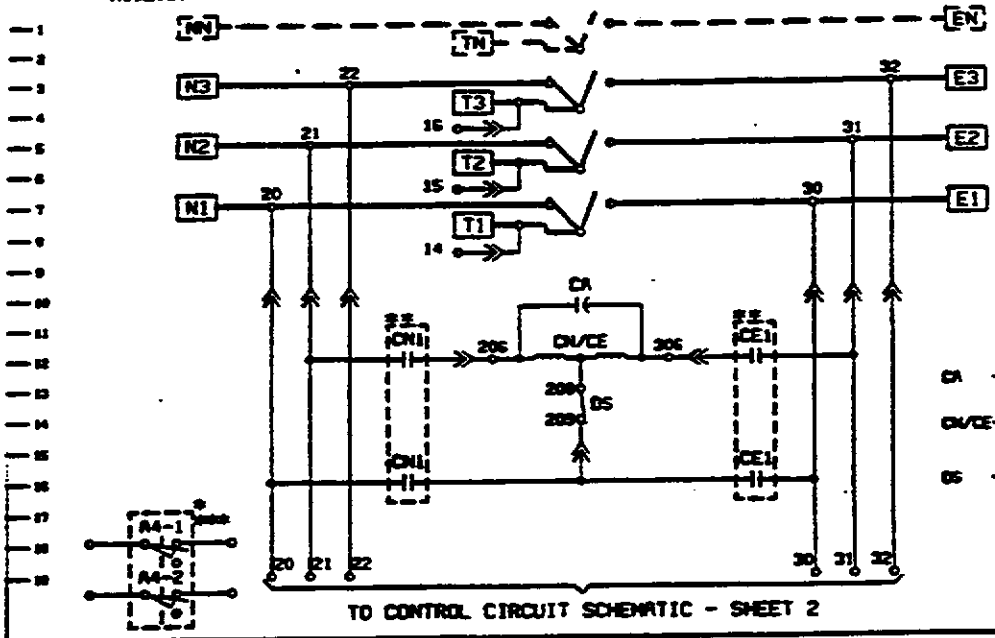
POWER CIRCUIT SCHEMATIC

N1.2.3.N - NORMAL LINE T1.2.3.N - LOAD E1.2.3.N - EMERGENCY LINE



* SWITCHED OR SOLID NEUTRAL AS SPECIFIED FOR 4 WIRE SYSTEMS.

VOLTAGE SYSTEMS

	VOLTS	NO. OF PHASES	NO. OF WIRES
-3	240V, 60HZ	3	3
-3A	208, 60HZ	3	3
-3B	120/240,60HZ	3	4
-4	120/208,60HZ	3	4
-5	480,60HZ	3	3
-7	277/480,60HZ	3	4
-8	240/416,60HZ	3	4
-81	220/380V,60HZ	3	4
-82	220/380V,50HZ	3	4

CA - MAIN TRANSFER OPERATOR CAPACITOR

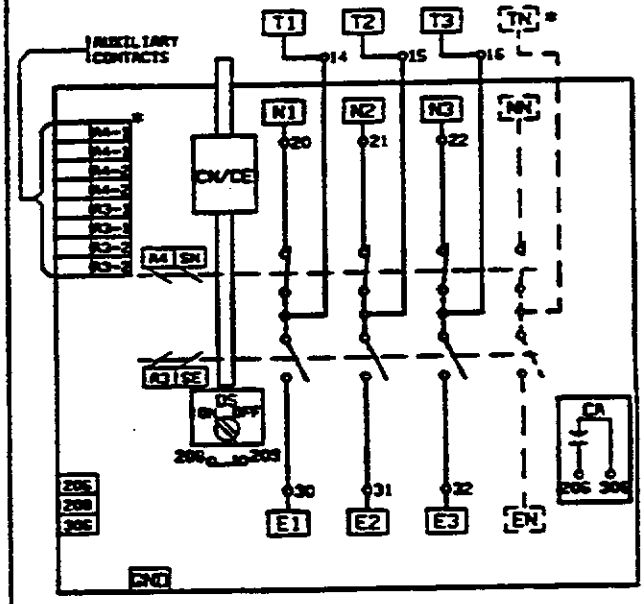
CN/CE - MAIN TRANSFER OPERATOR (TRANSFER TO NORMAL AND EMERGENCY)

DS - DISCONNECT SWITCH

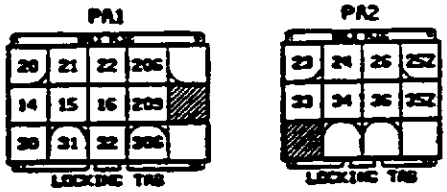
TO CONTROL CIRCUIT SCHEMATIC - SHEET 2

CABINET FRONT

POWER PANEL LAYOUT



INTERCONNECT PLUGS



REVISIONS:
ECN S-5780

CONTROLLED

ZENITH CONTROLS, INC.

NOTES:
1. ZTSH SHOWN IN NORMAL POSITION WITH NO POWER AVAILABLE.
2. DRAWING SHOWS ZENITH MODULE & ACCESSORY PACKAGE (A3,A4,E,L1, L2,P,T,U,W) AND TN ACCESSORY. SEE SUBMITTAL COVER SHEET FOR APPLICABLE ACCESSORIES.

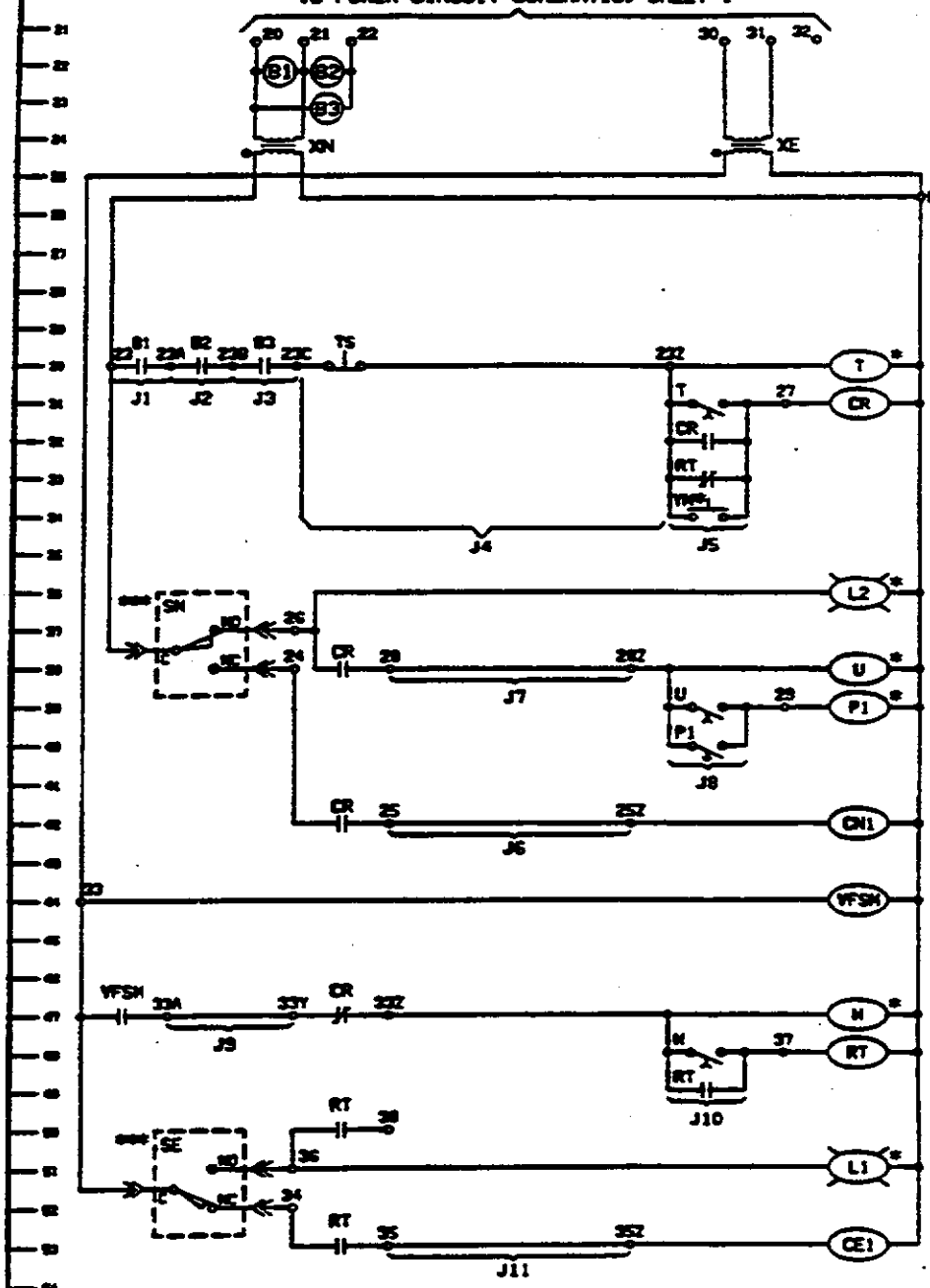
LEGEND
- WIRE CONNECTION
- WIRE ON MAIN TERMINAL BLOCK
- WIRE IN DISCONNECT PLUG
- * OPTIONAL
- ** LOCATED ON CONTROL PANEL
- *** MECHANICALLY ACTUATED, LOCATED ON POWER PANEL

REFER TO 40R-0100 FOR LEGEND & OPERATION.
FOR MANUFACTURING:
SEE PAGE 3 FOR ENCLOSED UNIT CONTROL PANEL.
SEE PAGE 4 FOR OPEN TYPE CONTROL PANEL.
SEE 40R-0800 FOR ACCESSORIES.

TITLE: POWER CIRCUIT & CABINET FRONT
MODEL: ZTSH4/26 (40-260 AMP)
DRFT: FHB APP'D:
DATE: 07/22/94
DRAWING NO.: 47A-1005-3 SHEET 1 OF 4

CONTROL CIRCUIT SCHEMATIC

TO POWER CIRCUIT SCHEMATIC, SHEET 1



B1,B2,B3-UNDER VOLTAGE RELAYS. 30

XN - CONTROL TRANSFORMER, NORMAL

XE - CONTROL TRANSFORMER, EMERGENCY

TS - TEST SWITCH

T - TIME DELAY ON RETRANSFER (NORMAL). 21

CR - NORMAL CONTROL RELAY. 32, 38, 42, 47

VN - PUSHBUTTON TO NORMAL

L2 - NORMAL POSITION LIGHT

SN - MECHANICALLY ACTUATED CONTACTS

U - ENGINE OVER-RUN TIMER. 39

P1 - (OR N) TIME DELAY TO ENGINE START. 40, 60

CN1 - POWER RELAY, ENERGIZES MAIN TRANSFER OPERATOR (NORMAL). 12, 16

VFSN - EMERGENCY VOLTAGE AND FREQUENCY SENSING RELAY 47

N - TIME DELAY ON TRANSFER (EMERGENCY). 48

RT - EMERGENCY CONTROL RELAY BYPASS "T" CONTACT UPON EMERGENCY FAILURE 33, 48, 50, 53

SE - MECHANICALLY ACTUATED CONTACTS

L1 - EMERGENCY POSITION LIGHT

CE1 - POWER RELAY, ENERGIZES MAIN TRANSFER OPERATOR (EMERGENCY). 12, 16

CUSTOMER CONNECTIONS

A3, A4 — SEE POWER CIRCUIT SCHEMATIC AND LAYOUT

ENGINE START

11 12 12A 13

E STANDARD CONNECTIONS

CONTACT RATING		
RELAY	CONTACT	RATING
N	E	10AMP @ 32VDC
P1	E	10AMP @ 32VDC
	A3, A4	20AMP, 125-250 VAC

JUMPER	CONNECT POINTS	REMOVE JUMPER WHEN ACCESSORIES USED
J1	23, 23A	B1
J2	23A, 23B	B2
J3	23B, 23C	B3
J4	23C, 232	J10, TS, C/O
J5	232, 27	T, VN
J6	25, 252	T2, B4
J7	28, 282	C, C/O
J8	282, 29	P1, U
J9	33A, 33Y	J10, EX1, 2, 3
J10	332, 37	N
J11	35, 352	A3, B4

NOTES:
1. ZTSH SHOWN IN NORMAL POSITION WITH NO POWER AVAILABLE.
2. DRAWING SHOWS ZENITH MODULE 9 ACCESSORY PACKAGE A3, A4, E, L1, L2, P, T, U, N1 AND VN ACCESSORY. SEE SUBMITTAL COVER SHEET FOR APPLICABLE ACCESSORIES.

LEGEND
- WIRE CONNECTION
- WIRE ON MAIN TERMINAL BLOCK
- WIRE ON DISCONNECT PLUG
- * OPTIONAL
- *** MECHANICALLY ACTUATED, LOCATED ON POWER PANEL

REVISIONS:
ECN 5-5788

CONTROLLED

ZENITH CONTROLS, INC

TITLE: CONTROL CIRCUIT SCHEM & CUSTOMER CONNECTIONS

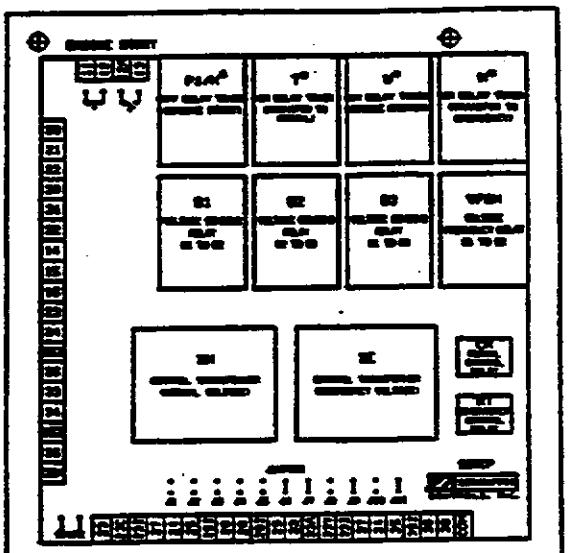
MODEL: ZTSH4/26 (40-260AMP)

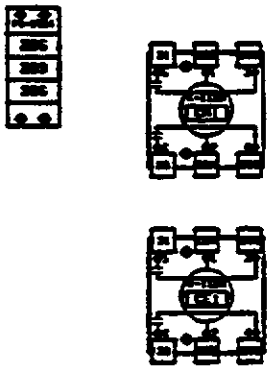
DRFT: FHB | APP'D:

DATE: 07/22/94

DRAWING NO.: 47A-1005-3 SHEET 2 OF 4

CONTROL PANEL LAYOUT





(12" X 29")
(305mm X 737mm)

(12" X 41")
(305mm X 1041mm)

NOTE:
12" X 29"/12" X 41"
(305mm X 737mm)/
(305mm X 1041mm)
PANELS ARE STANDARD
FOR ENCLOSED ZTSH
40-260 AMP.

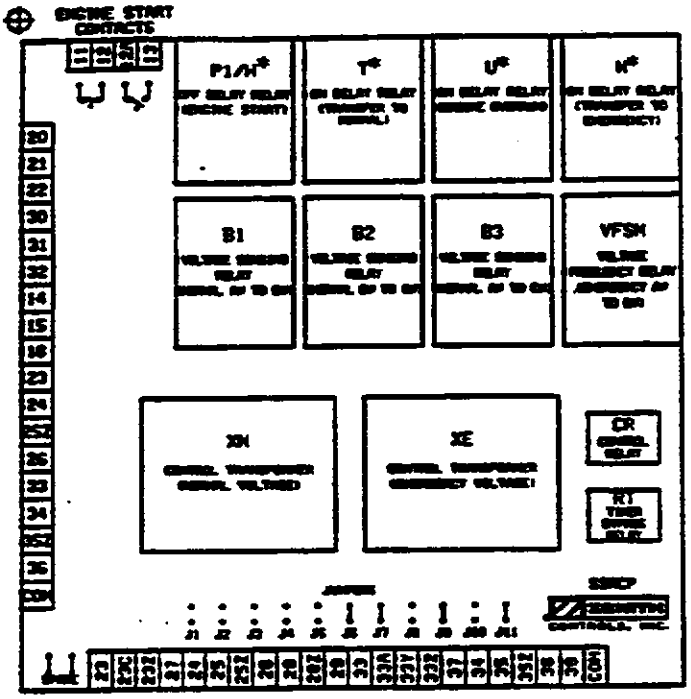
CONTROLLED

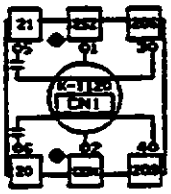
REVISIONS:
ECN S-5788

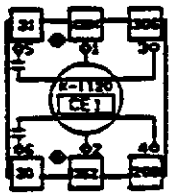
NOTES:
1. DRAWING SHOWS ZENITH MODULE
S ACCESSORY PACKAGE (A2,
A4, E, L1, L2, P, T, U, W)
AND YH ACCESSORY.
SEE SUBMITTAL COVER SHEET
FOR APPLICABLE ACCESSORIES.
2. (a) OPTIONAL

ZENITH CONTROLS, INC.

TITLE: CONTROL PANEL LAYOUT
MODEL: ZTSH4/26 (40-260AMP)
DRFT: FHB | APP'D:
DATE: 07/22/94
SCALE: 3/8 = 1
DRAWING NO.: 47A-1005-3
SHEET 3 OF 4







NOTE:
18" X 29"
(457mm X 737mm)
PANEL IS STANDARD FOR
OPEN TYPE ZTSH
40-260 AMP.

(18" X 29")
(457mm X 737mm)

CONTROLLED

REVISIONS: EDN S-5780	NOTES: 1. DRAWING SHOWS ZENITH MODULE S ACCESSORY PACKAGE (A3, A4, E, L1, L2, P, T, U, W) AND TM ACCESSORY. SEE SUBMITTAL COVER SHEET FOR APPLICABLE ACCESSORIES. 2.(*) OPTIONAL	MODEL: ZTSH4/26 (40-260 AMP)		ZENITH CONTROLS, INC.
		DRFT: FHB	APP'D:	TITLE: CONTROL PANEL LAYOUT
		DATE: 07/22/94		DRAWING NO.: 47A-1005-3
		SCALE: 1/2 = 1		SHEET 4 OF 4

ZTSH SERIES
AUTOMATIC TRANSFER SWITCHES
40 TO 260 AMP

FOR USE ON EMERGNECY OR STANDBY SYSTEMS
RATED FOR TOTAL SYSTEM & MOTOR LOAD

A. LEGEND

N1,2,3,(N)	Normal Line
E1,2,3,(N)	Emergency Line
T1,2,3,(N)	Load Connections
B1,2,3	Solid State Phase Relay(s)
	Dropout ____%
	Pickup ____%
CA	CN/CE Capacitor
CE1	CE Control Relay, Emergency
CN1	CN Control Relay, Normal
CN/CE	Main Transfer Operator
CR	Normal Control Relay
DS	Disconnect Switch
E	Engine Start Contact
GND	Ground
NB	Neutral Bar (if required)
RT	Emergency Control relay
SN	Cutout Switch, Normal
SE	Cutout Switch, Emergency
TS	Test Switch,Momentary,Not Keyed
VFSM	Emergency Volt-Freq. Relay
	Pickup {90% of rated Voltage, and 95% of rated Frequency
XE	Control Transformer, Emergency
XN	Control Transformer, Normal

B. OPERATION

When the Normal Line falls below the preset dropout point, the phase relays will dropout disconnecting the CR relay.

When the Emergency Line voltage & frequency reach the preset pickup point, the VFSM relay picks up. RT relay picks up to operate the CE1 relay through the SE cutout switch, causing the main transfer operator CN/CE to operate. The load is now transferred to the Emergency Line. The SE limit switch operates to disconnect the CE1 relay and CN/CE main transfer operator. The transfer switch is now mechanically locked. Limit switch SN operates to complete the circuit for the next closing operation to Normal.

When the Normal Line voltage exceeds the preset pickup point, the phase relays, B1, B2 & B3 pick up. CR relay picks up to operate the CN1 relay through the SN cutout switch causing the main transfer operator CN/CE to operate. The load is now re-transferred back to the Normal Line. The SN limit switch operates to disconnect the CN1 relay and CN/CE main transfer operator. The transfer switch is now mechanically locked. Limit switch SE operates to complete the circuit for the next closing operation to Emergency.

DS - Disconnect Switch
When the Disconnect Switch is placed in the INHIBIT position the circuit to the main transfer operator CN/CE is opened and transfer cannot take place.

TS - Test Switch
The Test Switch simulates a normal line failure when activated.
To test, activate the Test Switch allowing the transfer switch to transfer to the EMERGENCY position. De-activate the Test Switch. The transfer switch will reset to the NORMAL position. Testing at least once a month is recommended. For hospital emergency systems, test once a week.

NOTES:

1. ⚠ CAUTION: In using a 3 phase, 4 wire delta or open delta power supply (usually 120/240 volts, sometimes listed as 120/208 volts) with one leg having a grounded center tap, one line will be 160 to 208 volts to ground. When such a system is used it is necessary to connect the high leg to N2. DO NOT CONNECT 120 VOLT LOAD CIRCUIT TO THE HIGH LEG.
2. GROUNDING TERMINAL: A grounding terminal (GND) is provided. When installing open type switches connect this to the metal enclosure or conduit.
3. ⚠ WARNING - TO ENSURE AGAINST SHOCK OR ACCIDENT HAZARD, DISCONNECT ALL SOURCES OF SUPPLY BEFORE SERVICING.
4. ON SINGLE PHASE UNITS WHERE THE EMERGENCY SOURCE IS A UTILITY LINE, CONNECT EMERGENCY LINE SO THAT MINIMUM VOLTAGE IS MEASURED FROM N1 TO E1.
5. ON SINGLE PHASE (2 POLE) UNITS, CENTER POLE AND PHASE RELAYS (B2,B3) ARE NOT SUPPLIED.

CONTROLLED
ECN S-5004: 8-7-92

ZENITH CONTROLS, INC.

TITLE: LEGEND & OPERATION

DRAWING NO.: 40R-0100 — REV.

ACCESSORIES

The ZTS series switches are wired so that accessories can be easily added to the switch. The following is a description of the basic accessories. Those checked are supplied on this unit, see additional pages for complete legend & operation.

- ☐ A1 Auxiliary contact, S.P.D.T., operates on normal line failure.
- ☐ A1E Auxiliary contact, S.P.D.T., operates on emergency line failure.
- ☐ A3 Auxiliary contact closes when the transfer switch is in the Emergency position.
- ☐ A4 Auxiliary contact closes when the transfer switch is in Normal position.
- ☐ A5 Motor Disconnect. To de-energize external motor control circuit 5 seconds (adjustable) prior to transfer in either direction.
- ☐ C Plant Exerciser. Automatically starts generator for selected time intervals.
- ☐ C/D Plant Exerciser. Automatically starts generator to run unloaded or simulate a power failure and starts generator to run under load.
- ☐ E Engine Start Contact: 1 Normally Open, 1 Normally Closed.
- ☐ F Auxiliary Fan Contact, S.P.N.O. Closes when generator is running.
- ☐ H Time delay to engine start, non-adjustable. Factory set 1 or 3 seconds. When the Normal line fails the relay de-energizes. After the set time delay, its contacts close to start the engine. When Normal line restores and the transfer switch is in the Normal position, the relay energizes and the engine start contacts open to shut down the engine.
- ☐ J1 Adjustable under frequency sensor.
- ☐ J2 Adjustable over/under frequency sensor.
- ☐ K Frequency meter to indicate load frequency.
- ☐ L1 Pilot Light. Switch in Emergency Position.
- ☐ L2 Pilot Light. Switch in Normal Position.
- ☐ L3 Pilot Light. Normal source available.
- ☐ L4 Pilot Light. Emergency source available.
- ☐ M1 Ammeter; Single phase.
- ☐ M2 Ammeter; Three phase
- ☐ M3 Voltmeter; Single phase.
- ☐ M4 Voltmeter; Three phase.
- ☐ P1 Time Delay to Engine Start (solid state). Adjustable over time range .5 to 6 seconds. When the Normal line fails the relay de-energizes. After the set time delay, its contacts close to start the engine. When Normal line restores and the transfer switch is in Normal position, the relay energizes and the engine start contacts open to shut down the engine.
- ☐ P2 Time Delay to Engine Start (Pneumatic). Adjustable over time range 1/6 to 300 seconds. When the Normal line fails, the relay de-energizes. After the set time delay its contacts close to start the engine. When Normal line restores and the transfer switch is in the Normal position, the relay energizes and the engine start contacts open to shut down the engine.
- ☐ O2 Connections for remote peak shave or area protection relays. Includes bypass for automatic return to Normal if Emergency line fails and Normal is present.
- ☐ R1 Solid State Adjustable Overvoltage Relay(s). Set at 110% of pickup, 105% of dropout of nominal Line rate, unless otherwise specified.
- ☐ R4 In-Phase monitor. Prevents transfer until two sources are in-phase. For use of isochronous governors.
- ☐ R4S In-phase monitor. Prevents transfer until two sources are in-phase. For use with mechanical governors.
- ☐ S1 Four-position Engine Control Selector Switch. "STOP", "HAND CRANK", "TEST", "AUTOMATIC".
- ☐ T Time delay, re-transfer to Normal. When the Normal line restores and the phase relays operate, the T timer is energized. After the set time delay, its contacts close the circuit to the CR relay which operates to restore the load to the Normal line. RT relay is supplied to bypass T contacts if Emergency is de-energized during timing. CAUTION-DO NOT SET TIMER AT THE "0" POINT.
- ☐ TS / WS Presignal auxiliary Contact, S.P.D.T: Operates 0-30 seconds (adjustable) prior to transfer in either direction.
- ☐ U Time delay, engine cool-down. When the transfer switch is restored to the Normal position and the engine is signaled to shut down, the U timer operates to maintain the engine start circuit closed. At the end of the set time, the engine contacts open to shut down the engine. CAUTION-DO NOT SET TIMER AT THE "0" POINT.
- ☐ W Time delay, transfer to Emergency. When the Normal line fails and the engine has started, the WFSM relay energizes. The W timer energizes. After the set time delay, its contacts close to energize the RT relay. CAUTION-DO NOT SET TIMER AT THE "0" POINT.
- ☐ YE Pushbutton, Transfer to Emergency. Provides manual control of transfer to emergency source. If time delay accessory W is supplied pushbutton bypasses time delay for immediate transfer; otherwise, transfer to emergency will be automatic after time delay. If time delay accessory W is not supplied, transfer will be non-automatic (by pushbutton only).
- ☐ YN Pushbutton, Retransfer to Normal. Provides manual control of retransfer to normal source. If time delay accessory T is supplied, pushbutton bypasses time delay for immediate retransfer; otherwise, retransfer to normal will be automatic after time delay. If time delay accessory T is not supplied, retransfer will be non-automatic (by pushbutton only).
- ☐ Other: _____

CONTROLLED

ZENITH CONTROLS, INC.

TITLE: ACCESSORIES

DRAWING NO.: 40R-0900 — REV