis terminal. A connection to the frame (chassis) of the equipment which normally includes all exposed metal structures.

Alternating current (power line).



Direct current (power line).



Alternating or direct current (power line).

The WARNING sign denotes a hazard. It calls attention to a procedure, a practice, a condition, or the like, which, if not correctly performed or adhered to, could result in injury or death to personnel.

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, a practice, a condition, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the system.

NOTE: The NOTE sign denotes important information. It calls attention to a procedure, a practice, a condition or the like, which is essential to highlight.

VMIVME-PSS500
SWING OUT POWER SUPPLY

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VMIVME-PSS500 Swing Out Power Supply

CHAPTER

1

INTRODUCTION

The VMIVME-PSS500 Swing Out Power Supply provides the user with a selection of DC voltages and currents for providing power to VMEbus chassis requiring 5 volts, +12 volts, and -12 volts at 80 amps, 10 amps, and 5 amps maximum respectively, for a total not to exceed 500 W.

SECTION 1 - FEATURES

The VMIVME-PSS500 Swing Out Power Supply AC input voltage range is externally jumper selectable to the appropriate input operating range of the power supply to match the AC line supply voltage (115 or 230 V, 50/60 Hz). Each power supply is shipped with two different power cords (115 V and 230 V). These power supplies are designed to be mounted to the rear of the J1/P1 backplane. These power supplies are high efficiency up to 80 percent with built-in RFI filtering, overvoltage protection, fast recovery, short response time, and dielectric withstand of 2,400 VDC input/output, input/ground and 500 VDC output/ground for two seconds as standard features.

SECTION 2 - GENERAL DESCRIPTION

VMIVME-PSS500 Swing Out Power Supply provides high quality, high efficiency, high density DC power with the lowest failure rate feasible, utilizing a proprietary switching design. This design overcomes many previous cross-conduction problems common to switching power supplies by eliminating DC imbalance in the primary winding of the switching transformer, thus preventing spiking and component stress associated with core saturation. Soft start circuit to limit in-rush current at turn on or power interrupt cycle time is standard on the VMIVME-PSS500 Swing Out Power Supply.

SECTION 3 - REFERENCE MATERIAL LIST

150-000061-000	Assembly drawing
800-000061-000	Specification
510-000061-000	Test Procedure

The following reference materials are found in Appendix A and are for reference purpose only and are not to be copied or duplicated by any media without prior permission and duly approved in writing from VMIC's Contracts Administrator.

Power unit layout drawing

Power unit schematic

CHAPTER

2

PHYSICAL DESCRIPTION AND SPECIFICATIONS

SECTION 1 - PHYSICAL DESCRIPTION AND SPECIFICATIONS

Physical description and specifications can be found in the Specification 800-000061-000.

SECTION 2 - ASSEMBLY DRAWINGS

For assembly drawing, please see 150-000061-000 (for reference only).

SECTION 3 - LAYOUTS

For layout drawings, please see Appendix A (for reference only).

SECTION 4 - SCHEMATICS

For schematics, please see Appendix A (for reference only).

CHAPTER

3

INSTALLATION

SECTION 1 - UNPACKING PROCEDURES

CAUTION

SOME OF THE COMPONENTS ASSEMBLED ON VMIC'S PRODUCTS MAY BE SENSITIVE TO ELECTROSTATIC DISCHARGE AND DAMAGE MAY OCCUR ON PRODUCTS THAT ARE SUBJECTED TO A HIGH ENERGY ELECTROSTATIC FIELD. WHEN A STATIC-SENSITIVE PRODUCT IS LAID ON A BENCH FOR CONFIGURING, ETC., IT IS SUGGESTED THAT CONDUCTIVE MATERIAL BE USED UNDER THE PRODUCT TO PROVIDE A CONDUCTIVE SHUNT. STORE UNUSED PRODUCTS IN THE SAME PROTECTIVE BOXES IN WHICH THEY WERE SHIPPED.

Upon receipt, any precautions found in the shipping container should be observed. All items should be carefully unpacked and thoroughly inspected for damage that might have occurred during shipment. The product(s) should be checked for broken components, damaged printed-circuit board(s), heat damage, and other visible contamination. All claims arising from shipping damage should be filed with the carrier and a complete report sent to VMIC, together with a request for advice concerning the disposition of the damaged item(s).

SECTION 2 - GENERAL INSTALLATION

The VMIVME-PSS500 Swing Out Power Supply can be mounted to the backside of VMIC's standard VMIVME-120 chassis. All required mounting hardware is included with the power supply chassis. See assembly drawings 150-000061-000. Remove and replace the board chassis backplane top rail mounting screws to mount the power supply chassis side panels.

Matching holes of the side panels can be bolted to the matching holes of the chassis side panels' connector-protector protrusions with the mounting hardware supplied.

If the protector protrusions do not have the two matching holes, then holes may be added to match the power supply chassis side panel's holes. Before drilling the matching holes, remove all of the VMEbus boards from the chassis slots, always exercising good ESD safety procedures when handling PC boards. Suggestion: Masking tape around and over the spot to be drilled will help contain most of the drilling debris.

The power supply chassis are made to fit the chassis side panels and protrusions. This provides excellent support for the power supply. After securing the power supply side panels, fasten the top and bottom gusset braces to the power supply mounting plate with the screw hardware supplied.

Connect the power supply's DC output wiring harness such that the black wire(s) connect to the backplane DC power ground connecting points and the red wire(s) connect to the backplane +5 V connecting points. Connect the 12 volt orange wire to the backplane +12 V connecting point and the 12 volt blue wire to the -12 V connecting point. The auxiliary outputs common should be connected to the backplane main DC power ground connecting point.

SECTION 3 - REQUIRED EQUIPMENT, TOOLS, AND CHECK POINTS

NOTE:

EACH POWER SUPPLY IS FULLY LOADED AND TESTED FOR COMPLIANCE AFTER FINAL ASSEMBLING.

- Nonmetallic adjuster tool (flat blade screwdriver type)
- Quality DVM (Fluke 77 or equivalent)
- Metering test points are DC - bus tie point(s) on backplane

SECTION 4 - BEFORE APPLYING AC POWER

1. Verify that the intended AC power source matches the power specified by the power unit switch position.
2. Verify the DC voltage leads, polarity, and backplane connections.
3. Verify each DC voltage lead electrical connections for tightness to ensure very low contact resistance.

4. Insert the VMEbus boards into the respective chassis slots and seat firmly.

SECTION 5 - APPLYING AC POWER

The VMIVME-PSS500 Swing Out Power Supply is shipped with the internal switching frequency and the current limits preset and sealed. Improper adjustments of these internal setting can cause damage to the power supply circuitry and/or loading circuit(s). Tampering or alteration of these adjustments is not recommended; refer such service adjustments and other servicing to VMIC. The AC input voltage range is externally jumper selectable. The AC input voltage select is set for 115 volt powerline operation.

Plug and connect the appropriate power cord to the AC Line Power (115 V or 230 VAC). The DC output voltage is preadjusted to nominal output ± .05 percent. The power supply's DC output may be readjusted ±10 percent by the DC adjustment potentiometer if required. Make correction of any operating voltage changes on the equipment label.

Turn AC power ON, then recheck the DC voltage(s) and readjust the power supply if required.

Please refer to Appendix A for layouts and schematics.

CHAPTER

4

MAINTENANCE AND WARRANTY

SECTION 1 - MAINTENANCE

This section of the technical manual provides information relative to the care and maintenance of VMIC's products. Should the products malfunction, the user should verify the following:

a. Software
b. System configuration
c. Electrical connections
d. Jumper or configuration options
e. Boards fully inserted into their proper connector location
f. Connector pins are clean and free from contamination
g. No components of adjacent boards are disturbed when inserting or removing the board from the VMEbus card cage
h. Quality of cables and I/O connections

User level repairs are not recommended. Contact VMIC for a Return Material Authorization (RMA) Number. This RMA Number must be obtained prior to any return.

MAINTENANCE PRINTS

The appendix(ices) to this manual contain(s) drawings and diagrams for reference purposes.

SECTION 2 - WARRANTY

VMIC's Standard Products are warranted to be free from defects in material and workmanship for a period of two years (24 months) from the date of shipment.

In discharge of this warranty, VMIC, at its option, agrees to either repair or replace, at VMIC's facility and at VMIC's discretion, any part, component, subassembly accessory, or any hardware, software, or system product, which under proper and normal use proves defective in material and workmanship.

The customer shall provide notice to VMIC of each such defect within a reasonable time after the customer's discovery of such defect.

In order to return the defective product(s) or part(s), the customer must contact VMIC's Customer Service Department to obtain a Call Ticket Number. The defective product(s) or part(s) must also be properly boxed and weighed. After a VMIC Call Ticket Number and RMA Number have been obtained, the defective product(s) or part(s) may be returned (transportation collect for surface UPS) to VMIC. Any replaced or repaired product(s) or part(s) will be shipped back to the customer's at the expense of VMIC (also UPS surface).

The customer should be aware that the above process can sometimes take up to eight (8) days for the shipment to reach VMIC. The customer has the option to ship the defective product(s) or part(s) at the customers own expense if the customer cannot afford this possible delay.

There shall be no warranty or liability on any VMIC product(s) or part(s) that is (are) damaged or subjected to accident(s), perils of nature, negligence, overtemperature, overvoltage, misapplication of electrical power, insertion or removal of boards from backplanes and/or I/O connectors with power applied by the customer(s), appointee(s), or any other person(s) without the expressed approval of VMIC.

Final determination of warranty eligibility shall be made by VMIC, and if a warranty claim is considered invalid for any reason, the customer will be charged for services performed and expenses incurred by VMIC in repair, handling and shipping the returned product or part. Determination as to whether the item is within warranty, coverage shall not be unreasonably withheld.

The warranty period of the replacement or repaired product(s) or part(s) shall terminate with the termination of the warranty period with respect to

the original product(s) or part(s) for all replacement parts supplied or repairs made during the original warranty period.

THE FOREGOING WARRANTY AND REMEDY ARE EXCLUSIVE AND VMIC SHALL HAVE NO OTHER OR ADDITIONAL LIABILITY TO BUYER OR TO ANYONE CLAIMING UNDER BUYER (THIRD PARTY) UNDER ANY OTHER AGREEMENT OR WARRANTY, EXPRESS OR IMPLIED EITHER IN FACT OR BY OPERATION OF THE LAW, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS, STATUTORY, OR OTHERWISE. VMIC SHALL HAVE NO LIABILITY FOR SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND OR FROM ANY CAUSE ARISING OUT OF THE INSTALLATION OR USE OF ANY PRODUCT FURNISHED HEREUNDER.

SECTION 3 - OUT-OF-WARRANTY REPAIR POLICY

The following sections describe VMIC's policy on repairs and warranties on repaired products.

REPAIR CATEGORY

VMIC's repair policy of standard products is divided into two categories, depending on the item to be repaired. These categories are:

a. Product Exchange
b. Fixed Price Repair

Category 1 (product exchange) represents the fastest turn around of the two categories. In this case, the customer sends the malfunctioning product to VMIC. VMIC will return an operational product to the customer within 72 hours of receipt provided VMIC has the product in stock.

Provided that the returned product is repairable customers should contact VMIC prior to returning products for repair to determine stocking status.

Category 2 (Fixed Price Repair) applies to products returned to VMIC for repair and subsequent return to the customer.

Return authorizations are required on all product repairs, and all purchase orders should refer to VMIC's RMA Number which is assigned by VMIC's Customer Service Department.

REPAIR PRICING

Contact your factory representative for repair pricing. Current pricing can be found in the Repair and Replacement Policy in the most current Standard Conditions of Sales Document (F0109-91). Refer to exclusions.

PAYMENT

Payment is due upon delivery or at VMIC's option, net thirty (30) days from the date of delivery. Payment should be made to:

VME Microsystems International Corporation
12090 South Memorial Parkway
Huntsville, Alabama 35803-3308
Attention: Accounts Receivable

VMIC allows a one (1) percent discount for payment made within ten (10) days of invoice date or a two (2) percent discount on payment made prior to shipment of order. This payment discount, however, does not apply to freight.

SHIPPING CHARGES

Shipping charges are the customer's responsibility, with the exception of warranty repairs, whereby VMIC will pay the return to customer shipping charges.

SHIPPING INSTRUCTIONS

The type of packaging used to ship the product depends on whether the product is shipped singly, in a chassis, or packaged with other boards. The shipper should carefully pack the product(s), using the same precautions listed in the "unpacking procedures". The user should utilize the same (or equivalent) protective packaging container for re-shipment as provided by VMIC. Approved ESD procedures are recommended when handling VMIC's products.

WARRANTY ON REPAIRS

Products repaired by VMIC are warranted against defects in workmanship and material for a period of ninety (90) days from date of shipment to the customer for all products that were repaired out of warranty. See Standard Conditions of Sale for products repaired within the warranty.

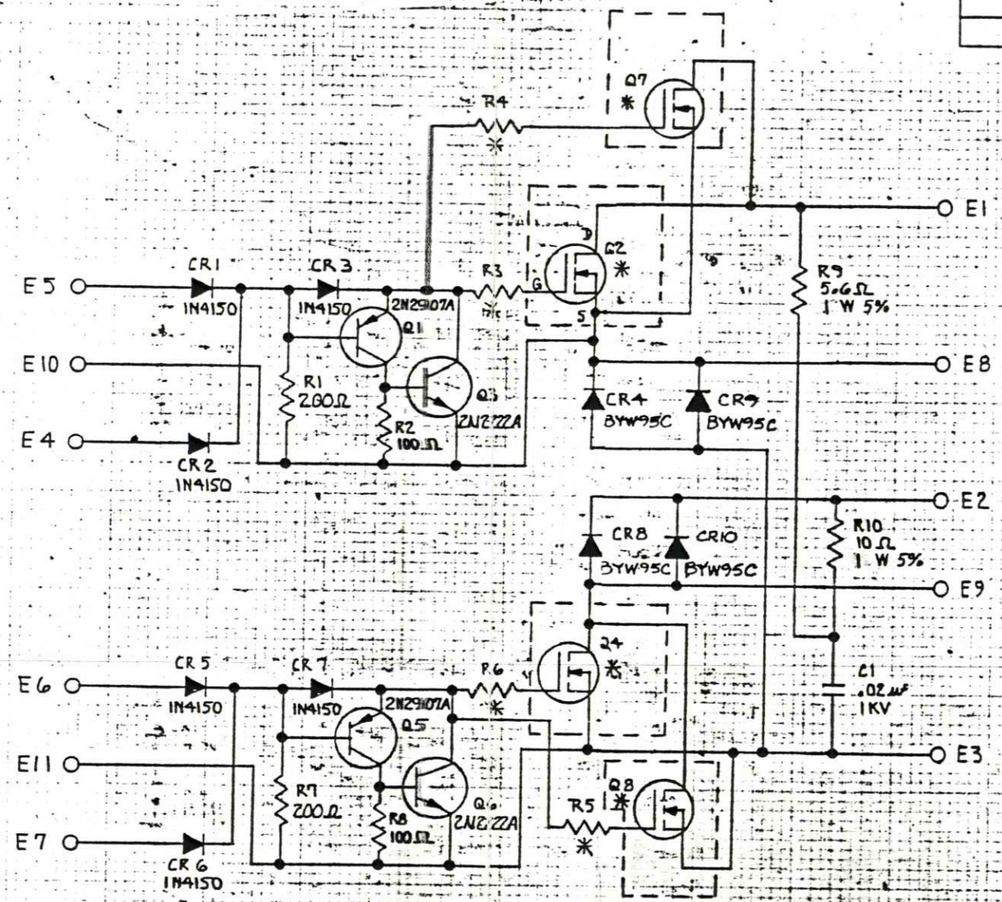
EXCLUSIONS

Repair rates may not apply to products which have received unusual physical or electrical damage. In such cases, VMIC will provide an estimated price for product repair or replacement. The customer may then choose to have the product repaired at the estimated price, returned unrepaired at no charge, or replaced at VMIC's current list price.

APPENDIX A

Schematics

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	B	PRODUCTION RELEASED	1-5-85	
	C	REVISE AND UPDATE	2-16-88	
	D	CHANGED PER ECN #100	8-24-89	



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QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE 1/4W 5%.
2. ALL 1% RESISTORS AR 1/4W
3. * = VARIBLE VALUE SEE PARTS LIST FOR ACTUAL REQUIREMENTS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± ; DECIMALS .XX ± .XXX ± ; ANGLES ±

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN CATHY LOPEZ	1-5-85
CHECKED	2-16-88

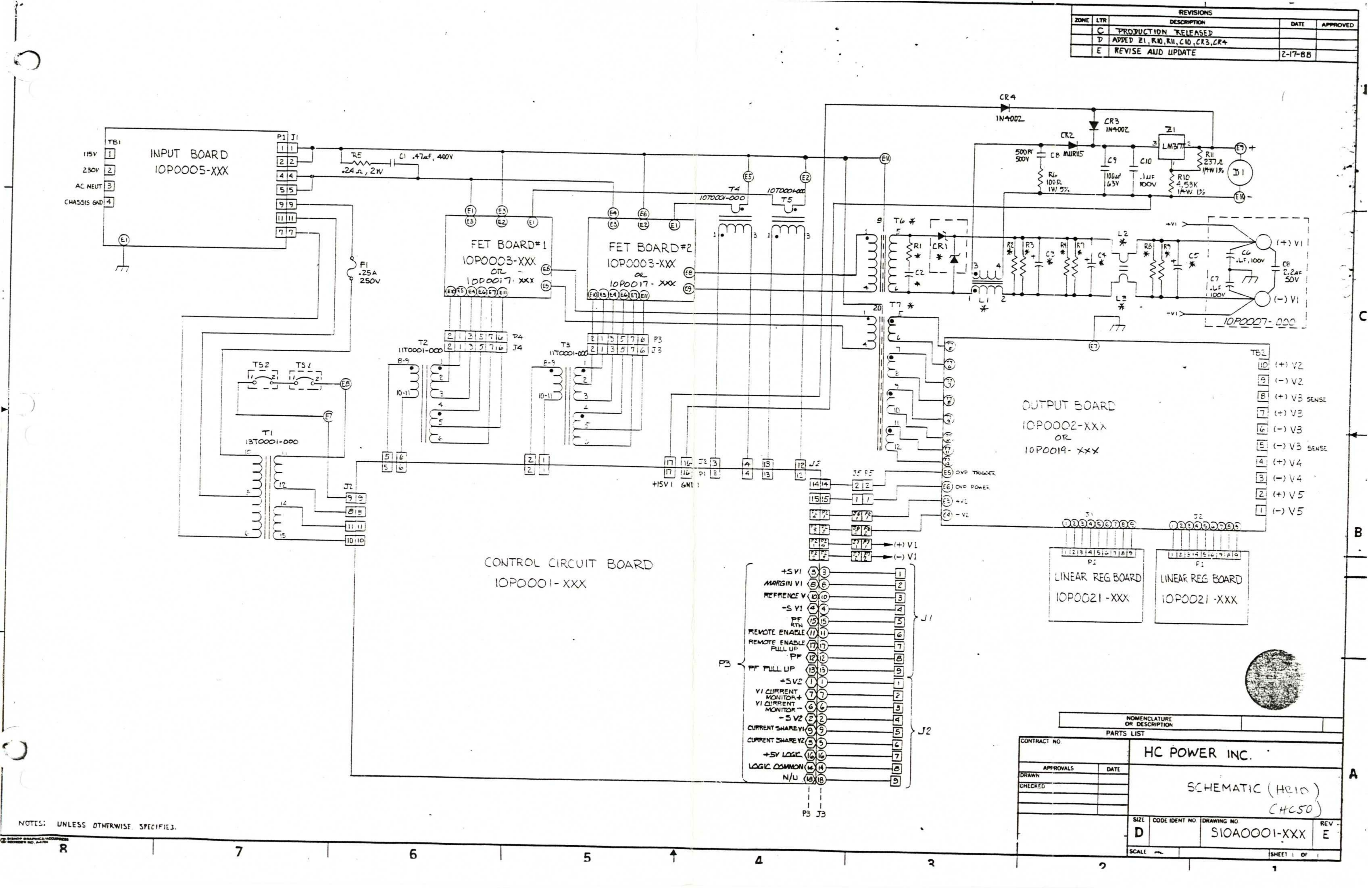
H C POWER INC.

SCHEMATIC
FET CIRCUIT

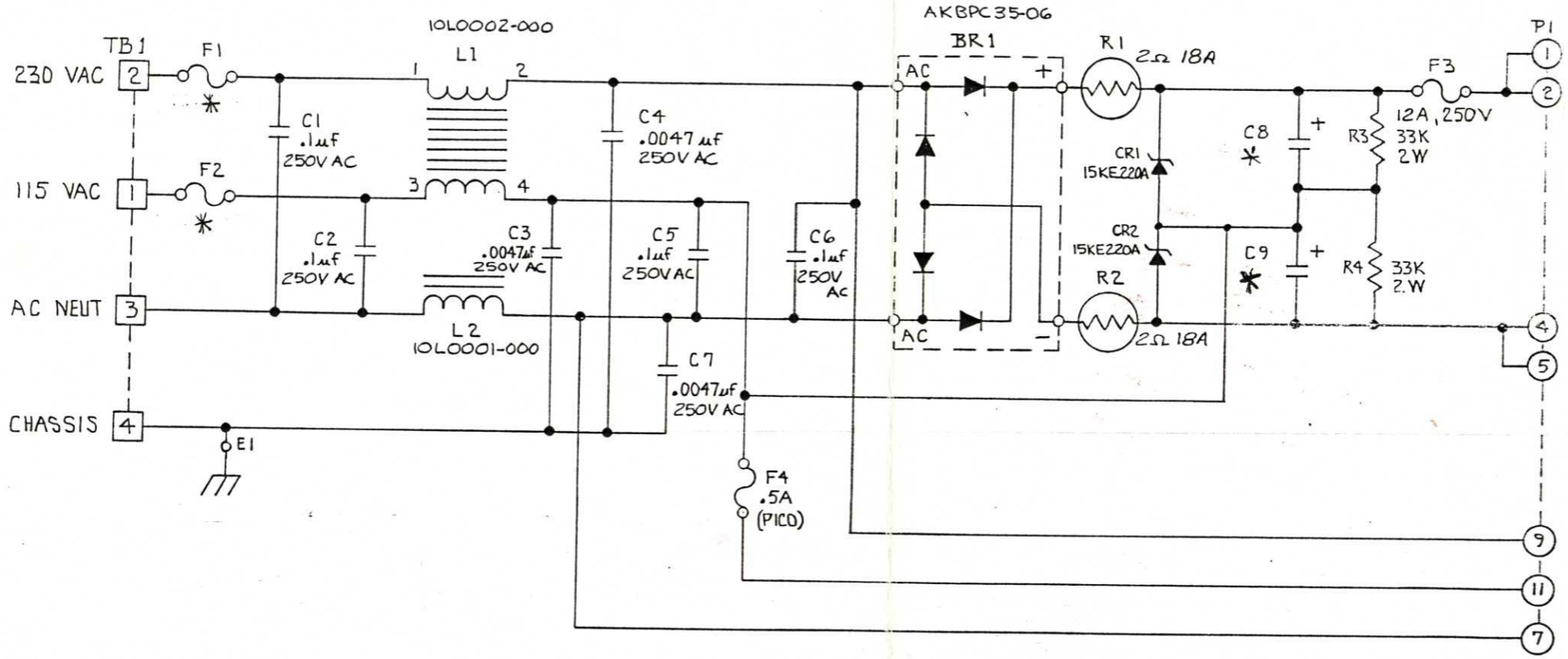
SIZE	CODE IDENT NO.	DRAWING NO.	
C		S10P0003-XXX	D

SCALE | SHEET 1 OF 1

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A3167


REVISIONS
ZONE LTR DESCRIPTION DATE APPROVED
C PRODUCTION RELEASED
D ADDED Z1, R10, R11, C10, CR3, CR4
E REVISE AND UPDATE 2-17-88
INPUT BOARD
10P0005-XXX
TB1
115V
230V
AC NEUT
CHASSIS GND
R5 .24Ω, 2W
C1 .47uF, 400V
F1 .25A 250V
FET BOARD#1
10P0003-XXX
OR
10P0017-XXX
FET BOARD#2
10P0003-XXX
OR
10P0017-XXX
T2 11T0001-000
T3 11T0001-000
T4 10T0001-000
T5 10T0001-000
TS2
TS1
T1 13T0001-000
CR4 1N4002
CR3 1N4002
CR2 MUR115
Z1 LM317
R11 237Ω 1/4W 1%
R10 4.53K 1/4W 1%
R6 100Ω 1W 5%
C8 500PF 500V
C9 100uF 63V
C10 .1uF 100V
T6
T7
L1
L2
L3
CR1
C6 .1uF, 100V
C7 .1uF 100V
CE 2.2uF 50V
10P0007-000
(+) V1
(−) V1
OUTPUT BOARD
10P0002-XXX
OR
10P0019-XXX
OVP TRIGGER
OVP POWER
TB2
(+) V2
(−) V2
(+) V3 SENSE
(+) V3
(−) V3
(−) V3 SENSE
(+) V4
(−) V4
(+) V5
(−) V5
LINEAR REG BOARD
10P0021-XXX
LINEAR REG BOARD
10P0021-XXX
+15V1
GND1
CONTROL CIRCUIT BOARD
10P0001-XXX
+5V1
MARGIN V1
REFRENCE V
−5 V1
PF RTN
REMOTE ENABLE
REMOTE ENABLE PULL UP
PF
PF PULL UP
+5V2
V1 CURRENT MONITOR+
V1 CURRENT MONITOR−
−5 V2
CURRENT SHARE V1
CURRENT SHARE V2
+5V LOGIC
LOGIC COMMON
N/U
J1
J2
P3
J3
NOTES: UNLESS OTHERWISE SPECIFIED.
NOMENCLATURE OR DESCRIPTION
PARTS LIST
CONTRACT NO.
APPROVALS DATE
DRAWN
CHECKED
HC POWER INC.
SCHEMATIC (HC10) (HC50)
SIZE D
CODE IDENT NO
DRAWING NO. S10A0001-XXX
REV E
SCALE
SHEET 1 OF 1

REV.	E. O.	DESCRIPTION	DWN	CHKD	APPD	DATE
	B	PRODUCTION RELEASED				
	C	MOVED F5 TO MOTHER BD & ADDED E1		–	–	P-26-96
	D	ECN 1166				32890



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REQD	ITEM	PART NO.	REF DES	DESCRIPTION	SPEC	RECOMMENDED MFR OR EQUIVALENT

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
XX ± .020
XXX ± .010
ANGLES ± ½°

MATERIAL ~

FINISH ~

ORIGNAL DATE OF DRAWING
DRAFTSMAN D. Farmer
CHECKER Clover
ENGR
DESIGNER

TITLE
SCHEMATIC
INPUT FILTER

SCALE ~ IDENT CODE 28357

HC Power,

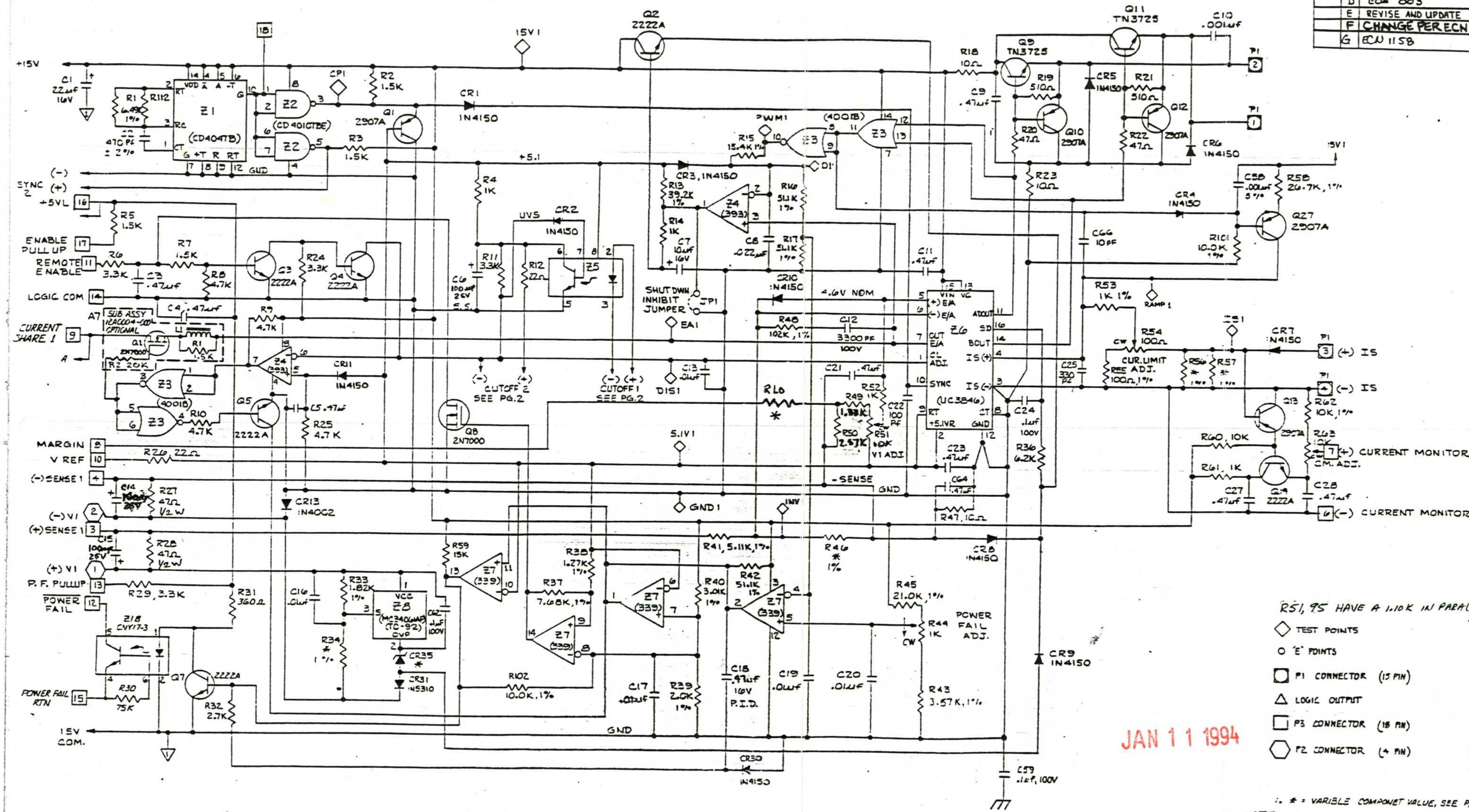
C | S10P0005-XXX | D

DWG SIZE | SHEET / OF / | REV

1. * = VARIABLE VALUE SEE PARTS LIST FOR ACTUAL REQUIREMENTS.

NOTES: UNLESS OTHERWISE SPECIFIED.

E.O.	REV.	DESCRIPTION	BY	DATE	APP
	C	PRODUCTION RELEASED			
	D	ECN 003	RGV		
	E	REVISE AND UPDATE	CL	2-16-88	
	F	CHANGE PER ECN 202	LM		
	G	ECN 1158	TL		



+15V
C1 22uf 16V
R1 R112
Z1 (CD4047B)
Z2 (CD4011BE)
CP1
R2 1.5K
CR1 1N4150
Q1 2907A
R3 1.5K
15V1
Q2 2222A
+5.1
PWM1
R15 15.4K 1%
Z3 (4001B)
Q9 TN3725
Q11 TN3725
R18 10Ω
C9 .47uf
R19 510Ω
CR5 1N4150
R21 510Ω
Q10 2907A
Q12 2907A
R20 47Ω
R22 47Ω
CR6 1N4150
R23 10Ω
C10 .001uf
P1
5V1
SYNC 2
+5VL
ENABLE PULL UP
REMOTE ENABLE
LOGIC COM
CURRENT SHARE 1
MARGIN
V REF
(-) SENSE 1
(-) V1
(+) SENSE 1
(+) V1
P.F. PULLUP
POWER FAIL
POWER FAIL RTN
15V COM.
R5 1.5K
R6 3.3K
R7 1.5K
R8 4.7K
C3 .47uf
Q3 2222A
R24 3.3K
Q4 2222A
R4 1K
UVS
CR2 1N4150
Z5
C6 100uf 25V
R11 3.3K
R12 22Ω
CUTOFF 2 SEE PG.2
CUTOFF 1 SEE PG.2
R13 39.2K 1%
R14 1K
CR3 1N4150
Z4 (393)
C7 10uf 16V
R16 511K 1%
R17 511K 1%
C8 .022uf
SHUT DWN INHIBIT JUMPER
JP1
EA1
CR10 1N4150
4.6V NOM
R48 102K 1%
C12 3300PF 100V
Z6 (UC3846)
C11 .47uf
C66 10PF
CR4 1N4150
R101 10.0K 1%
Q27 2907A
C58 .001uf 5%
R58 26.7K 1%
R53 1K 1%
RAMP 1
R54 100Ω
CUR. LIMIT ADJ.
IS1
CR7 1N4150
(+) IS
(-) IS
R56
R57
C25 330 PF
Q13 2907A
R62 10K 1%
R63 10K
CM. ADJ.
(+) CURRENT MONITOR
(-) CURRENT MONITOR
R60 10K
R61 1K
Q14 2222A
C27 .47uf
C28 .47uf
C4 .47uf
A7 SUB ASSY
R9 4.7K
CR11 1N4150
Z3 (4001B)
R10 4.7K
Q5 2222A
C5 .47uf
R25 4.7K
Q8 2N7000
DIS1
C13 .01uf
R16
C21 .47uf
R49 1K
R50 2.87K
R51 10K
V1 ADJ.
C22 100 PF
C24 .1uf 100V
R36 6.2K
C23 .47uf
C64 .47uf
R47 10Ω
-SENSE
GND
5.1V1
GND1
INV
R26 22Ω
C14
R27 47Ω 1/2W
CR13 1N4002
C15 100uf 25V
R28 47Ω 1/2W
R29 3.3K
R31 360Ω
Z18 CNY17-3
R30 75K
Q7 2222A
R32 2.7K
C16 .01uf
R33 1.82K 1%
Z8 (MC34064P) (TC-92) CVP
C62 .1uf 100V
R34 1%
CR35
CR31 1N5310
R59 15K
Z7 (339)
R38 1.27K 1%
R37 7.68K 1%
R102 10.0K 1%
C17 .01uf
R39 2.0K 1%
R40 3.01K 1%
R41 5.11K 1%
R42 51.1K 1%
C18 .47uf 16V P.I.D.
C19 .01uf
C20 .01uf
R46 1%
R45 21.0K 1%
R44 1K
POWER FAIL ADJ.
R43 3.57K 1%
CR8 1N4150
CR9 1N4150
CR30 1N4150
GND
C59 .1uf 100V

R51, 95 HAVE A 1.10K IN PARALLEL WITH PINS 1 & 3.

◇ TEST POINTS

○ "E" POINTS

▢ P1 CONNECTOR (15 PIN)

△ LOGIC OUTPUT

□ P3 CONNECTOR (18 PIN)

⬡ P2 CONNECTOR (4 PIN)

JAN 1 1 1994

1. * = VARIBLE COMPONET VALUE, SEE P/L FOR ACTUAL REQUIREMENT.

NOTE: UNLESS OTHERWISE SPECIFIED

REQD	ITEM	PART NO.	DESCRIPTION	SPEC/MFR
			LIST OF MATERIALS	

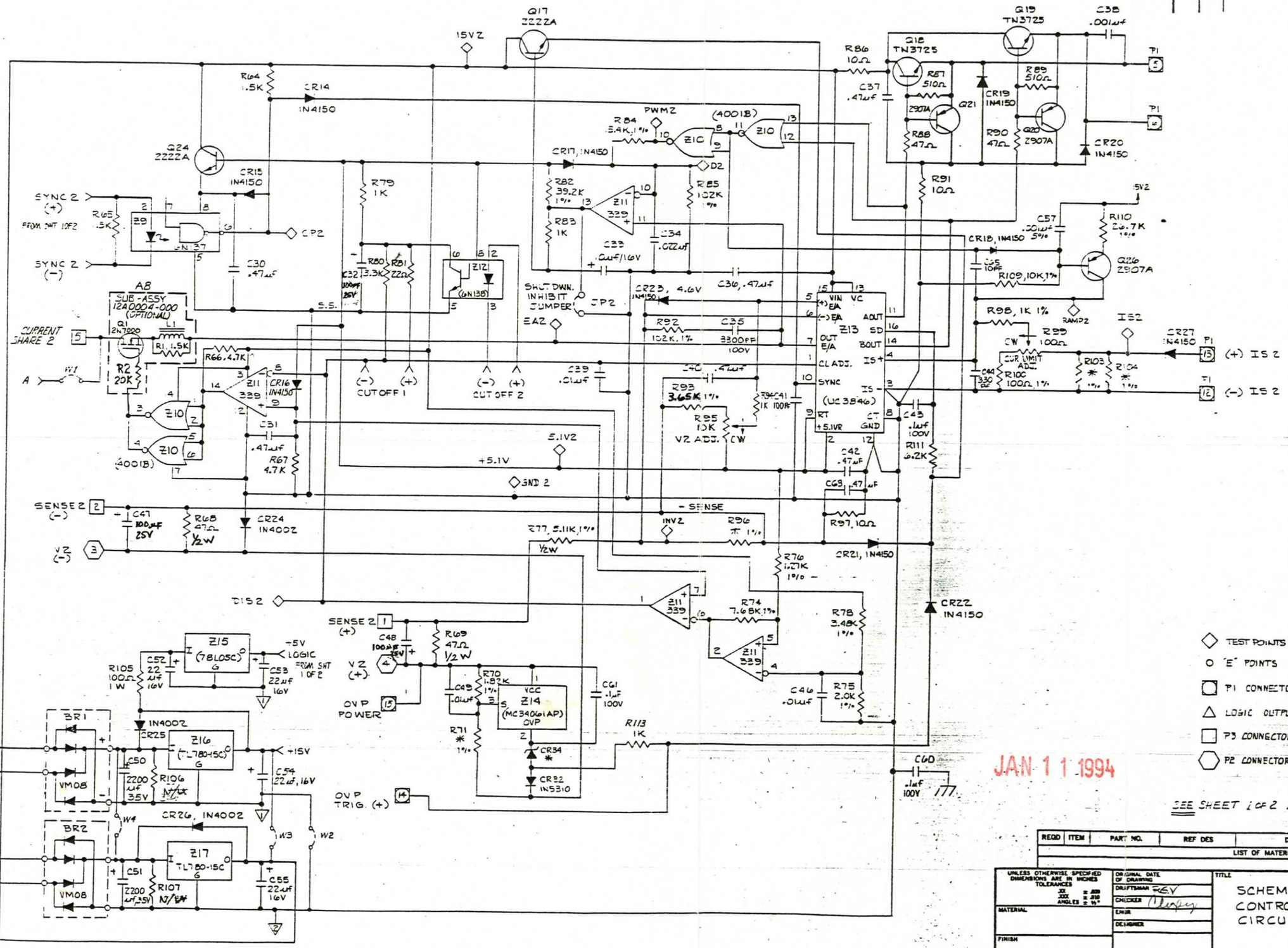
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	CONTRACT NO.
TOLERANCES: DECIMALS .XX ± .XXX ± ANGLES ±	APPROVALS / DATE
	DRAWN KGV 10/85
	CHECKED 11-85
DO NOT SCALE DRAWING	ENGR
FINISH	MATL
NEXT ASSY / USED ON	

HC POWER INC

SCHEMATIC CONTROL CIRCUIT

CODE IDENT NO.	SIZE	DWG NO.	REV.
	D	510P0001-XXX	G
SCALE		SHEET 1 OF 2	

REV.	E.O.	DESCRIPTION	DWN	CHKD	APPD	DATE
		SEE SHEET 1 OF 2				



REQD	ITEM	PART NO.	REF DES	DESCRIPTION	SPEC	RECOMMENDED MFR OR EQUIVALENT
LIST OF MATERIALS						

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES XX ± .03 .XXX ± .010 ANGLES ± 1°	ORIGINAL DATE OF DRAWING	TITLE: SCHEMATIC CONTROL CIRCUIT	HC POWER INC
MATERIAL	DRAFTSMAN REV		D S10P0001-XXX 9
FINISH	CHECKER Murphy		
	ENGR		
	DESIGNER	SCALE / IDENT CODE	DWG SIZE / SHEET 2 OF 2 / REV