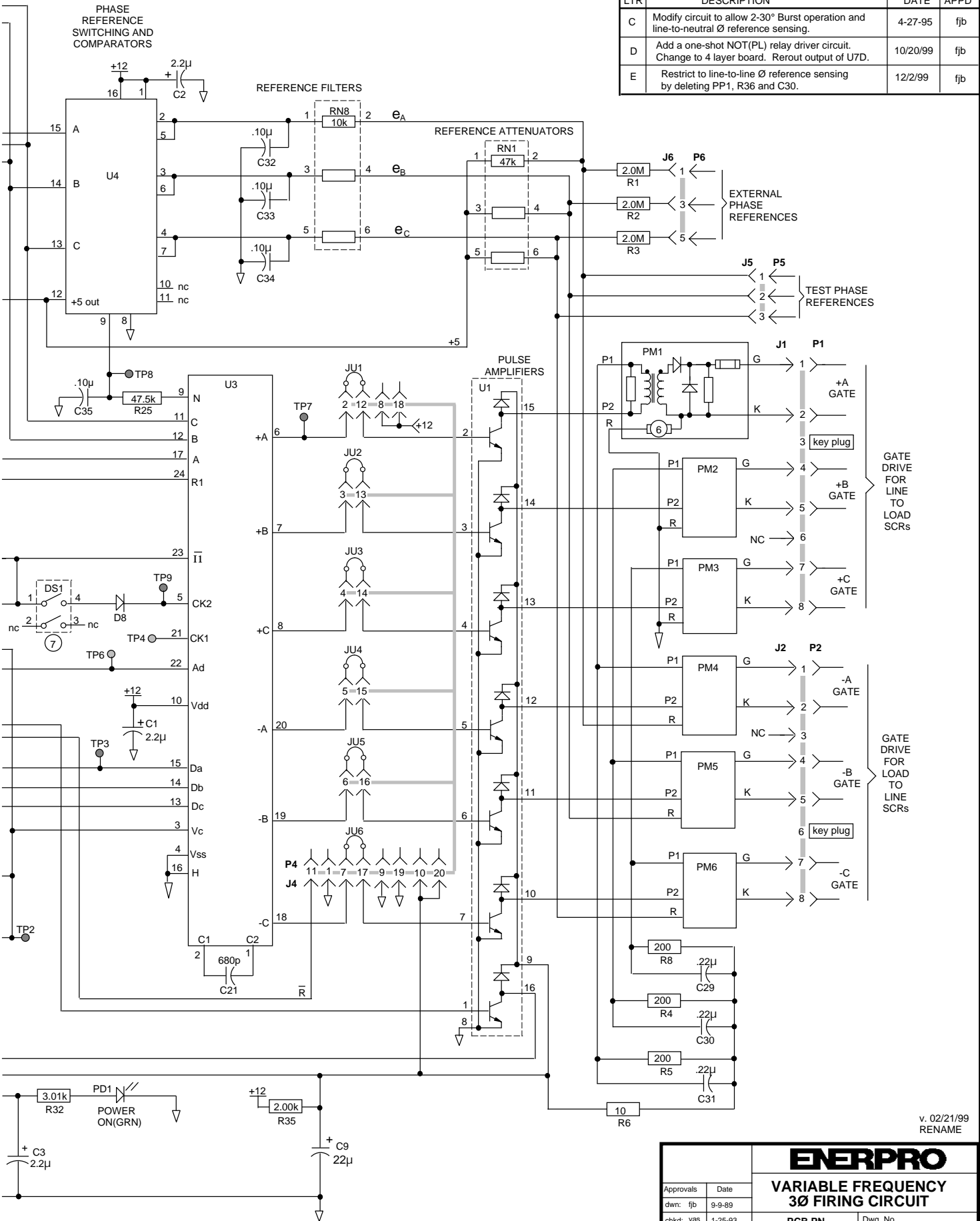


E445-E

SERIAL NOS.

REVISIONS			
LTR	DESCRIPTION	DATE	APPD
C	Modify circuit to allow 2-30° Burst operation and line-to-neutral Ø reference sensing.	4-27-95	fjb
D	Add a one-shot NOT(PL) relay driver circuit. Change to 4 layer board. Rerout output of U7D.	10/20/99	fjb
E	Restrict to line-to-line Ø reference sensing by deleting PP1, R36 and C30.	12/2/99	fjb



v. 02/21/99
RENAME

ENERPRO VARIABLE FREQUENCY 3Ø FIRING CIRCUIT		PCB PN		Dwg. No.
		FCOVF6100		
Approvals	Date			
dwn: fjb	9-9-89			
chkd: yas	1-25-93			
mod: fjb	12-3-99			
chkd:				

Sheet 1 of 2

NOTES

PART	DESCRIPTION	PART	DESCRIPTION
U1	ULN2004A	PD1	LN31GPH(GRN)
U2	NE555N	PD2-PD3	LN21RPH (RED)
U3	EP1014C	PM1-PM6	EP1024-X 6
U4	EP1016	DS1	S1D02
U5	MC34072P	JU1-JU6	65474-001
U6	LM239N	JU7-JU9	W1J01
U7	MC34074P	J1-J2	640584-2
VR1	LM340LAH-12	P1-P2	640582-1
DN1	MAD1108P	J3	350714-2
RN1	750-63-R10k	P3	350736-1
RN2	750-83-R22k	J4	050-020-133A
RN3	750-63-R3.3k	P4	
RN4	750-83-R100k	P1-P3 SOCKETS	350570-6 (24-18AWG, gld, phos. brz.)
RN5	750-63-R100k	J5/P5	640456-3/640440-3
RN6	750-83-R68k	J6/P6	6640900-1/350809-1
RN7	750-63-R1.5k		
RN8	750-63-R47k		
PS1	NFC15-48D15 (48V input)		
Q1-Q2	BS170P		
D1	1N4004		
D2-D6	1N5346A(9.1V)		
D7-D8	1N914B		
R1-R3	RN65D2003E		
R7	CW2C TBD 5%		
R4, R5 & R8	CW2C 200 5%		
R11-R39	1/4 W 1% RN60		
R6CW2C 10 5%			
C1	ECS-F16E2R(2.2µF 16V)		
C2	ECS-F16E2R(2.2µF 16V)		
C3	ECS-F16E2R(2.2µF 16V)		
C4	ECS-F16E2R(2.2µF 16V)		
C5	ECS-F16E2R(2.2µF 16V)		
C6	ECS-F35E22(22µF 35V)		
C7	ECS-F16E2R(2.2µF 16V)		
C8	ECS-F16E2R(2.2µF 16V)		
C9	ECS-F35E22(22µF 35V)		
C10	ECS-F35E22(22µF 35V)		
C11	ECS-F50E6R8(6.8µF/50V)		
C12	ECS-F50E6R8(6.8µF/50V)		
C21	FKC3 680pF 160V 5%		
C22	FKC3 220pF 160V 5%		
C23	MKS3 .01µF 16V 10%		
C24	MKS3 .0022µF 16V 10%		
C25	MKS3 .10µF 16V 10%		
C26	MKS3 .47µF 16V 10%		
C27	MKS3 .047µF 16V 10%		
C28	MKS3 .10µF 16V 10%		
C29	MKS3 .22µF 16V 10%		
C30	MKS3 .22µF 16V 10%		
C31	MKS3 .22µF 16V 10%		
C32-C34	MKS3 .10µF 16V(matched to 1%)		
C35	MKS3 .10µF 16V/10%		
C36	MKS3 .27µF 16V 5%		
C37	MKS3 .10µF 16V/10%		
C38	MKS3 .10µF 16V/10%		
C39	MKS3 .10µF 16V/10%		

RN60 RESISTORS (k)			
R11	2.26	R27	47.5
R12	10.0	R28	30.1
R13	57.6	R29	2.00
R14	61.9	R30	150
R15	100	R31	32.4
R16	10.0	R32	3.01
R17	2.26	R33	20.0
R18	omit	R34	10.0
R19	8.06	R35	2.00
R20	100	R36	3.01
R21	47.5	R37	omit
R22	100	R38	100
R23	3.01	R39	100
R24	1.0		
R25	47.5		
R26	33.2		

v. 2/21/00

		ENERPRO	
		VARIABLE FREQUENCY 3Ø FIRING CIRCUIT	
Approvals	Date	PCB PN FCOVF6100	Dwg. No. E445-E
dwn: fjb	9-9-99		
chkd: yas	1-25-93		
mod: fjb	12-3-99		
chkd:		Sheet 2 of 2	

For variable frequency compensation:

1. Select R19 for approximately 5.5 VDC at TP2.
2. Select R31 for minimum variation of TP2 (U6-8) voltage over frequency range.
3. Select C25 for .094 μ F to .097 μ F
4. Select C31 for minimum frequency, f_{min} , as :

$$C31(\mu F) = 8 / f_{min}(\text{Hz})$$

5. Select R7 value to obtain 24 Vdc lamp or relay coil voltage.
Use 600 ohm when driving the TK1E-24V relay(VLCLTL-1 board).
6. Select PM1 - PM6 = EP1024-X Series Pulse Modules as determined by Internal phase sensing resistor value vs SCR line voltage:

EP1024-0 = NONE (external Phase References Provided J5/P5)
EP1024-1 = 2.0Meg (AC Line = 240/600v)
EP1024-2 = 511K (AC Line = 100/240v)
EP1024-3 = 200K (AC Line = less than 100v)

7. Open Close DS1-1 for 120 degree burst gating.
Close DS1-1 to obtain 2-30 degree burst gating.