FFY17-18 DERA PROJECT - ITB 20053

CHIGNIK LAKE DERA PROJECT DESIGN DRAWINGS:	
M1	PROJECT DESCRIPTION, SCHEDULE OF DRAWINGS, & MECHANICAL WORK PLANS
M2	GENSET #1 & #4 INSTALLATION DETAILS
M3	GENERATOR FABRICATION DETAILS
E1	ELECTRICAL WORK PLANS & EQUIPMENT SCHEDULE
E2	ELECTRICAL DETAILS
E3.1	SWITCHGEAR MODIFICATIONS
E3.2	24V ENGINE WIRING JUNCTION BOX

CIRCLE DERA PROJECT DESIGN DRAWINGS	
M1.1	PROJECT DESCRIPTION, SCHEDULE OF DRAWINGS, & MECHANICAL WORK PLAN
M1.2	MECHANICAL WALL PENETRATIONS & VENTILATION DETAILS
M2.1	GENSET #1 & #2 INSTALLATION DETAILS
M2.2	FUEL PIPING PLAN, DETAILS, & GENSET #3 INSTALLATION
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E1	ELECTRICAL WORK PLAN & EQUIPMENT SCHEDULE
E2.1	TYPICAL GENERATION BAY SECTION & DETAILS
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E3.1	SWITCHGEAR LAYOUT, ONE-LINE, & SCHEMATICS
E3.2	GENSET #1 & #2 24V ENGINE WIRING JUNCTION BOX

TAKOTNA DERA PROJECT DESIGN DRAWINGS:	
M1	PROJECT DESCRIPTION, SCHEDULE OF DRAWINGS, & MECHANICAL WORK PLANS
M2	GENSET #2 & #4 INSTALLATION DETAILS
M3	GENSET FABRICATION DETAILS
E1	ELECTRICAL WORK PLANS & EQUIPMENT SCHEDULE
E2	ELECTRICAL DETAILS
E3.1	SWITCHGEAR MODIFICATIONS
E3.2	24V ENGINE WIRING JUNCTION BOX

SWITCHGEAR REFERENCE DRAWINGS
CHIGNIK LAKE SWITCHGEAR ORIGINAL DRAWINGS (28 SHEETS TOTAL)
TAKOTNA SWITCHGEAR ORIGINAL DRAWINGS (32 SHEETS TOTAL)
CROOKED CREEK SWITCHGEAR UPGRADE DRAWINGS (25 SHEETS TOTAL)

PROJECT:
FFY17-18 DERA PROJECT

TITLE:
SCHEDULE OF DRAWINGS,

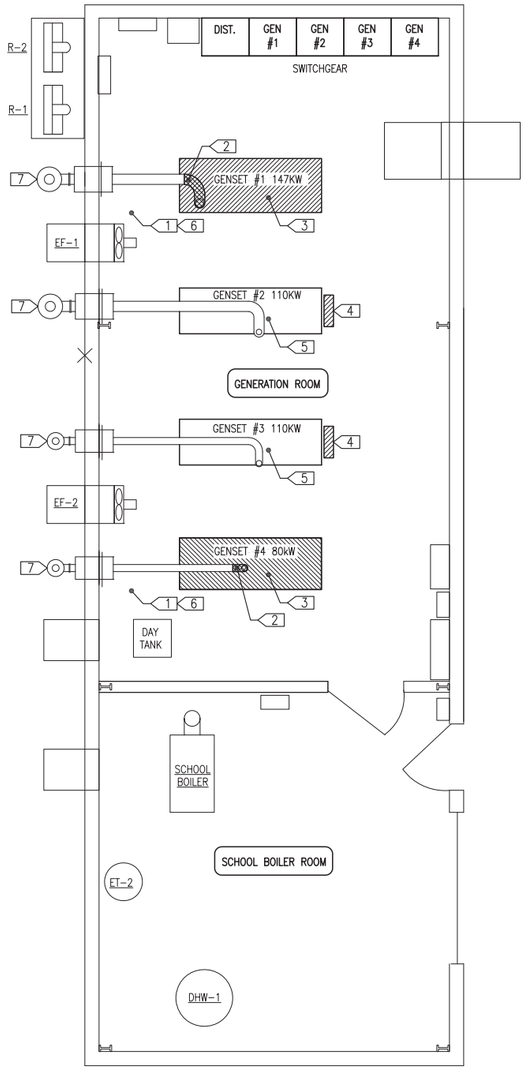
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: BCG | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/18/20
FILE NAME: FFY17-18 G1-3 | SHEET: G1 OF 1
PROJECT NUMBER:

PROJECT DESCRIPTION

1. THE EXISTING CHIGNIK LAKE POWER PLANT WAS ORIGINALLY CONSTRUCTED IN 2003. SEVERAL MODIFICATIONS HAVE BEEN MADE SINCE ORIGINAL CONSTRUCTION. THE PLANT PRESENTLY HAS MULTIPLE MECHANICAL AND ELECTRICAL DEFICIENCIES REQUIRING UPGRADES TO PROVIDE RELIABLE PRIME POWER SERVICE FOR THE COMMUNITY.
2. THE PRIMARY PURPOSE OF THIS PROJECT IS TO INSTALL TWO NEW TIER 3 MARINE DIESEL ENGINE–GENERATOR SETS (GENSETS) AND TO RESTORE FULL MANUAL AND AUTOMATIC PARALLELING CONTROL OF THE NEW AND THE EXISTING GENSETS.
3. EXISTING GENSETS #1 AND #4 WILL BE REMOVED AND REPLACED WITH NEW COMPLETE SKID MOUNTED GENSETS.
4. EXISTING GENSETS #2 & #3 WILL RECEIVE NEW SENSORS, VOLTAGE REGULATORS AND ENGINE CONTROL WIRING JUNCTION BOXES.
5. THE EXISTING SWITCHGEAR WILL BE RETROFIT WITH NEW CONTROLS.
6. IN ADDITION, MINOR MODIFICATIONS WILL BE MADE TO THE PLANT MECHANICAL AND ELECTRICAL SYSTEMS AS INDICATED.

SCHEDULE OF DRAWINGS:



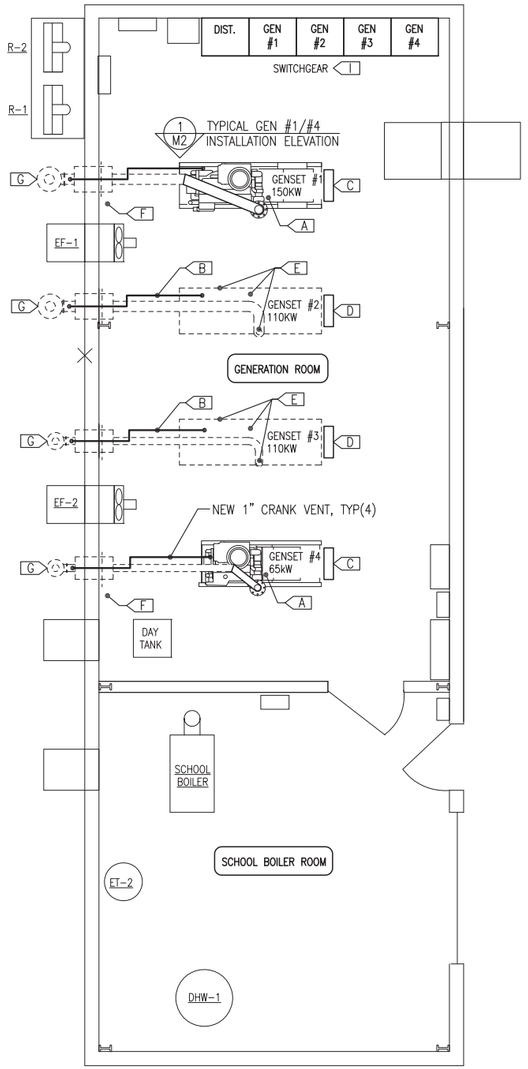
1 M1 DEMOLITION PLAN
1/4"=1'–0"

DEMOLITION GENERAL NOTES:

1. EXISTING EQUIPMENT AND PIPING TO BE REMOVED INDICATED BY HATCHING
2. TAKE ALL PRECAUTIONS TO MINIMIZE DAMAGE TO GENERATION EQUIPMENT BEING REMOVED DURING DEMOLITION. TARP GENERATOR ENDS AND SEAL ALL EXPOSED CONNECTIONS PRIOR TO REMOVING FROM PLANT. TURN ALL REMOVED EQUIPMENT OVER TO THE UTILITY FOR FINAL DISPOSITION.
3. DRAIN GENSETS #1 AND #4 OF ALL FLUIDS AND RENDER UNUSABLE (SEE NOTE 4). SAVE ANY REMAINING GLYCOL AND DIESEL FUEL FOR RE–USE IN NEW SYSTEMS. TURN USED OIL OVER TO THE UTILITY FOR FINAL DISPOSITION
4. ENGINE BLOCKS FOR GENSETS #1 & #4 MUST BE RENDERED UNUSABLE BY CUTTING A MINIMUM 3"x3" HOLE IN ENGINE BLOCK. PROVIDE PHOTOGRAPHIC DOCUMENTATION OF HOLE AND ASSOCIATED ENGINE NAMEPLATE. COMPLETE DERA CERTIFICATE OF ENGINE DESTRUCTION.
5. SEE ELECTRICAL PLANS FOR ADDITIONAL DEMOLITION.

DEMOLITION SPECIFIC NOTES:

1. REMOVE ALL HOSES FOR ENGINE COOLANT & FUEL.
2. CUT OFF EXISTING 6" EXHAUST PIPE (GENSET #1) AND 4" EXHAUST PIPE (GENSET #4) JUST BEFORE ELBOW DOWN AND SAVE FLANGED EXHAUST RISER FOR REUSE ON REPLACEMENT GENSETS.
3. REMOVE EXISTING GENSETS #1 AND #4 IN THEIR ENTIRETY. SEE ELECTRICAL FOR ADDITIONAL DEMOLITION NOTES.
4. SEE ELECTRICAL.
5. GENSETS #2 & #3 TO REMAIN, SEE NEW WORK PLAN FOR INSTRUMENTATION UPGRADES.
6. REMOVE EXISTING 12V BATTERY CHARGER & BATTERIES IN PREPARATION FOR REPLACEMENT, SEE ELECTRICAL.
7. REMOVE EXISTING RAIN CAP FROM EXISTING EXHAUST PIPE RISER.
8. SEE ELECTRICAL.



2 M1 NEW WORK PLAN
1/4"=1'–0"

NEW WORK GENERAL NOTES:

1. EXISTING EQUIPMENT AND PIPING TO REMAIN IN SERVICE SHOWN WITH LIGHT DASHED LINES.
2. NEW EQUIPMENT AND PIPING TO BE INSTALLED SHOWN WITH DARK SOLID LINES.

NEW WORK SPECIFIC NOTES:

A. INSTALL NEW GENSETS #1 & #4 INCLUDING COOLANT, FUEL, EXHAUST, & CRANK VENT CONNECTIONS. SEE TYPICAL INSTALLATION ELEVATION 1/M2. SEE ELECTRICAL FOR ADDITIONAL INSTALLATION DETAILS.

B. FURNISH & INSTALL NEW CRANK VENT SYSTEM ON EXISTING GENSETS #2 & #3. SEE TYPICAL INSTALLATION ELEVATION 1/M2, SIMILAR.

C. INSTALL NEW 24V ENGINE WIRING J–BOX ON GENSETS #1 & #4, SEE ELECTRICAL.

D. REVISE WIRING CONNECTIONS ON EXISTING 12V ENGINE WIRING J–BOX ON GENSETS #2 & #3, SEE ELECTRICAL.

E. FURNISH & INSTALL NEW SENSORS ON EXISTING ENGINE IN ACCORDANCE WITH SPECIFICATIONS. WELD 1/4" FPT COUPLING TO EXISTING 4" STEEL EXHAUST PIPE IN ACCESSIBLE LOCATION FOR INSTALLATION OF EXHAUST GAS TEMPERATURE SENSOR. TAP EXISTING AIR INTAKE FOR INSTALLATION OF AIR FILTER VACUUM SENSOR. INSTALL OIL LEVEL SITE GAUGE/SWITCH IN ACCORDANCE WITH DETAIL 4/M3. SEE ELECTRICAL FOR ADDITIONAL DETAIL.

F. INSTALL NEW 24V BATTERY CHARGER & BATTERIES. SEE ELECTRICAL.

G. INSTALL NEW STAINLESS STEEL RAIN CAP ON EXISTING EXHAUST PIPE RISER, 6" IRON PIPE SIZE ON GENSETS #1 & #2, 4" IRON PIPE SIZE ON GENSETS #3 & #4.

H. SEE ELECTRICAL.

I. MODIFY SWITCHGEAR. SEE ELECTRICAL.

ISSUED FOR CONSTRUCTION FEB 2020

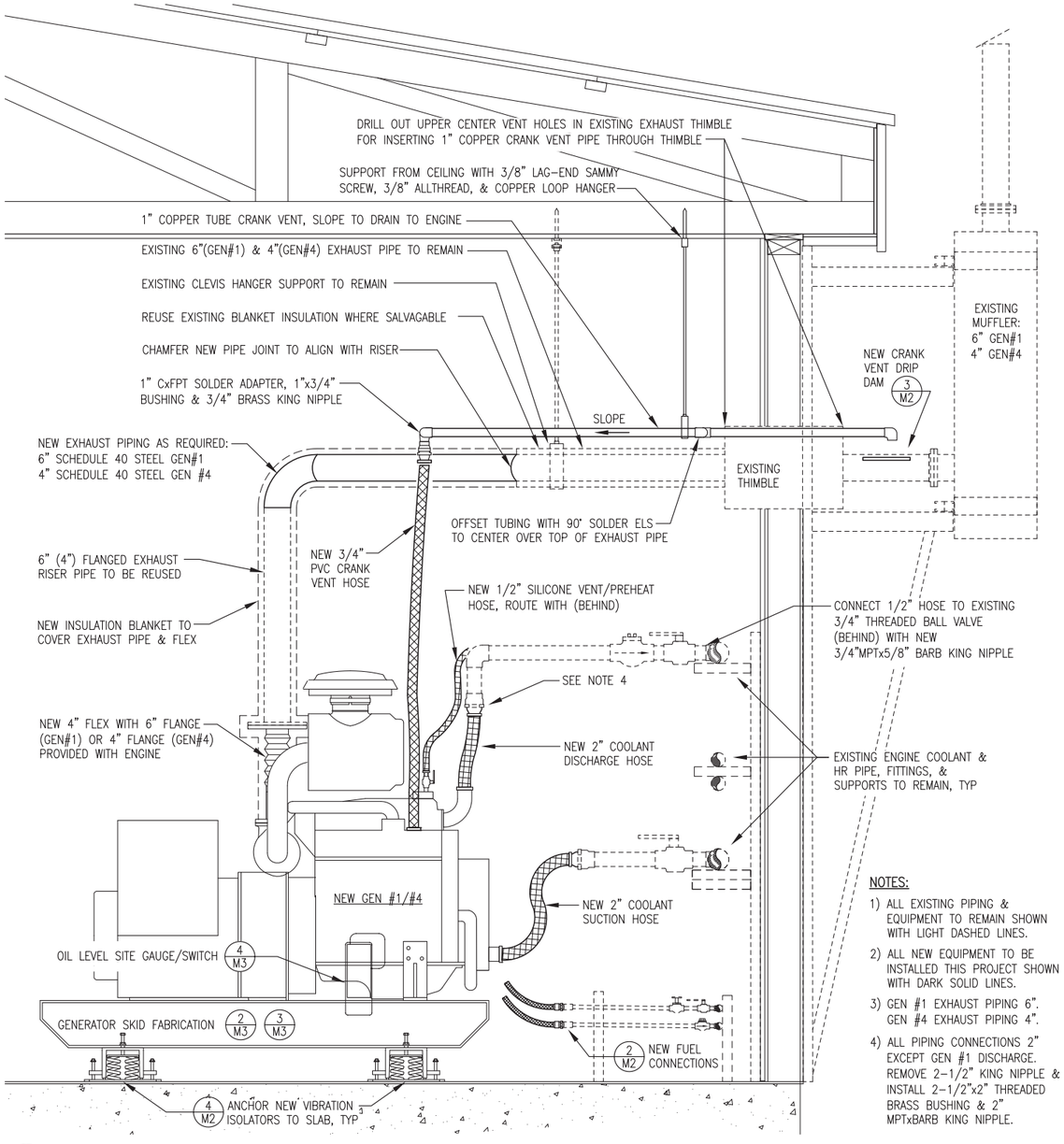
STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17–18 DERA PROJECT
CHIGNIK LAKE POWER PLANT UPGRADE

TITLE: PROJECT DESCRIPTION, SCHEDULE OF DRAWINGS, & MECHANICAL WORK PLANS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

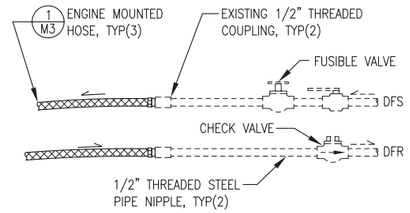
DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/18/20
FILE NAME: CLAKDERA M1–3 | SHEET: M1 OF 3
PROJECT NUMBER:



NOTES:

1) ALL EXISTING PIPING & EQUIPMENT TO REMAIN SHOWN WITH LIGHT DASHED LINES.
2) ALL NEW EQUIPMENT TO BE INSTALLED THIS PROJECT SHOWN WITH DARK SOLID LINES.
3) GEN #1 EXHAUST PIPING 6". GEN #4 EXHAUST PIPING 4".
4) ALL PIPING CONNECTIONS 2" EXCEPT GEN #1 DISCHARGE. REMOVE 2-1/2" KING NIPPLE & INSTALL 2-1/2"x2" THREADED BRASS BUSHING & 2" MPTxBARB KING NIPPLE.

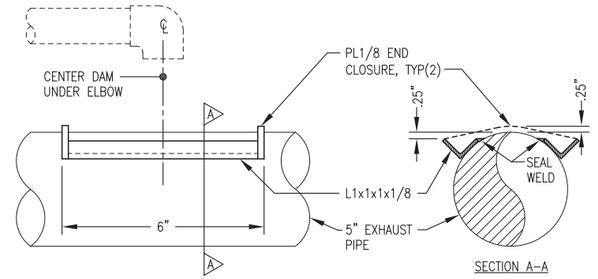
1/M2 GEN #1/#4 INSTALLATION ELEVATION (GEN #2/#3 MODS SIMILAR)
1"=1'-0"



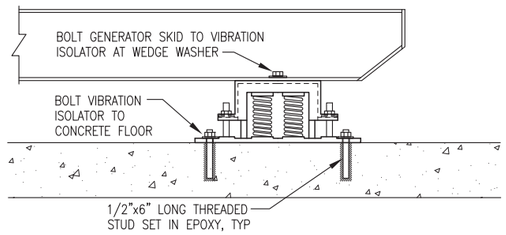
NOTES:

1) EXISTING PIPING & VALVES 1/2" THREADED.
2) FIELD CUT NEW ENGINE MOUNTED HOSES TO LENGTH & REINSTALL JIC FITTINGS.

2/M2 TYPICAL FUEL PIPING CONNECTIONS
NO SCALE



3/M2 CRANKCASE DRIP DAM FABRICATION DETAIL
NO SCALE



NOTE: AFTER INSTALLATION ADJUST SPRING VIBRATION ISOLATOR LEVELING BOLTS TO ACHIEVE A UNIFORM INSTALLATION HEIGHT OF APPROXIMATELY 5-3/4" THEN TIGHTEN LOCKING NUTS. ADJUST NUTS ON STABILIZER BOLTS TO ACHIEVE A UNIFORM CLEARANCE OF APPROXIMATELY 1/8" THEN TIGHTEN LOCKING NUTS. VERIFY UNIT MOVES FREELY ON ISOLATORS.

4/M2 TYPICAL GENERATOR VIBRATION ISOLATOR INSTALLATION
NO SCALE

ISSUED FOR CONSTRUCTION
FEB 2020

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
CHIGNIK LAKE POWER PLANT UPGRADE

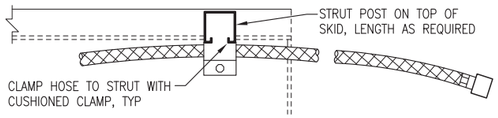
TITLE: GENSET #1 & #4 INSTALLATION DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

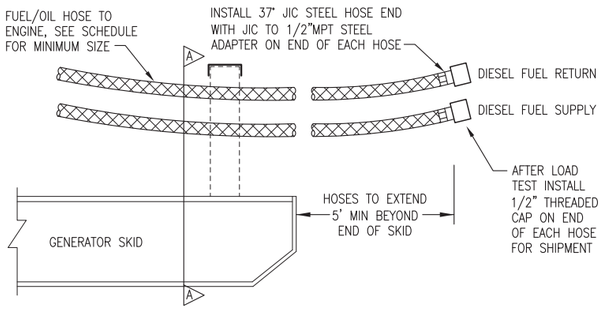
DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/18/20
FILE NAME: CLAKDERA M1-3 | SHEET: M2 OF 3
PROJECT NUMBER:

MINIMUM HOSE SIZE SCHEDULE		
FUEL SUPPLY	FUEL RETURN	USED OIL
#8	#8	N/A

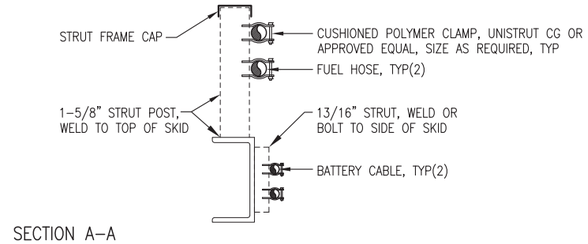
NOTE:
ON 4045'S GROUP HOSES ON LEFT SKID AS SHOWN TO COORDINATE WITH COOLANT HOSES.



LEFT SKID PLAN (TOP) VIEW

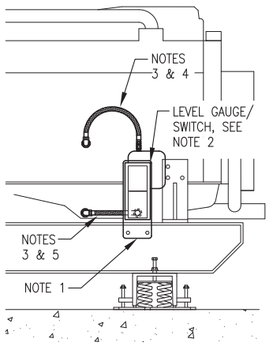


ELEVATION (SIDE) VIEW



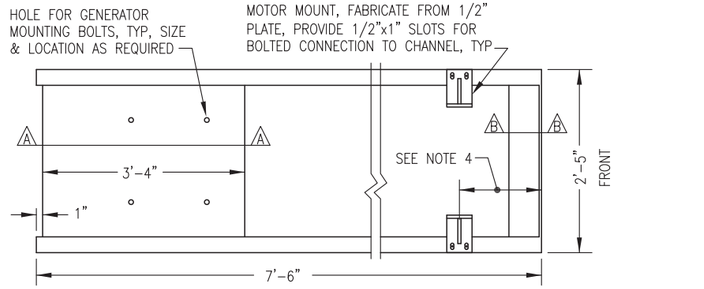
SECTION A–A

1 M3 FUEL/OIL HOSE & BATTERY CABLE INSTALLATION ON SKID
NO SCALE

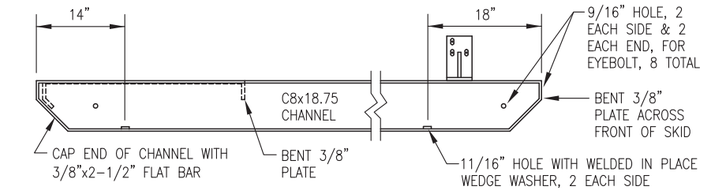


NOTES:
1) 1/4" STEEL SUPPORT PLATE PRE–DRILLED TO MATCH GAUGE/SWITCH MOUNTS, CHANNEL SKID HOLES AND BOTTOM HOSE ENTRANCE. BOLT TO INSIDE (BACK) OF CHANNEL SKID AT HEIGHT AS REQUIRED TO CENTER GAUGE AT NORMAL FULL OIL LEVEL. ADJUST SWITCH CONTACTS 1/2" ABOVE & BELOW.
2) SEE ENGINE GENERATOR SPECIFICATIONS FOR LEVEL/GUAGE SWITCH. MOUNT TO STEEL SUPPORT PLATE WITH RUBBER SHOCK MOUNTS.
3) #8 HOSE WITH 1/2" OR 3/8" NPT JIC SWIVEL ENDS AS REQUIRED.
4) CONNECT TOP (VENT) PORT TO ENGINE CRANK CASE WITH HOSE. ROUTE UPPER HOSE TO AVOID LOW POINT TRAPS.
5) CONNECT BOTTOM PORT TO ENGINE OIL PAN WITH HOSE. DO NOT TEE INTO OIL DRAIN LINE. ROUTE LOWER HOSE BACK THROUGH PRE–DRILLED HOLE IN STEEL PLATE.

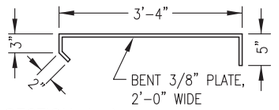
4 M3 TYPICAL OIL LEVEL GAUGE/SWITCH INSTALLATION
NO SCALE



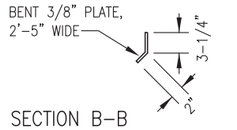
PLAN (TOP) VIEW



ELEVATION (SIDE) VIEW



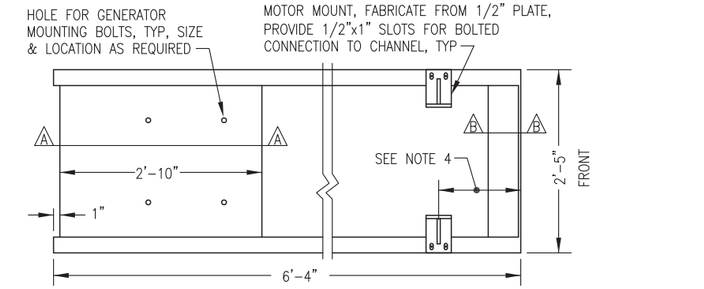
SECTION A–A



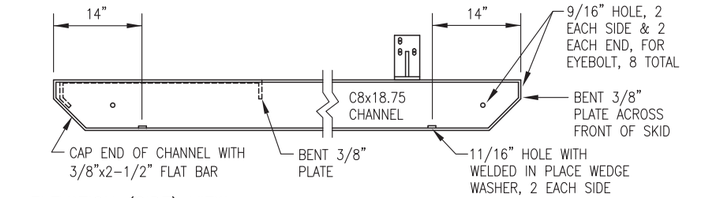
SECTION B–B

NOTES:
1) FABRICATE FROM ASTM A–36 STEEL. BEND PLATES & CUT ENDS OF CHANNELS AT 90° & 45° AS SHOWN.
2) EXCEPT WHERE INDICATED AS BOLTED MAKE ALL CONNECTIONS WITH CONTINUOUS WELDS (FILLET OR FULL–PENETRATION GROOVE AS REQUIRED) IN ACCORDANCE WITH CURRENT AWS STANDARD CODE.
3) ROUND ALL CORNERS & GRIND WELDS SMOOTH AFTER FABRICATION. PAINT TO MATCH ENGINE–GENERATOR.
4) PLACE UNIT ON SKID SO THAT THE EXHAUST RISER CENTERLINE IS 4'–2" FROM THE FRONT OF THE SKID.

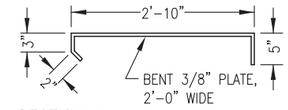
2 M3 GENSET #1 (6068) SKID FABRICATION
NO SCALE



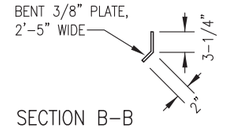
PLAN (TOP) VIEW



ELEVATION (SIDE) VIEW



SECTION A–A



SECTION B–B

NOTES:
1) FABRICATE FROM ASTM A–36 STEEL. BEND PLATES & CUT ENDS OF CHANNELS AT 90° & 45° AS SHOWN.
2) EXCEPT WHERE INDICATED AS BOLTED MAKE ALL CONNECTIONS WITH CONTINUOUS WELDS (FILLET OR FULL–PENETRATION GROOVE AS REQUIRED) IN ACCORDANCE WITH CURRENT AWS STANDARD CODE.
3) ROUND ALL CORNERS & GRIND WELDS SMOOTH AFTER FABRICATION. PAINT TO MATCH ENGINE–GENERATOR.
4) PLACE UNIT ON SKID SO THAT THE EXHAUST RISER CENTERLINE IS 3'–3" FROM THE FRONT OF THE SKID.

3 M3 GENSET #4 (4045) SKID FABRICATION
NO SCALE

ISSUED FOR CONSTRUCTION
FEB 2020

STATE OF ALASKA 49TH
BRIAN C. GRAY ME 8210
REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17–18 DERA PROJECT
CHIGNIK LAKE POWER PLANT UPGRADE

TITLE: GENERATOR FABRICATION DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/18/20
FILE NAME: CLAKDERA M1–3 | SHEET: M3 OF 3
PROJECT NUMBER:

DEMOLITION GENERAL NOTES:

1) EXISTING EQUIPMENT AND PIPING TO BE REMOVED INDICATED BY HATCHING

2) THIS PLANT PROVIDES PRIME POWER TO THE COMMUNITY OF CHIGNIK LAKE AND TO THE SCHOOL COMPLEX. KEEP OUTAGES TO A MINIMUM AND COORDINATE ALL REQUIRED OUTAGES WITH THE UTILITY AND SCHOOL.

3) ALL ITEMS TO REMAIN UNLESS SPECIFICALLY INDICATED FOR REMOVAL.

4) ENSURE ALL EQUIPMENT AND CIRCUITS TO BE REMOVED ARE DE-ENERGIZED PRIOR TO BEGINNING DEMOLITION. LOCK AND TAG OUT ALL AFFECTED CIRCUIT BREAKERS AND DISCONNECTS.

5) TAKE ALL PRECAUTIONS TO MINIMIZE DAMAGE TO ELECTRICAL EQUIPMENT AND CONDUCTORS BEING SALVAGED FOR REUSE. TURN ALL REMOVED MATERIALS AND EQUIPMENT OVER TO THE UTILITY FOR FINAL DISPOSITION IF NOT REUSED.

DEMOLITION SPECIFIC NOTES:

1 SEE MECHANICAL.

2 SEE MECHANICAL.

3 REMOVE EXISTING GENSETS #1 & #4 IN THEIR ENTIRETY. EXISTING POWER & CONTROL CONDUCTORS & ASSOCIATED CONDUIT & FITTINGS TO REMAIN IN PLACE FOR RECONNECTION TO NEW GENSETS. CAREFULLY SEPARATE EXISTING MOGULS & FITTINGS FROM GENERATOR ENCLOSURES & DISCONNECT ALL CONDUCTORS. TAPE ENDS & COIL CONDUCTORS IN SECURE LOCATION TO PROTECT FROM DAMAGE DURING GENSET REPLACEMENT.

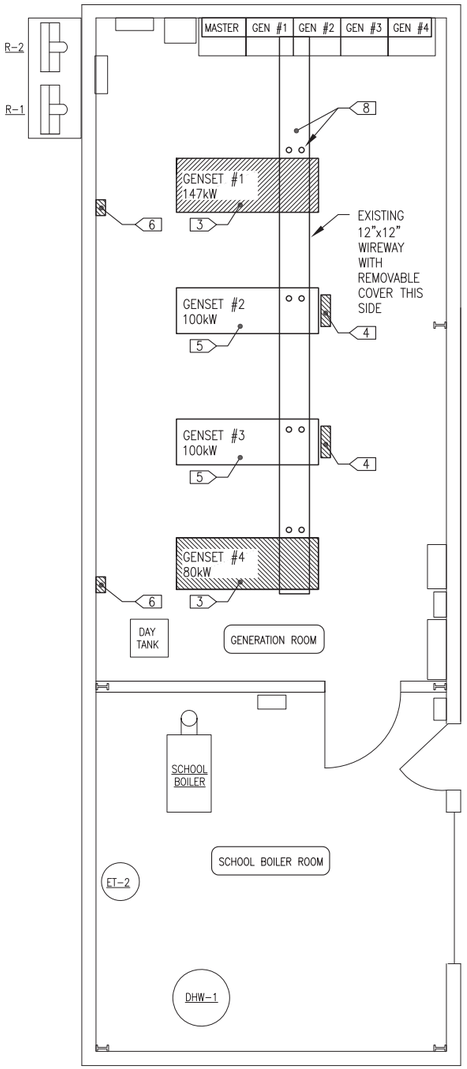
4 EXISTING GENSET #2 & #3 12V ENGINE WIRING J-BOXES TO REMAIN. SEE NEW WORK PLAN FOR WIRING CHANGES.

5 EXISTING GENSETS #2 & #3 TO REMAIN. SEE NEW WORK PLAN FOR INSTRUMENTATION UPGRADES.

6 REMOVE EXISTING 12V BATTERY CHARGERS & BATTERIES FROM GENSETS #1 & #4.

7 SEE MECHANICAL

8 ALL EXISTING GENERATOR WIREWAY, CONDUIT, POWER CONDUCTORS, & CONTROL WIRING TO REMAIN.



1 / E1 DEMOLITION PLAN
1/4"=1'-0"

NEW WORK GENERAL NOTES:

1. EXISTING EQUIPMENT TO REMAIN IN SERVICE SHOWN WITH LIGHT DASHED LINES.

2. NEW EQUIPMENT TO BE INSTALLED SHOWN WITH DARK SOLID LINES.

3. RECONNECT EXISTING POWER & CONTROL CONDUCTORS & ASSOCIATED CONDUIT & FITTINGS TO TO NEW GENSETS AS INDICATED.

NEW WORK SPECIFIC NOTES:

A CONNECT EXISTING POWER CONDUCTORS TO NEW GENSET & GROUND GENERATOR FRAME. SEE ELEVATION 1/E2. SEE MECHANICAL FOR ADDITIONAL GENSET INSTALLATION DETAILS

B SEE MECHANICAL

C INSTALL NEW 24V ENGINE WIRING J-BOX ON GENSETS #1 & #4, SEE ELEVATION 1/E2. REUSE EXISTING CONTROL CONDUCTORS FROM GENERATOR TO SWITCHGEAR & ADD NEW #18 SHIELDED PAIRS ADDED AS REQUIRED. TERMINATE ALL ACTIVE CONTROL CONDUCTORS AS SHOWN ON SHEET E3.2. TAPE ENDS AND NEATLY COIL UNUSED CONDUCTORS IN J-BOX.

D REVISE ENGINE SENSING AND CONTROL WIRING TERMINATIONS IN EXISTING 12V ENGINE WIRING J-BOX ON GENSETS #2 & #3 TO MATCH 24V ENGINE WIRING J-BOX TERMINATIONS, SEE SHEET E3.2. ADD NEW INSTRUMENTATION CONNECTIONS PER NOTE E. NOTE THAT EXISTING VOLTAGE REGULATOR & ASSOCIATED WIRING TO REMAIN UNCHANGED EXCEPT FOR BIAS CONNECTIONS TO TERMINATE ON TERMINALS 25 & 26 TO MATCH 24V ENGINE WIRING.

E INSTALL NEW SENSORS ON EXISTING GENSETS #2 & #3 AS INDICATED BELOW. SEE SPECIFICATIONS & MECHANICAL FOR ADDITIONAL DETAIL. ROUTE #18 SHIELDED PAIR FROM EACH DEVICE TO EXISTING ENGINE WIRING J-BOX. CONNECT EXISTING GENERATOR CONTROL WIRING FROM SWITCHGEAR TO TERMINALS IN J-BOX.
- EXHAUST GAS TEMPERATURE SENSOR
- AIR FILTER VACUUM SENSOR
- OIL LEVEL SITE GAUGE/SWITCH

F INSTALL NEW 24V BATTERY CHARGER, TWO NEW BATTERIES & STARTER CABLES FOR NEW GENSETS #1 & #4. SEE DETAIL 3/E2.

G SEE MECHANICAL.

H INSTALL NEW 4 PAIR #18 SHIELDED FROM SWITCHGEAR TO EACH ENGINE WIRING J-BOX FOR ECU SPEED, EXHAUST TEMP, VOLTAGE BIAS, & J1939 CANBUS. SEE SHEET E3.2. 16 PAIRS TOTAL.

I MODIFY SWITCHGEAR FOR AUTOMATIC PARALLELING OPERATION UPGRADE FOR NEW & EXISTING GENSETS, SEE SHEET E3.1 & SPECIFICATIONS.

ELECTRICAL EQUIPMENT/DEVICE SCHEDULE

SYMBOL	SERVICE	DESCRIPTION	MANUFACTURER/MODEL
1	BATTERY CHARGER	12/24-VOLT SOLID STATE 20-AMP AUTO-EQUALIZING BATTERY CHARGER FOR 120 VAC INPUT, WITH OPTIONAL HIGH/LOW VOLTAGE, AC POWER FAILURE, & REMOTE SUMMARY ALARM RELAYS	SENS NRG22-20-RCLS OR EQUAL

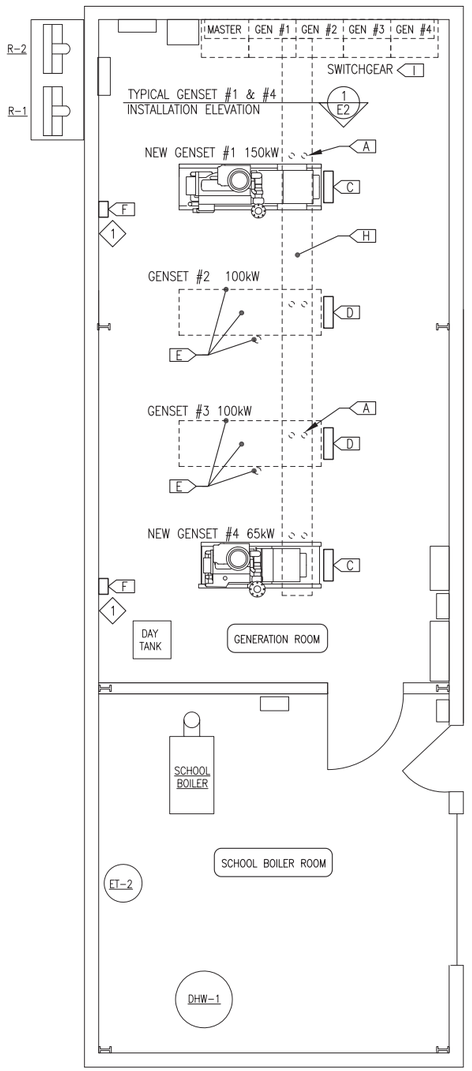
ELECTRICAL CONDUCTOR SCHEDULE

SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL	NOTES:
GENERAL USE CONDUCTORS	CLASS B CONCENTRIC STRANDED, SOFT DRAWN COPPER. TYPE XHHW INSULATION, 600V AND 75C RATED.		
SHIELDED/TWISTED INSTRUMENT & CONTROL & CANBUS CONDUCTORS	#18 AWG STRANDED TINNED COPPER CONDUCTORS, 600V POLYETHYLENE INSULATION, 100% COVERAGE ALUMINUM FOIL-POLYESTER TAPE SHIELD WITH STRANDED TINNED COPPER DRAIN WIRE & PVC OUTER JACKET	BELDEN PART #'S SINGLE PAIR: #1120A FOUR PAIR: #1049A SINGLE TRIAD: #1121A	GROUND SHIELD DRAIN WIRE AT PANEL END ONLY.

COLOR CODING - UNLESS SPECIFICALLY INDICATED OTHERWISE COLOR CODE CONDUCTORS AS FOLLOWS:
- 480-VOLT POWER CONDUCTORS
  - PHASE A - BROWN
  - PHASE B - ORANGE
  - PHASE C - YELLOW
  - NEUTRAL - WHITE WITH YELLOW STRIPE
- 120/208-VOLT POWER CONDUCTORS
  - PHASE A - BLACK
  - PHASE B - RED
  - PHASE C - BLUE
  - NEUTRAL - WHITE
- 24 VOLT DC CONDUCTORS
  - +24VDC - RED or RED WITH GRAY STRIPE
  - -24VDC - BLACK or BLACK WITH GRAY STRIPE
- CONTROL & INSTRUMENT CONDUCTORS
  - COLOR CODED PER MANUFACTURER'S STANDARD

NOTES:
1) FOR NO. 6 AWG AND SMALLER CONDUCTORS COLOR CODING SHALL BE PROVIDED BY USING CONDUCTORS WITH CONTINUOUS COLOR EMBEDDED IN THE INSULATION. FOR ALL CONDUCTORS LARGER THAN NO. 6 SCOTCH 35 MARKING TAPE OR EQUIVALENT MAY BE USED TO COLOR CODE THE CABLE. WHERE MARKING TAPE IS USED THE CABLE SHALL BE IDENTIFIED AT EVERY ACCESSIBLE LOCATION. PROVIDE A MINIMUM OF 2 INCHES OF TAPE AT EACH LOCATION.

2) GROUNDING - PROVIDE A SEPARATE EQUIPMENT GROUNDING CONDUCTOR IN EACH RACEWAY. DO NOT USE THE CONDUIT AS AN EQUIPMENT GROUNDING CONDUCTOR. EQUIPMENT GROUNDING CONDUCTORS SHALL BE OF THE SAME TYPE AS THE PHASE CONDUCTORS AND SHALL BE SIZED AS INDICATED ON THE DRAWINGS. CONDUCTORS NOT INDICATED SHALL BE SIZED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.



2 / E1 NEW WORK PLAN
1/4"=1'-0"

ISSUED FOR CONSTRUCTION
FEB 2020

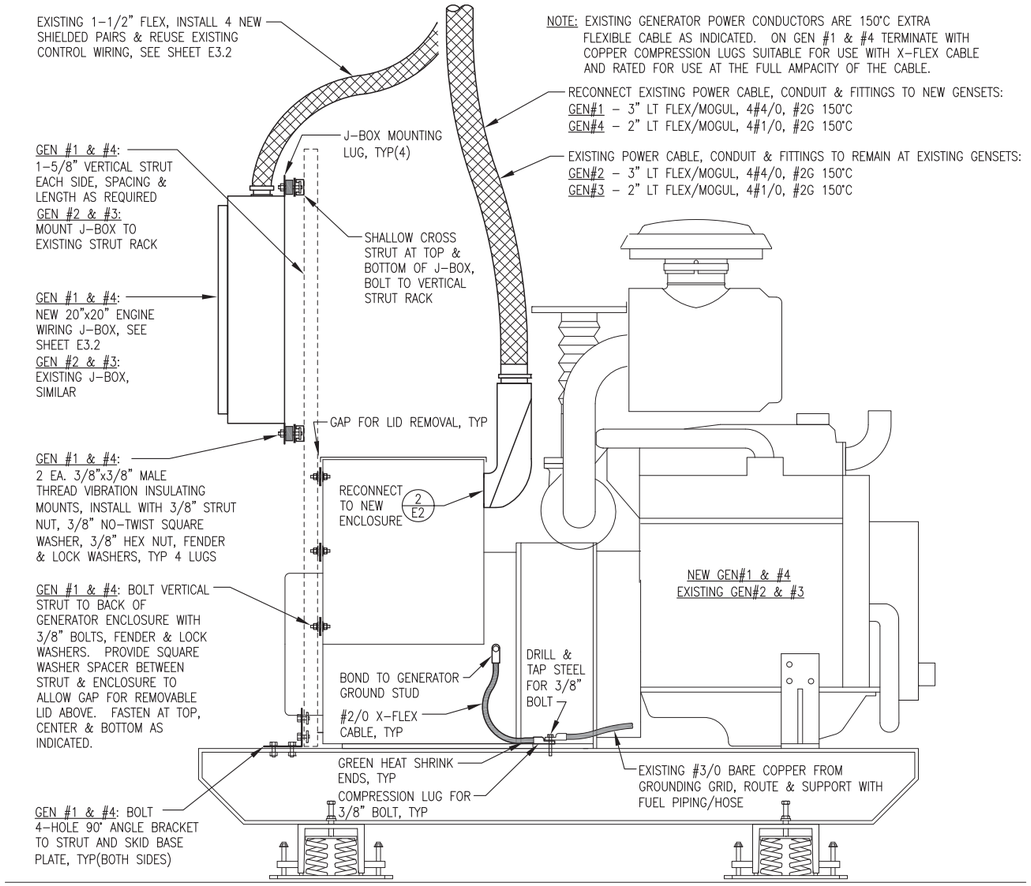
STATE OF ALASKA 49TH
CLOIS W. VERSYP
EE 7802
REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
CHIGNIK LAKE POWER PLANT UPGRADE

TITLE: ELECTRICAL WORK PLANS & SCHEDULES

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: CWV/BCG | DATE: 3/18/20
FILE NAME: CLAKDERA E1-3 | SHEET: E1 OF 3
PROJECT NUMBER:



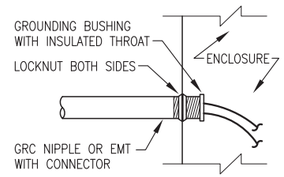
NOTES:

1) GEN #1 & #4 ARE COMPLETELY NEW INSTALLATIONS WITH ALL WORK AS INDICATED.
2) GEN #2 & #3 ARE EXISTING SIMILAR INSTALLATION WITH NEW WORK LIMITED TO CONTROL WIRING REVISIONS & GROUNDING.
3) ON GEN #1 & #4 INSTALL NEW ENGINE WIRING J-BOX INCLUDING ALL MOUNTING HARDWARE & STRUT AS INDICATED. RECONNECT EXISTING CONDUIT, EXISTING CONDUCTORS, & NEW CONDUCTORS AS INDICATED.
4) ON GEN #2 & #3 THE ENGINE WIRING J-BOX IS EXISTING. REVISE TERMINATIONS OF EXISTING CONTROL CONDUCTORS & TERMINATE NEW CONTROL CONDUCTORS. SEE SHEET E3.2.

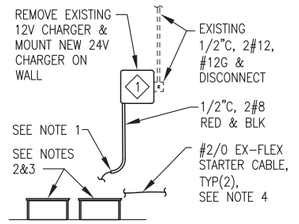
1/E2 TYPICAL GENERATOR INSTALLATION
1-1/2"=1'-0"

NOTES:

1) THIS DETAIL APPLIES TO CONNECTIONS TO WIREWAY, GENERATOR ENCLOSURES, SWITCHGEAR, AND PANELS.
2) AT A MINIMUM INSTALL GROUNDING BUSHING ON ALL GENERATOR POWER CONDUIT, COMMUNITY FEEDER CONDUIT, STATION SERVICE FEEDERS, AND WHERE OTHERWISE INDICATED OR REQUIRED. BOND GROUNDING BUSHING TO EQUIPMENT GROUNDING CONDUCTOR.
3) INSTALL PLASTIC BUSHING WHERE GROUNDING BUSHING IS NOT REQUIRED.
4) ON GENERATOR ENCLOSURES MAKE ALL CONNECTIONS AS TIGHT AS POSSIBLE.



2/E2 TYP ENCLOSURE CONNECTION
NO SCALE



NOTES:

1. INSTALL BUSHING IN END OF EMT & ROUTE 2#8 CHARGING LEADS TO BATTERY.
2. PROVIDE TWO EACH MINIMUM 800 COLD CRANK AMP 12-VOLT STARTING BATTERIES FOR EACH GENERATOR. BATTERIES SHALL BE SEALED MAINTENANCE FREE, OPTIMA RED TOP NAPA PART# BAT N993478RED OR APPROVED EQUAL. PLACE BATTERIES OUT OF TRAFFIC AREA IN CONVENIENT LOCATION NEAR BACK WALL.
3. INSTALL EACH BATTERY IN A RACK SIZED TO SECURELY HOLD THE BATTERY.
4. #2/0 EX-FLEX BATTERY CABLES PROVIDED WITH GENSETS. MAKE BATTERY CONNECTIONS WITH STRAIGHT CRIMP BATTERY TERMINAL FITTING AND TOP MOUNT TERMINAL COVERS, POLAR WIRE OR EQUAL. ROUTE CABLES WITH FUEL PIPING ALONG WALL TO GENSET BRANCH CONNECTION. ROUTE TO GENSET SKID DIRECTLY BELOW FUEL HOSE. TYWRAP CABLES TO FUEL PIPING AND HOSE AS REQUIRED. SEE SHEET M3.3 FOR STARTER CABLE SUPPORT FROM GENSET SKID.

3/E2 BATTERY CHARGER, BATTERIES AND STARTER CABLE INSTALLATION
NO SCALE"

ISSUED FOR CONSTRUCTION
FEB 2020

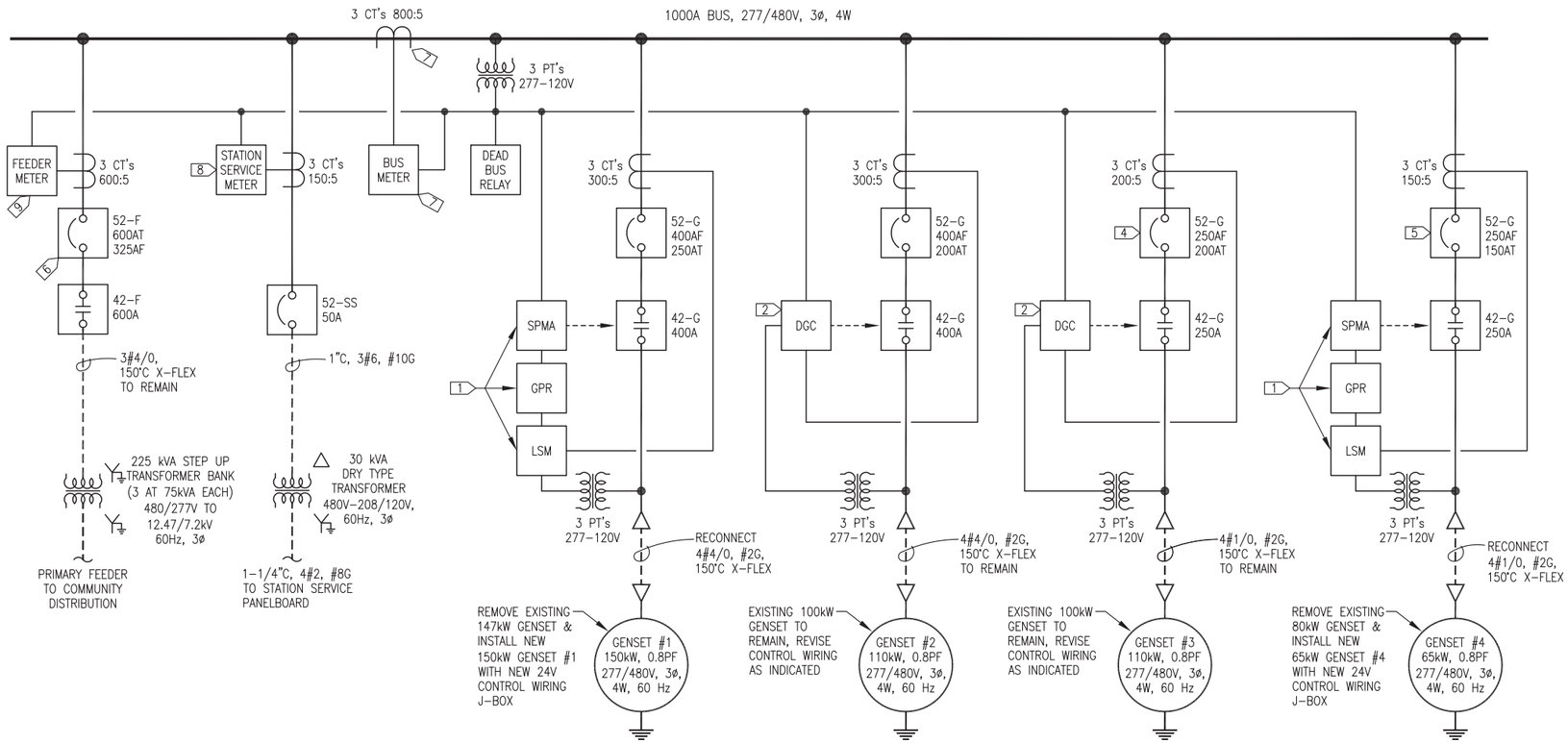
STATE OF ALASKA 49TH
CLOIS W. VERSYP
EE 7802
REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
CHIGNIK LAKE POWER PLANT UPGRADE

TITLE: ELECTRICAL DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: NO SCALE
DESIGNED BY: CWV/BCG | DATE: 3/18/20
FILE NAME: CLAKDERA E1-3 | SHEET: E2 OF 3
PROJECT NUMBER:



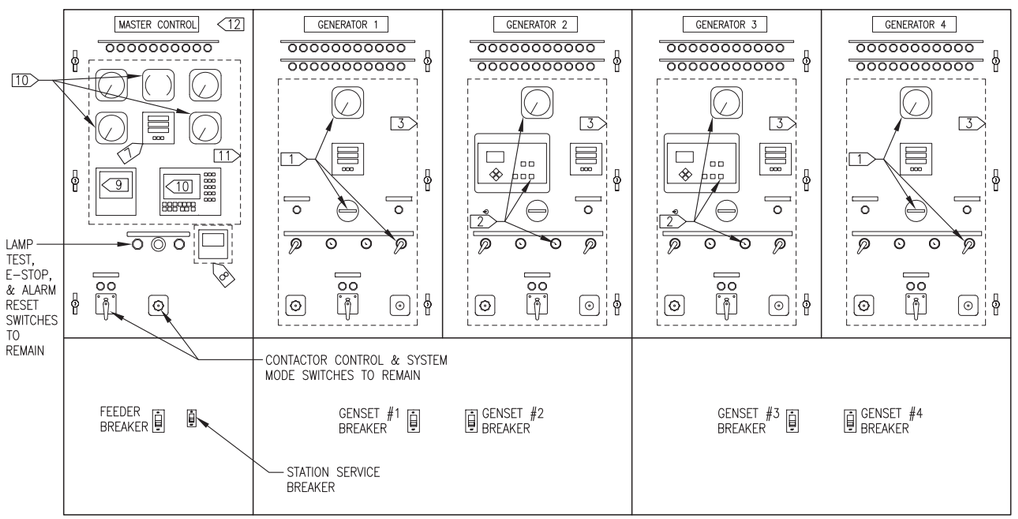
1 E3.1 SWITCHGEAR MODIFICATION ONE-LINE DIAGRAM
NO SCALE

SWITCHGEAR MODIFICATION GENERAL NOTES:

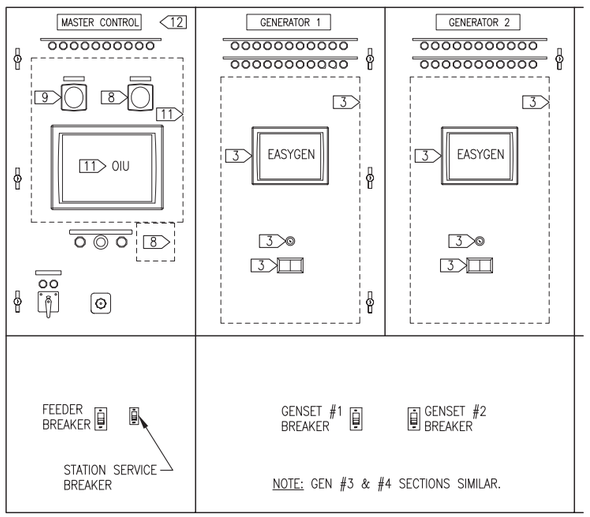
1) ALL ITEMS TO REMAIN UNLESS SPECIFICALLY INDICATED FOR REMOVAL OR REPLACEMENT.
2) ENSURE ALL EQUIPMENT AND CIRCUITS TO BE REMOVED ARE DE-ENERGIZED PRIOR TO BEGINNING DEMOLITION. LOCK AND TAG OUT ALL AFFECTED CIRCUIT BREAKERS AND DISCONNECTS.
3) SEE SPECIFICATIONS FOR DETAIL ON NEW DEVICES AND EQUIPMENT.

SWITCHGEAR MODIFICATION SPECIFIC NOTES:

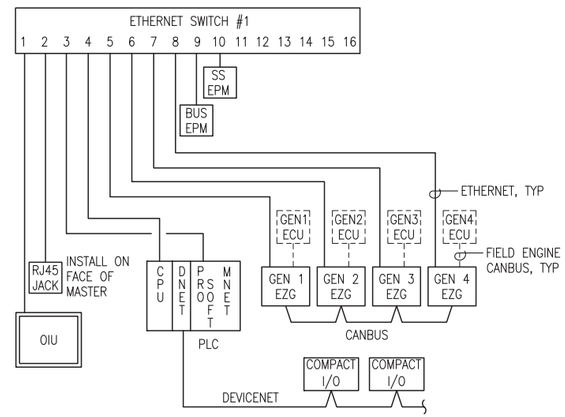
1. REMOVE EXISTING ENGINE-GENERATOR CONTROL DEVICES INCLUDING METERS, SWITCHES, POTENTIOMETERS, SYNCHRONIZER, GENERATOR PROTECTIVE RELAY, & LOAD SHARE MODULE. REPLACE WITH NEW EASYGEN & DEVICES, SEE NOTE 3. ANNUNCIATION LIGHTS TO REMAIN.
2. REMOVE EXISTING ENGINE-GENERATOR CONTROL DEVICES INCLUDING METERS, SWITCHES, POTENTIOMETERS, & BASLER DIGITAL GENSET CONTROLLER. REPLACE WITH NEW EASYGEN & DEVICES, SEE NOTE 3. ANNUNCIATION LIGHTS TO REMAIN.
3. INSTALL MINIMUM 22"Wx30"H BLANK PLATE OVER DOOR FACE TO COVER OPENINGS FROM DEMOLITION. INSTALL EASYGEN, GENERATOR LOCKOUT SWITCH, AND CONTACTOR CLOSED/OPEN ANNUNCIATION LIGHTS IN NEW PLATE.
4. REMOVE EXISTING 150A TRIP PLUG AND SAVE FOR REINSTALLATION IN GEN #4 SECTION. INSTALL NEW 200A TRIP PLUG. EXISTING BREAKER IS A G.E. SPECTRA RMS CAT. # SFHA36AT0250.
5. REMOVE EXISTING 90A TRIP PLUG AND INSTALL 150A TRIP PLUG SALVAGED FROM GEN #3 SECTION.
6. REMOVE EXISTING 600A TRIP PLUG AND INSTALL NEW 325A TRIP PLUG. EXISTING BREAKER IS A G.E. SPECTRA RMS CAT. # SGHA36AT0600.
7. REMOVE EXISTING BUS METER AND ASSOCIATED WIRING AND SHORT OUT TERMINALS ON CT'S.
8. REMOVE EXISTING STATION SERVICE METER AND INSTALL MINIMUM 6"Wx6"H BLANK PLATE OVER DOOR FACE. INSTALL NEW STATION SERVICE METER IN NEW MASTER DOOR COVER PLATE, SEE NOTE 11.
9. REMOVE EXISTING FEEDER METER AND INSTALL NEW FEEDER METER IN NEW MASTER DOOR COVER PLATE, SEE NOTE 11.
10. REMOVE EXISTING MASTER SECTION VOLTAGE & FREQUENCY METERS, OIU, & SYNCH SCOPE. REPLACE WITH NEW OIU & METERS, SEE NOTE 11. ANNUNCIATION LIGHTS TO REMAIN.
11. INSTALL MINIMUM 24"Wx24"H BLANK PLATE OVER DOOR FACE TO COVER OPENINGS FROM DEMOLITION. INSTALL NEW STATION SERVICE METER, FEEDER METER, & OIU IN NEW PLATE.
12. REMOVE EXISTING PLC & ASSOCIATED DEVICES (NOT SHOWN) FROM MASTER SECTION & REPLACE WITH NEW.



2 E3.1 EXISTING SWITCHGEAR MODIFICATION ELEVATION
NO SCALE



3 E3.1 SWITCHGEAR NEW FACEPLATES PARTIAL ELEVATION
NO SCALE



4 E3.1 COMMUNICATION SCHEMATIC
NO SCALE

ISSUED FOR CONSTRUCTION FEB 2020

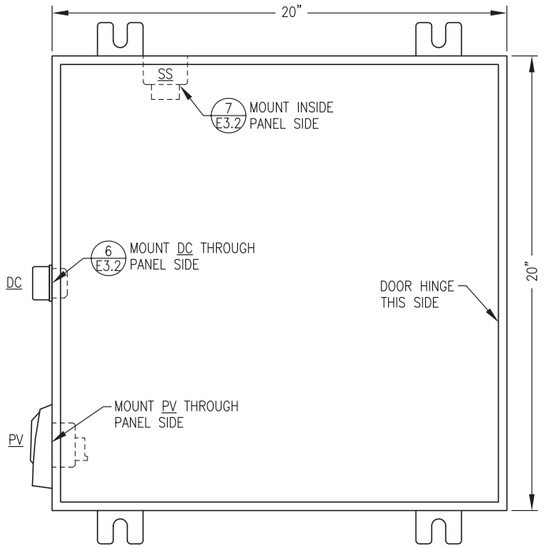
STATE OF ALASKA 49TH
CLOIS W. VERSYP EE 7802
REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
CHIGNIK LAKE POWER PLANT UPGRADE

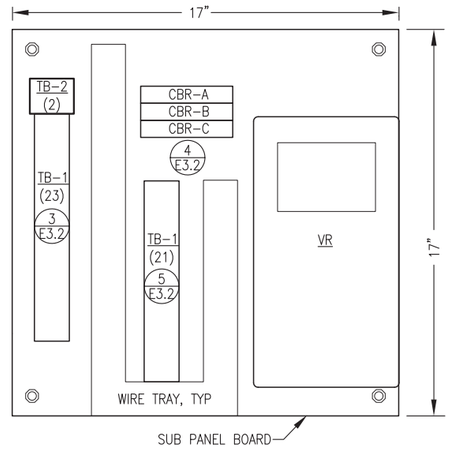
TITLE: SWITCHGEAR MODIFICATIONS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: NO SCALE
DESIGNED BY: CWV/BCG	DATE: 3/18/20
FILE NAME: CLAKDERA E1-3	SHEET: E3.1 OF 3
PROJECT NUMBER:	



1 E4 JUNCTION BOX FRONT PANEL LAYOUT
NO SCALE



2 E4 JUNCTION BOX SUB PANEL LAYOUT
NO SCALE

BILL OF MATERIALS			
TAG	MANUFACTURER	MODEL	DESCRIPTION
ENCL.	HOFFMAN	A20H20ALP	20x20x8" NEMA 12
	HOFFMAN	A20P20	BACK PANEL
VR	BASLER	DECS-150 5NS1V1N1S	DIGITAL VOLTAGE REGULATOR
CBR	ALLEN-BRADLEY	1489-M1-C010	RAIL MOUNT CIRCUIT BREAKER, 1-POLE, 1A
DC	JOHN DEERE	57M7919	DIAGNOSTIC CONNECTOR, 9-PIN, CAN-BUS
	DEUTSCH	HD18-009	CONNECTOR STRAIN RELIEF
	DEUTSCH	HDC16-9	CONNECTOR PROTECTIVE DUST CAP
	DEUTSCH	HD10-9-GKT	CONNECTOR GASKET
	DEUTSCH	JDL062397	CONNECTOR LANYARD
PV	MURPHY	PV101-C-MSTD	POWER VIEW W/HARNESS
SS	CATERPILLAR	9X-8124	STARTER AUXILIARY SOLENOID, 24V
TB-1	IDEC	BNH15LW	15A DIN RAIL-MOUNT TERMINAL BLOCK
TB-2	IDEC	BNH50W	50A DIN RAIL-MOUNT TERMINAL BLOCK

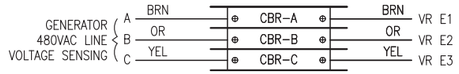
NOTE: SPECIFIC PARTS MANUFACTURER AND MODEL SELECTED NOT ONLY TO MEET PERFORMANCE FUNCTION BUT ALSO TO COORDINATE AND INTERFACE WITH OTHER DEVICES AND SYSTEMS. APPROVED EQUAL SUBSTITUTIONS WILL BE ALLOWED ONLY BY ENGINEER'S APPROVAL. TO OBTAIN APPROVAL, SUBMITTALS MUST CLEARLY DEMONSTRATE HOW SUBSTITUTE ITEM MEETS OR EXCEEDS SPECIFIED ITEM QUALITY AND PERFORMANCE CHARACTERISTICS AND ALSO COMPLIES WITH MECHANICAL AND/OR ELECTRICAL CONNECTIONS AND PHYSICAL LAYOUT REQUIREMENTS.

SHOP FABRICATION NOTES:

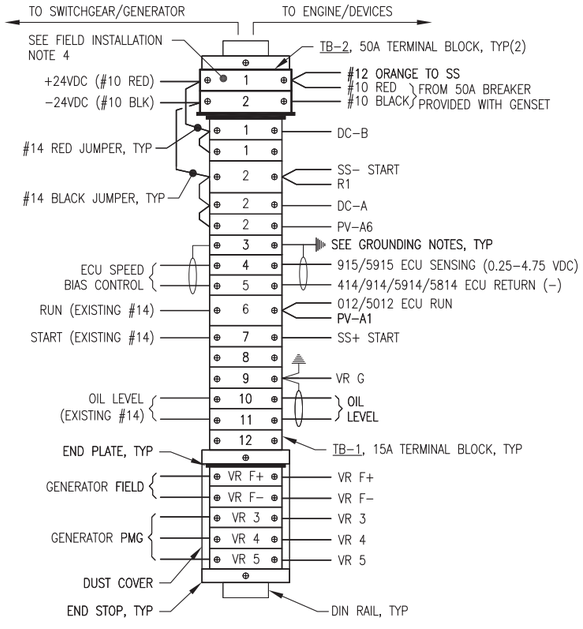
1) PROVIDE ASSEMBLY WITH ALL DEVICES AND WIRING INDICATED.
2) INSTALL IN A NEMA 12 ENCLOSURE WITH MOUNTING FLANGES AT BACK, A MIN 14 GAUGE INTERIOR BACK PANEL AND HINGED LOCKABLE DOOR. SIZE AS INDICATED.
3) PROVIDE DIN RAIL, TERMINAL END PLATES, TERMINAL END STOPS, TERMINAL DUST COVERS AND OTHER MISCELLANEOUS HARDWARE AS REQUIRED TO MATCH TERMINALS. LABEL ALL TERMINALS EXACTLY AS INDICATED ON THE DETAILS.
4) ALL WIRE #14AWG EXCEPT WHERE SPECIFICALLY INDICATED OTHERWISE. LABEL BOTH ENDS OF ALL JUMPERS WITH THE ENGINE PANEL TERMINAL NUMBER.
5) PROVIDE MECHANICAL GROUND LUGS FASTENED TO BACK PANEL AND GROUNDED TO ENGINE-GENERATOR. GROUND ALL SHIELD DRAIN WIRES TO LUGS AT PANEL END ONLY.
6) PROVIDE WIRING HARNESSES FOR CONNECTION TO GENERATOR AND TO ENGINE. INSTALL WIRES IN LIQUID TIGHT FLEX OR FLEXIBLE PLASTIC WIRE LOOM AND PROVIDE SERVICE LOOPS IN ACCORDANCE WITH SPECIFICATIONS.
7) SHOP TEST EACH NEW ENGINE-GENERATOR WITH ASSOCIATED JUNCTION BOX PERMANENTLY CONNECTED. UPON COMPLETION OF TESTING, COIL WIRING HARNESSES AND SECURE JUNCTION BOX TO GENERATOR FOR SHIPPING.

FIELD INSTALLATION NOTES:

1) PERFORM ALL FIELD WIRING IN ACCORDANCE WITH SPECIFICATIONS.
2) GEN #1 & #4 TO BE FURNISHED WITH NEW J-BOXES SHOP CONNECTED TO GENSET AS INDICATED & SPECIFIED.
3) GEN #2 & #3 J-BOXES TO BE FIELD REVISED TO MATCH TERMINATION NUMBERS ON THIS SHEET & TO CONNECT TO NEW INSTRUMENTATION DEVICES.
4) ON SHIELDED CONDUCTORS GROUND ALL SHIELD DRAIN WIRES TO LUGS AT PANEL END ONLY.
5) #10 & #14 CONDUCTORS FROM GENERATOR TO SWITCHGEAR ARE EXISTING. TAPE ENDS AND NEATLY COIL UNUSED CONDUCTORS IN J-BOX. INSTALL NEW 4 PAIR #18 SHIELDED FOR CONTROL & INSTRUMENTATION AS INDICATED.
6) RELABEL ALL TERMINALS IN SWITCHGEAR TO MATCH NEW J-BOX TERMINAL NUMBERS. LABEL BOTH ENDS OF ALL FIELD WIRING WITH THE ENGINE PANEL TERMINAL NUMBER.

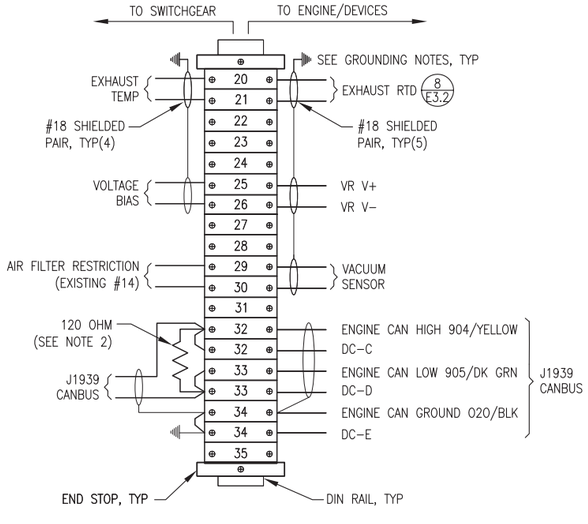


4 E3.2 CIRCUIT BREAKER CONNECTIONS
NO SCALE



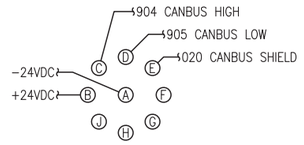
NOTE: TYPICAL JOHN DEERE ECU CONNECTION NUMBERS SHOWN. SEE WIRING HARNESS FOR EACH ENGINE FOR ACTUAL ECU CONNECTIONS.

3 E3.2 TERMINAL STRIP CONNECTIONS
NO SCALE

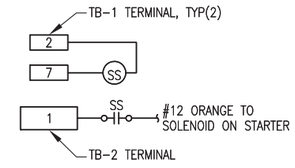


NOTES: 1) ALL RESISTORS 0.25W.
2) REMOVE RESISTOR IF ENGINE WIRING HARNESS HAS 120 OHM END OF LINE RESISTOR.

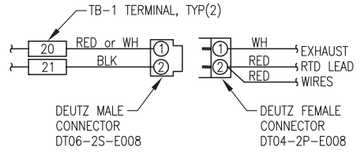
5 E3.2 TERMINAL STRIP CONNECTIONS
NO SCALE



6 E3.2 DIAGNOSTIC CONNECTOR WIRING
NO SCALE



7 E3.2 STARTER AUX SOLENOID SS WIRING
NO SCALE



8 E3.2 EXHAUST RTD CONNECTOR
NO SCALE

ISSUED FOR CONSTRUCTION
FEB 2020

STATE OF ALASKA 49TH
CLOIS W. VERSYP
EE 7802
REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
CHIGNIK LAKE POWER PLANT UPGRADE

TITLE: 24V ENGINE WIRING JUNCTION BOX

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: NO SCALE
DESIGNED BY: CWV/BCG | DATE: 3/18/20
FILE NAME: CLAKDERA E1-3 | SHEET: E3.2 OF 3
PROJECT NUMBER:

PROJECT DESCRIPTION

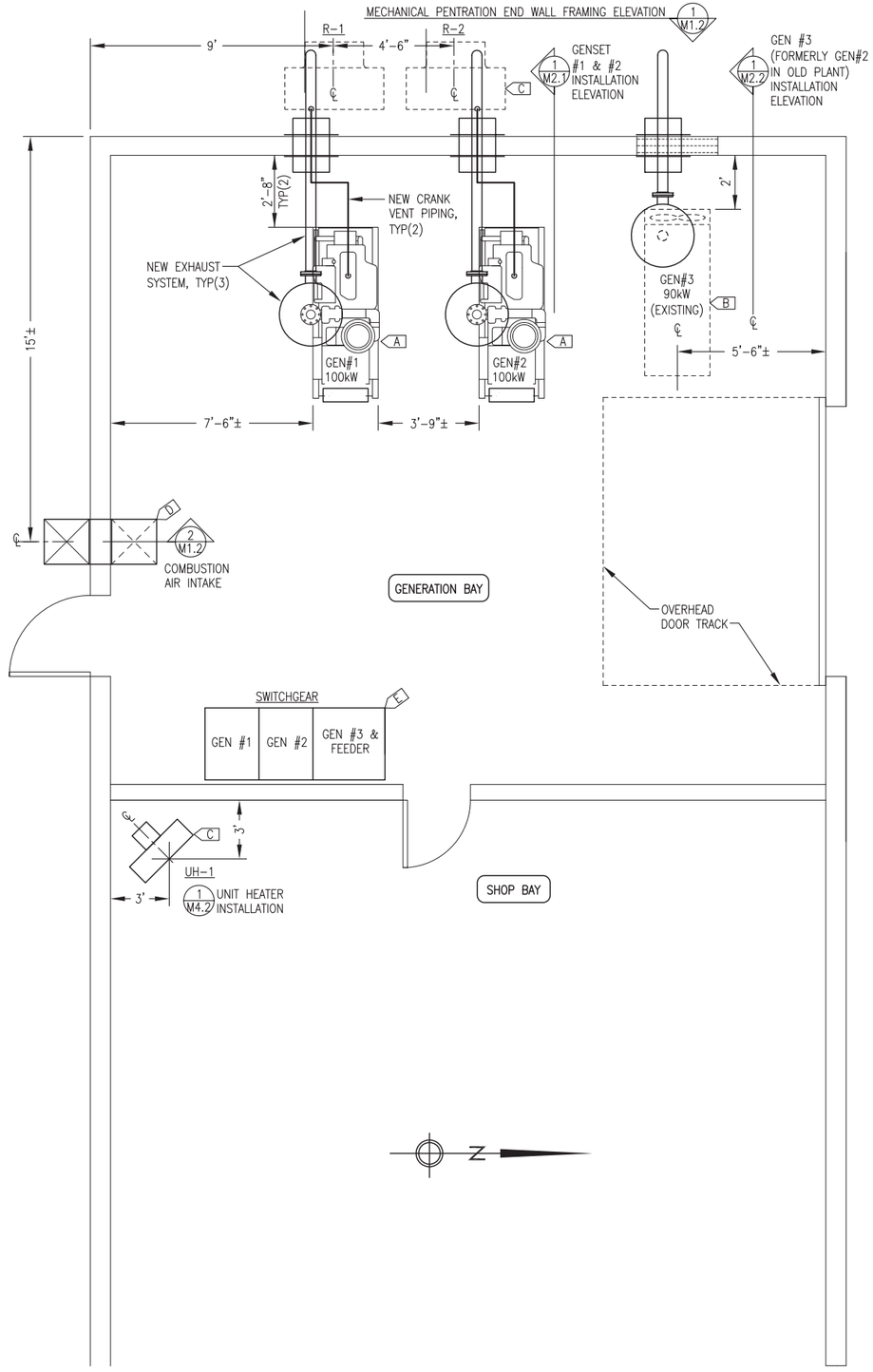
1. THE CIRCLE ELECTRIC UTILITY HAS CONSTRUCTED A NEW ADDITION TO THE WEST OF THE EXISTING BUILDING. THE NEW ADDITION WILL SERVE AS THE GENERATION BAY AND WILL HOUSE ALL GENERATORS AND SWITCHGEAR. THE EXISTING BUILDING WILL SERVE AS A SHOP BAY.

2. THE PRIMARY PURPOSES OF THIS DERA PROJECT ARE TO:
   - INSTALL TWO NEW TIER 3 MARINE DIESEL ENGINE–GENERATOR SETS (GENSETS #1 & #2) WITH FULL AUTOMATIC PARALLELING CONTROL.
   - RELOCATE EXISTING GENSET #3 AS INDICATED.
   - INSTALL NEW SWITCHGEAR WITH FULL AUTOMATIC PARALLELING CONTROL FOR GENSETS #1 & #2 PRIME POWER AND MANUAL ON/OFF CONTROL FOR GENSET #3 BACKUP OPERATION.

3. IN ADDITION, MINOR MODIFICATIONS WILL BE MADE TO THE PLANT MECHANICAL AND ELECTRICAL SYSTEMS AS INDICATED.

4. THE DESIGN SHOWS CONSTRUCTION OF A NEW HYDRONIC ENGINE COOLING SYSTEM WITH REMOTE RADIATORS AND NEW SHOP BAY UNIT HEATER. ALL ENGINE COOLING AND HYDRONIC WORK SHOWN ON THESE DRAWINGS IS FOR INFORMATIONAL PURPOSES ONLY. ALL HYDRONIC EQUIPMENT IS TO BE FURNISHED AND INSTALLED BY THE UTILITY. THE SCOPE OF THE DERA PROJECT COOLING SYSTEM IS LIMITED TO HOSES AND FITTINGS AS NOTED ON DETAILS.

SCHEDULE OF DRAWINGS:



1 M1.1 EQUIPMENT LAYOUT & MECHANICAL WORK PLAN
3/8"=1'–0"

GENERAL NOTES:

1. EXISTING EQUIPMENT TO BE RELOCATED AND REMAIN IN SERVICE SHOWN WITH LIGHT DASHED LINES.
2. NEW EQUIPMENT TO BE INSTALLED SHOWN WITH DARK SOLID LINES.

SPECIFIC NOTES:

A INSTALL NEW GENSETS #1 & #2 INCLUDING COOLANT, FUEL, EXHAUST, & CRANK VENT CONNECTIONS. SEE ELECTRICAL FOR ADDITIONAL INSTALLATION DETAILS.

B RELOCATE EXISTING GENSET #3 & INSTALL FUEL & EXHAUST CONNECTIONS. SEE ELECTRICAL FOR ADDITIONAL INSTALLATION DETAILS.

C ENGINE COOLANT & HYDRONIC PIPING & EQUIPMENT SHOWN FOR INFORMATIONAL PURPOSES ONLY & IS NOT IN DERA PROJECT SCOPE. AS PART OF DERA PROJECT FURNISH & INSTALL COOLANT HOSES, KING NIPPLES, & CLAMPS AS INDICATED.

D INSTALL NEW COMBUSTION AIR INTAKE DUCT, SEE SHEET M1.2

E SEE ELECTRICAL.

ENGINE COOLING & HYDRONIC SYSTEM EQUIPMENT SCHEDULE

SYMBOL	SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL
R–1 R–2	GLYCOL RADIATOR	HORIZONTAL DISCHARGE HOT WATER UNIT HEATER, 358 MBH AT 37 GPM 200F EWT & 60F EAT, 1–1/2HP, 240V, 3ø	MODINE PT–500
ET–1	GEN COOLANT EXPANSION TANK	24 GALLON CAPACITY TANK, 12.75" O.D x 48" LONG FABRICATED STEEL TANK, SEE FABRICATION DETAIL	CUSTOM FABRICATION
HP–EC	ENGINE COOLANT FILL HAND PUMP	DOUBLE ACTION PISTON HAND PUMP, ALUM HOUSING, SS PISTON SHAFT & LINER, BUNA–N SEALS, ANTI–SIPHONING VALVE.	GPI MODEL HP–100
P–UH1	SHOP HEAT	15 GPM AT 15' TDH, 1/12HP, 115V, 1ø. PROVIDE WITH 1–1/4" SOLDER SHUTOFF FLANGES, GASKETS, & BOLTS.	GRUNDFOS UP 26–64F
UH–1	SHOP HEAT	HORIZONTAL DISCHARGE UNIT HEATER, 143 MBH AT 15 GPM, 200F EWT & 60F EAT, 1/3HP, 120V, 1ø	MODINE HC–193

NOTE: ALL ENGINE COOLING AND HYDRONIC EQUIPMENT IS TO BE FURNISHED AND INSTALLED BY THE UTILITY AND ARE SHOWN HERE FOR INFORMATIONAL PURPOSES ONLY.

PIPE/TUBING STRUT CLAMP SCHEDULE

COPPER TUBE	CLAMP #	STEEL PIPE	CLAMP #
1/2" COPPER	B2026	1/2" STEEL	B2008
3/4" COPPER	B2028	3/4" STEEL	B2009
1" COPPER	B2030	1" STEEL	B2010
1–1/4" COPPER	B2032	1–1/4" STEEL	B2011
1–1/2" COPPER	B2034	1–1/2" STEEL	B2012
2" COPPER	B2038	2" STEEL	B2013
2–1/2" COPPER	B2042	3" STEEL	B2015

NOTES:
1) ALL CLAMP NUMBERS ARE B–LINE. EQUIVALENT EQUALS ACCEPTABLE.
2) ALL COPPER CLAMPS COPPER PLATED. ALL STEEL CLAMPS ZINC PLATED.
3) WRAP ALL COPPER TUBING WITH VINYL PIPE WRAP TAPE AT CLAMPS TO ISOLATE FROM GALV STRUT.
4) SEE PLANS, ELEVATIONS, ISOMETRICS, AND DETAILS FOR ACTUAL PIPE SIZES.

EXCLUSIONS: SEE NOTES THIS SHEET AND ON MECHANICAL SHEETS WHICH FOLLOW FOR WORK TO BE PERFORMED BY UTILITY THAT IS NOT PART OF THE DERA PROJECT CONTRACTOR SCOPE.

ISSUED FOR CONSTRUCTION FEB 2020

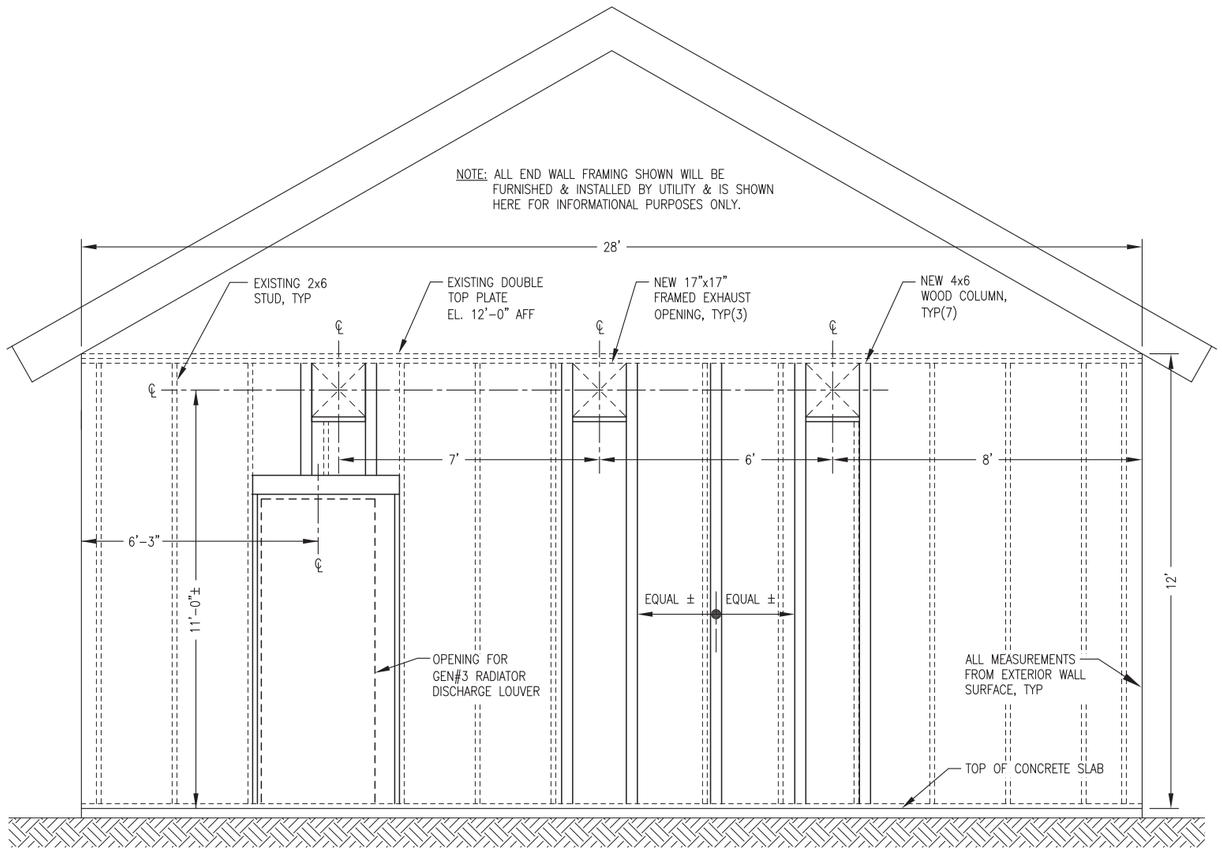
STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17–18 DERA PROJECT
CIRCLE POWER PLANT UPGRADE

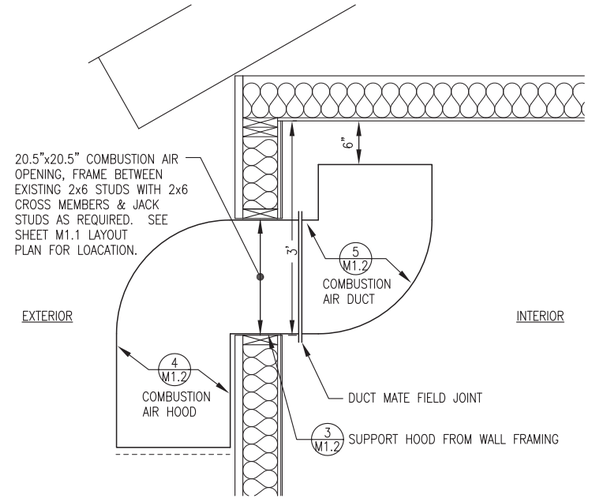
TITLE: PROJECT DESCRIPTION, SCHEDULE OF DRAWINGS, & MECHANICAL WORK PLAN

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

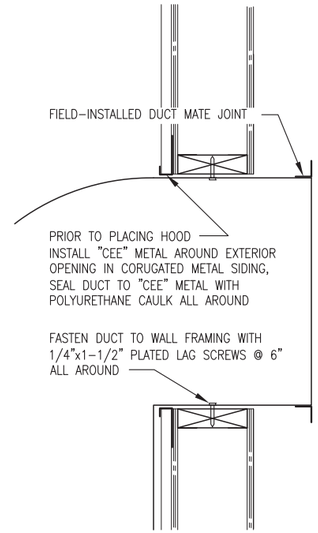
DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/18/20
FILE NAME: CIRDERA M1–4 | SHEET: M1.1 OF 4
PROJECT NUMBER:



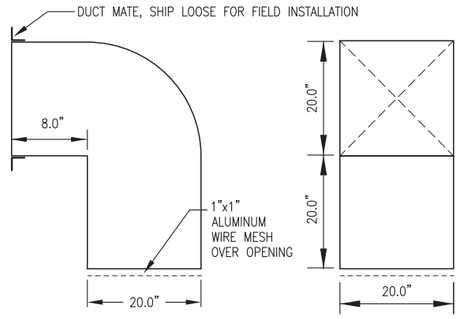
1 M1.2 MECHANICAL PENETRATION END WALL FRAMING ELEVATION (EXTERIOR VIEW)
1/2"=1'-0"



2 M1.2 COMBUSTION AIR DUCT INSTALLATION
1"=1'-0"

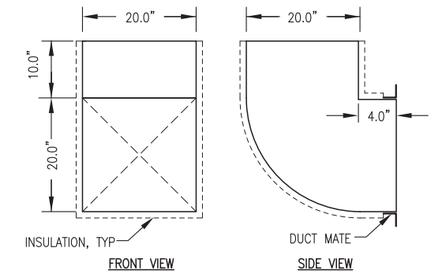


3 M1.2 COMBUSTION AIR HOOD SUPPORT
2"=1'-0"



NOTE: FABRICATE FROM 20 GAUGE GALV. SHEET METAL.

4 M1.2 COMBUSTION AIR HOOD FABRICATION
1"=1'-0"



NOTES:

1. FABRICATE 1 EA. ASSEMBY.
2. FABRICATE FROM MIN 20 GAUGE GALV. SHEET METAL, WELD ALL SEAMS.
3. INSULATE WITH 1" THICK RIGID FOIL-BACK INSULATION AND SEAL WITH FOIL TAPE

5 M1.2 COMBUSTION AIR DUCT FABRICATION
1"=1'-0"

EXCLUSIONS: END WALL FRAMING AS INDICATED.

ISSUED FOR CONSTRUCTION
FEB 2020

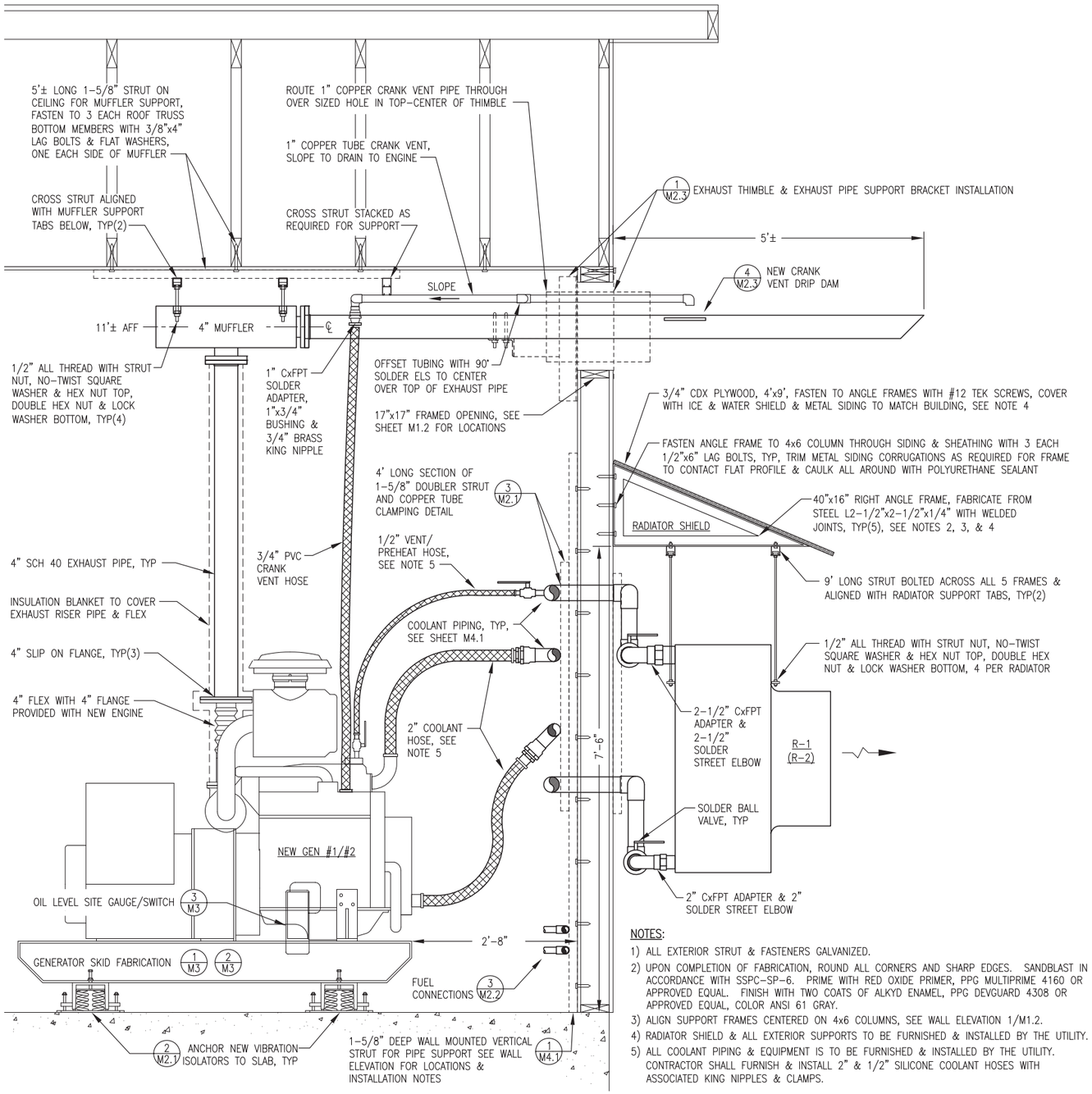
STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
CIRCLE POWER PLANT UPGRADE

TITLE: MECHANICAL WALL PENETRATIONS & VENTILATION DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

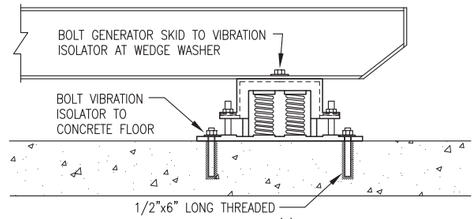
DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/18/20
FILE NAME: CIRDERA M1-4 | SHEET: M1.2 OF 4
PROJECT NUMBER:



NOTES:

1) ALL EXTERIOR STRUT & FASTENERS GALVANIZED.
2) UPON COMPLETION OF FABRICATION, ROUND ALL CORNERS AND SHARP EDGES. SANDBLAST IN ACCORDANCE WITH SSPC-SP-6. PRIME WITH RED OXIDE PRIMER, PPG MULTIPRIME 4160 OR APPROVED EQUAL. FINISH WITH TWO COATS OF ALKYD ENAMEL, PPG DEVGUARD 4308 OR APPROVED EQUAL, COLOR ANSI 61 GRAY.
3) ALIGN SUPPORT FRAMES CENTERED ON 4x6 COLUMNS, SEE WALL ELEVATION 1/M1.2.
4) RADIATOR SHIELD & ALL EXTERIOR SUPPORTS TO BE FURNISHED & INSTALLED BY THE UTILITY.
5) ALL COOLANT PIPING & EQUIPMENT IS TO BE FURNISHED & INSTALLED BY THE UTILITY. CONTRACTOR SHALL FURNISH & INSTALL 2" & 1/2" SILICONE COOLANT HOSES WITH ASSOCIATED KING NIPPLES & CLAMPS.

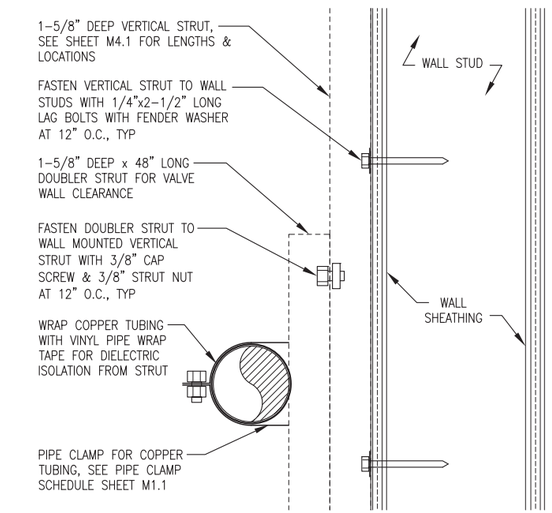
1 M2.1 NEW GENSET #1 & #2 INSTALLATION ELEVATION
1"=1'-0"



NOTES:

1) GENSET #1 & #2: VIBRATION ISOLATORS SPECIFIED TO BE FURNISHED WITH GENSETS. FOR GENSET #3 FURNISH 4 NEW VIBRATION ISOLATORS IDENTICAL TO THOSE FURNISHED FOR GENSET #1 & #2.
2) AFTER INSTALLATION ADJUST SPRING VIBRATION ISOLATOR LEVELING BOLTS TO ACHIEVE A UNIFORM INSTALLATION HEIGHT OF APPROXIMATELY 5-3/4" THEN TIGHTEN LOCKING NUTS. ADJUST NUTS ON STABILIZER BOLTS TO ACHIEVE A UNIFORM CLEARANCE OF APPROXIMATELY 1/8" THEN TIGHTEN LOCKING NUTS. VERIFY UNIT MOVES FREELY ON ISOLATORS

2 M2.1 GENERATOR VIBRATION ISOLATOR INSTALLATION
NO SCALE



3 M2.1 DOUBLER STRUT & COPPER TUBE CLAMPING DETAIL
NO SCALE

EXCLUSIONS: COOLANT PIPING, EQUIPMENT, AND SUPPORTS AS INDICATED.

ISSUED FOR CONSTRUCTION FEB 2020

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT CIRCLE POWER PLANT UPGRADE

TITLE: GENSET #1 & #2 INSTALLATION DETAILS

Gray Stassel Engineering, Inc.
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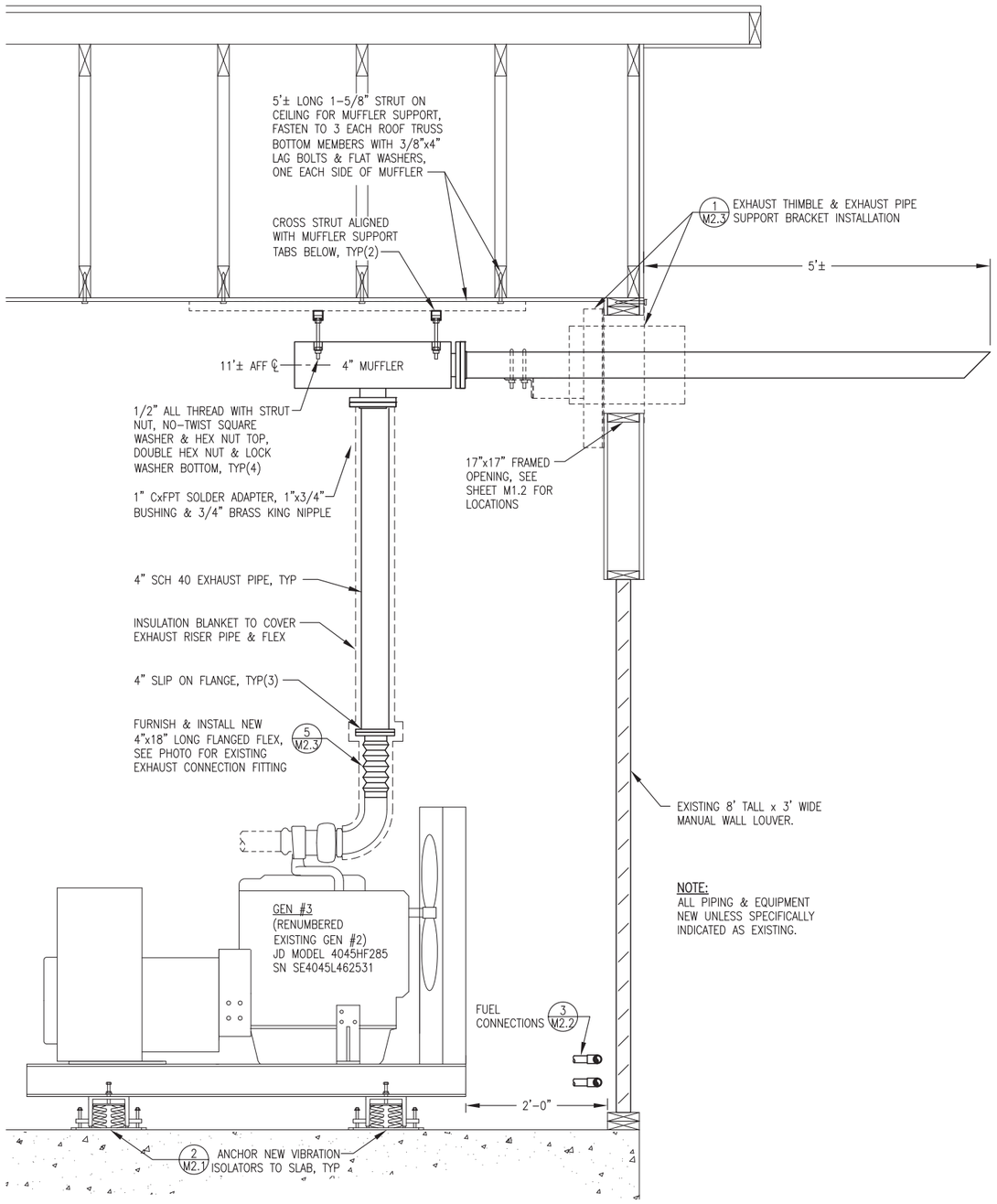
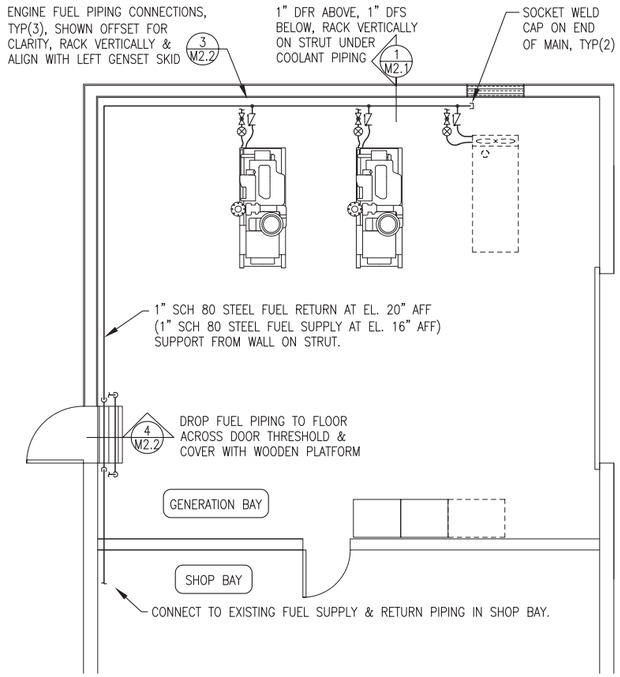
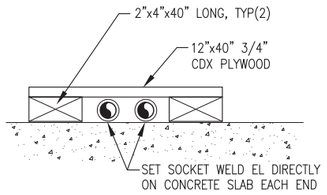
DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/18/20
FILE NAME: CIRDERA M1-4 | SHEET: M2.1 OF 4
PROJECT NUMBER:



1 M2.2 GENSET #3 (RENUMBERED EXISTING GENSET #2) REINSTALLATION ELEVATION
1"=1'-0"



2 M2.2 FUEL PIPING PLAN
1/4"=1'-0"



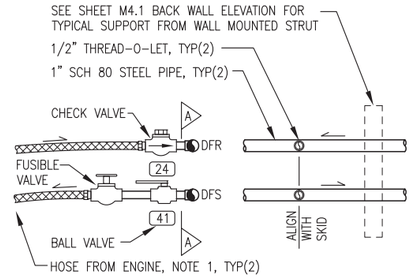
4 M2.2 PIPING COVER AT DOOR
NO SCALE

NOTES:

1) GENSET #1 & #2: HOSES PROVIDED WITH ENGINE, SIZE VARIES PER ENGINE & PRODUCT, SEE SHEET M3. ALL EQUIPPED WITH JIC SWIVELS & 1/2" MPT ADAPTERS. CUT TO LENGTH & RE-INSTALL ENDS.

2) GENSET #3 (FORMERLY GEN #2): FURNISH & INSTALL NEW #8 HOSE FOR DFS/DFR. FURNISH WITH JIC SWIVELS & FIELD CUT TO LENGTH. PROVIDE 1/2" MPT ADAPTERS FOR VALVE CONNECTIONS. PROVIDE ADAPTERS AS REQUIRED FOR ENGINE FUEL SYSTEM CONNECTIONS.

3) ALL PIPING & NIPPLES SCH 80. ALL VALVES 1/2" SIZE, THREADED BODY.



3 M2.2 TYPICAL FUEL PIPING CONNECTION DETAIL
NO SCALE

ISSUED FOR CONSTRUCTION
FEB 2020

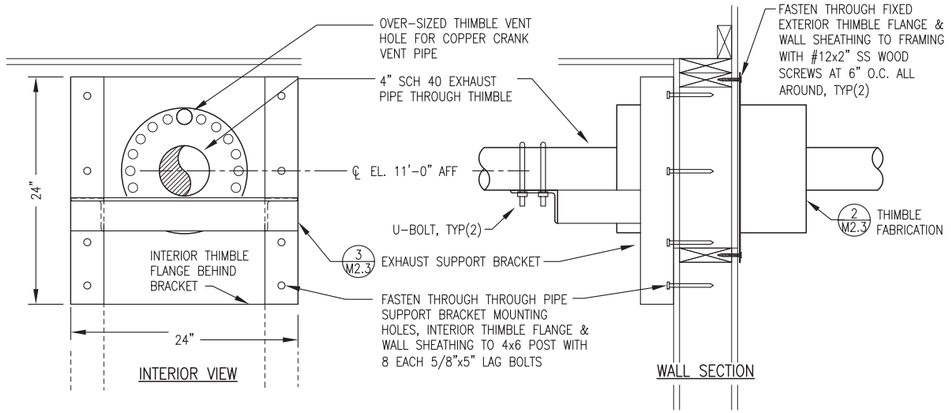
STATE OF ALASKA 49TH
BRIAN C. GRAY
ME 8210
REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
CIRCLE POWER PLANT UPGRADE

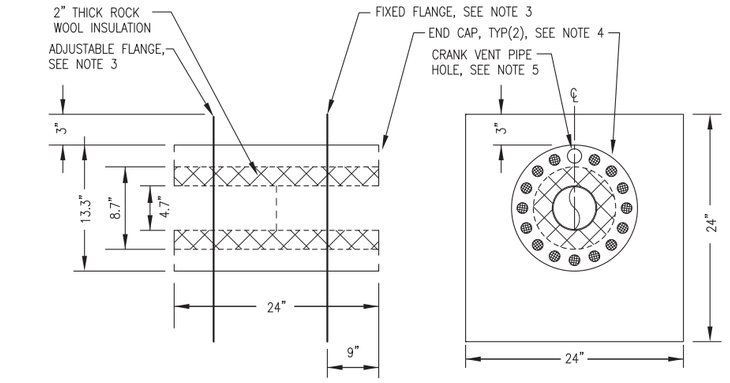
TITLE: FUEL PIPING PLAN, DETAILS, & GENSET #3 INSTALLATION,

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/18/20
FILE NAME: CIRDERA M1-4 | SHEET: M2.2 OF 4
PROJECT NUMBER:

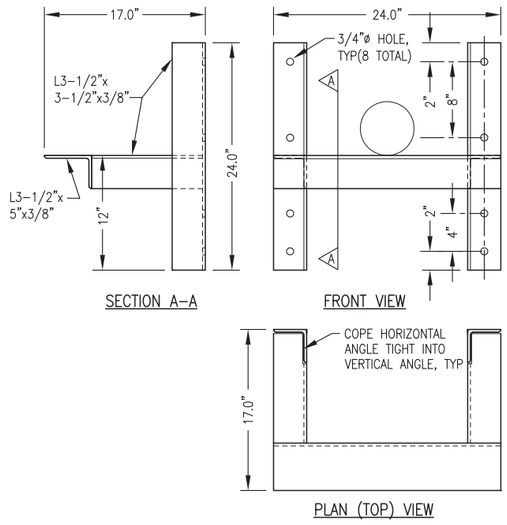


1 M2.3 EXHAUST THIMBLE & EXHAUST PIPE SUPPORT BRACKET INSTALLATION
1-1/2"=1'-0"



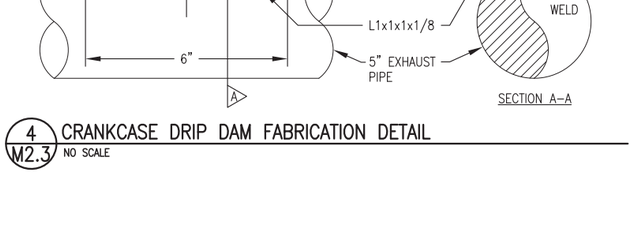
NOTES:
1. FABRICATE 3 EACH IDENTICAL THIMBLES.
2. FABRICATE ENTIRE ASSEMBLY FROM MINIMUM 16 GAUGE TYPE 304 STAINLESS STEEL WITH ALL JOINTS SEAL WELDED.
3. FABRICATE TWO IDENTICAL SQUARE FLANGES. SEAL WELD FIXED FLANGE TO OUTER SHELL. ADJUSTABLE FLANGE TO SHIP LOOSE FOR FIELD INSTALLATION.
4. SEAL WELD END CAPS TO INNER & OUTER SHELLS. PROVIDE 16 EACH 1"ø VENT HOLES INTO UNINSULATED SPACE BOTH ENDS, EQUALLY SPACED. ON EXTERIOR (FIXED FLANGE) END INSTALL 1/8" STAINLESS STEEL BUG SCREEN.
5. AT TOP-CENTER LOCATION EACH END PROVIDE 1.5"ø HOLE WITHOUT SCREEN FOR CRANK VENT PIPE INSTALLATION.

2 M2.3 EXHAUST PIPE THIMBLE FABRICATION
NO SCALE

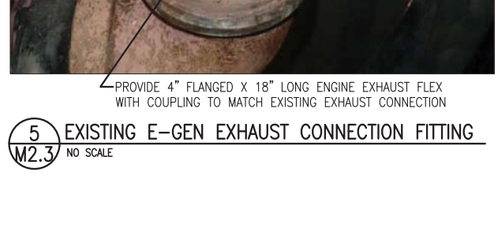


NOTES:
1. FABRICATE 3 EACH IDENTICAL BRACKETS.
2. MAKE ALL JOINTS WITH CONTINUOUS FULL PENETRATION WELDS.
3. AFTER COMPLETION GRIND EDGES AND ROUND SHARP CORNERS, SANDBLAST ENTIRE ASSEMBLY, AND FINISH WITH TWO COATS OF EPOXY, SHERWIN WILLIAMS MACROPOXY 646, NO SUBSTITUTES, COLOR STRUCTURAL GRAY 4031.

3 M2.3 EXHAUST SUPPORT BRACKET FABRICATION
NO SCALE



4 M2.3 CRANKCASE DRIP DAM FABRICATION DETAIL
NO SCALE



5 M2.3 EXISTING E-GEN EXHAUST CONNECTION FITTING
NO SCALE

ISSUED FOR CONSTRUCTION FEB 2020

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
CIRCLE POWER PLANT UPGRADE

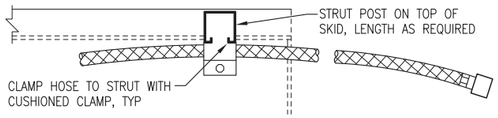
TITLE: EXHAUST & CRANK VENT INSTALLATION DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

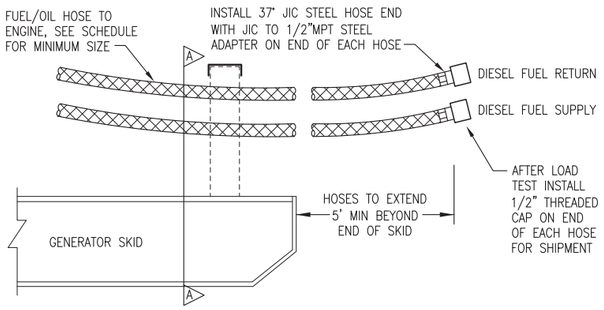
DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/18/20
FILE NAME: CIRDERA M1-4 | SHEET: M2.3 OF 4
PROJECT NUMBER:

MINIMUM HOSE SIZE SCHEDULE		
FUEL SUPPLY	FUEL RETURN	USED OIL
#8	#8	N/A

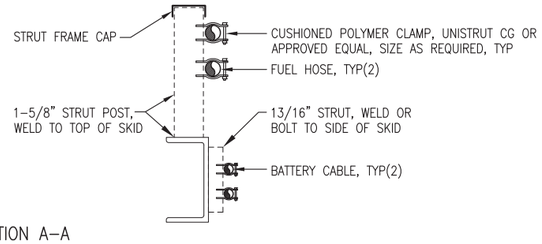
NOTE:
ON 4045'S GROUP HOSES ON LEFT SKID AS SHOWN TO COORDINATE WITH COOLANT HOSES.



LEFT SKID PLAN (TOP) VIEW

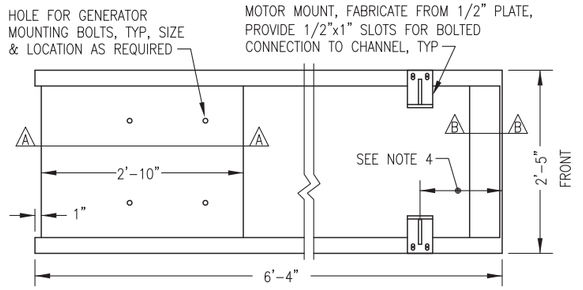


ELEVATION (SIDE) VIEW

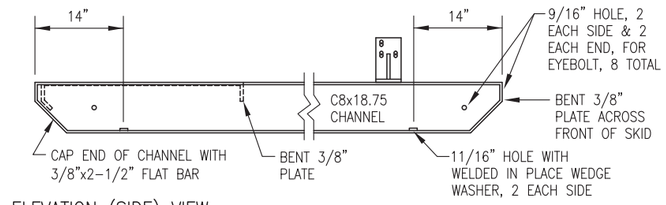


SECTION A-A

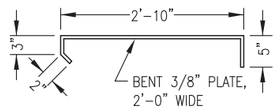
1/M3 FUEL/OIL HOSE & BATTERY CABLE INSTALLATION ON SKID
NO SCALE



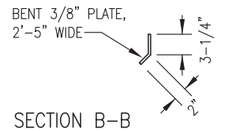
PLAN (TOP) VIEW



ELEVATION (SIDE) VIEW



SECTION A-A

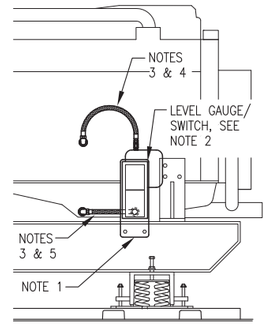


SECTION B-B

NOTES:

1) FABRICATE FROM ASTM A-36 STEEL. BEND PLATES & CUT ENDS OF CHANNELS AT 90° & 45° AS SHOWN.
2) EXCEPT WHERE INDICATED AS BOLTED MAKE ALL CONNECTIONS WITH CONTINUOUS WELDS (FILLET OR FULL-PENETRATION GROOVE AS REQUIRED) IN ACCORDANCE WITH CURRENT AWS STANDARD CODE.
3) ROUND ALL CORNERS & GRIND WELDS SMOOTH AFTER FABRICATION. PAINT TO MATCH ENGINE-GENERATOR.
4) PLACE UNIT ON SKID SO THAT THE EXHAUST RISER CENTERLINE IS 3'-3" FROM THE FRONT OF THE SKID.

2/M3 TYPICAL GENERATOR SKID FABRICATION
NO SCALE



NOTES:

1) 1/4" STEEL SUPPORT PLATE PRE-DRILLED TO MATCH GAUGE/SWITCH MOUNTS, CHANNEL SKID HOLES AND BOTTOM HOSE ENTRANCE. BOLT TO INSIDE (BACK) OF CHANNEL SKID AT HEIGHT AS REQUIRED TO CENTER GAUGE AT NORMAL FULL OIL LEVEL. ADJUST SWITCH CONTACTS 1/2" ABOVE & BELOW.
2) SEE ENGINE GENERATOR SPECIFICATIONS FOR LEVEL/GUAGE SWITCH. MOUNT TO STEEL SUPPORT PLATE WITH RUBBER SHOCK MOUNTS.
3) #8 HOSE WITH 1/2" OR 3/8" NPT JIC SWIVEL ENDS AS REQUIRED.
4) CONNECT TOP (VENT) PORT TO ENGINE CRANK CASE WITH HOSE. ROUTE UPPER HOSE TO AVOID LOW POINT TRAPS.
5) CONNECT BOTTOM PORT TO ENGINE OIL PAN WITH HOSE. DO NOT TEE INTO OIL DRAIN LINE. ROUTE LOWER HOSE BACK THROUGH PRE-DRILLED HOLE IN STEEL PLATE.

3/M3 TYPICAL OIL LEVEL GAUGE/SWITCH INSTALLATION
NO SCALE

ISSUED FOR CONSTRUCTION
FEB 2020

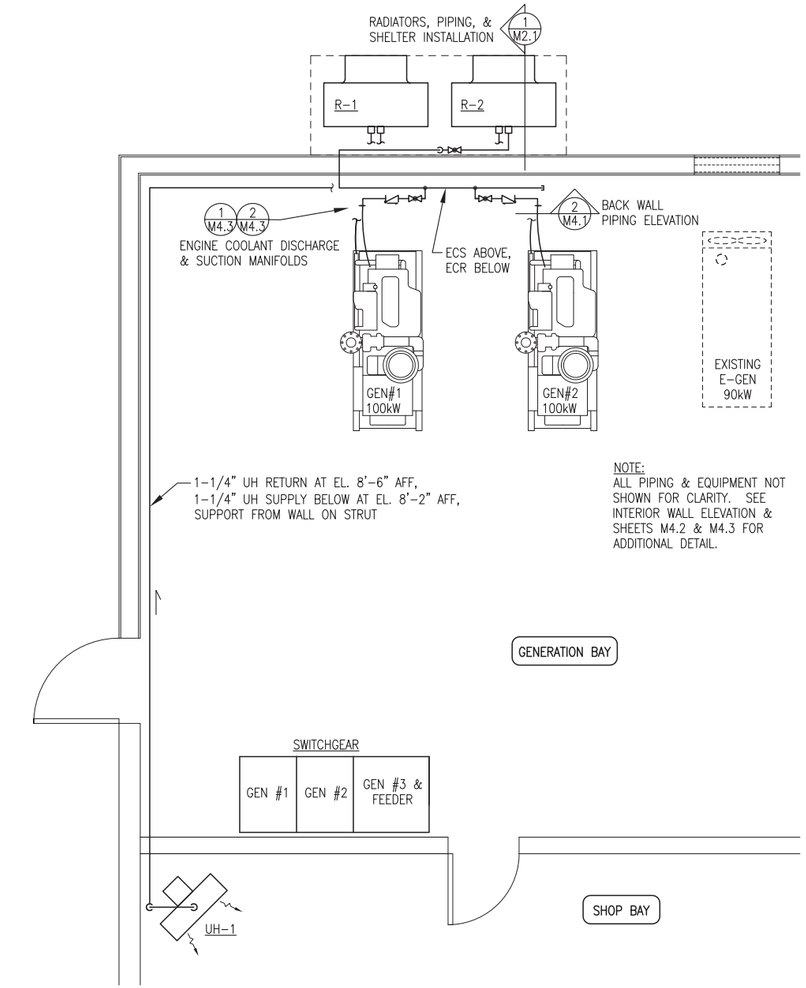
STATE OF ALASKA 49TH
BRIAN C. GRAY
ME 8210
REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
CIRCLE POWER PLANT UPGRADE

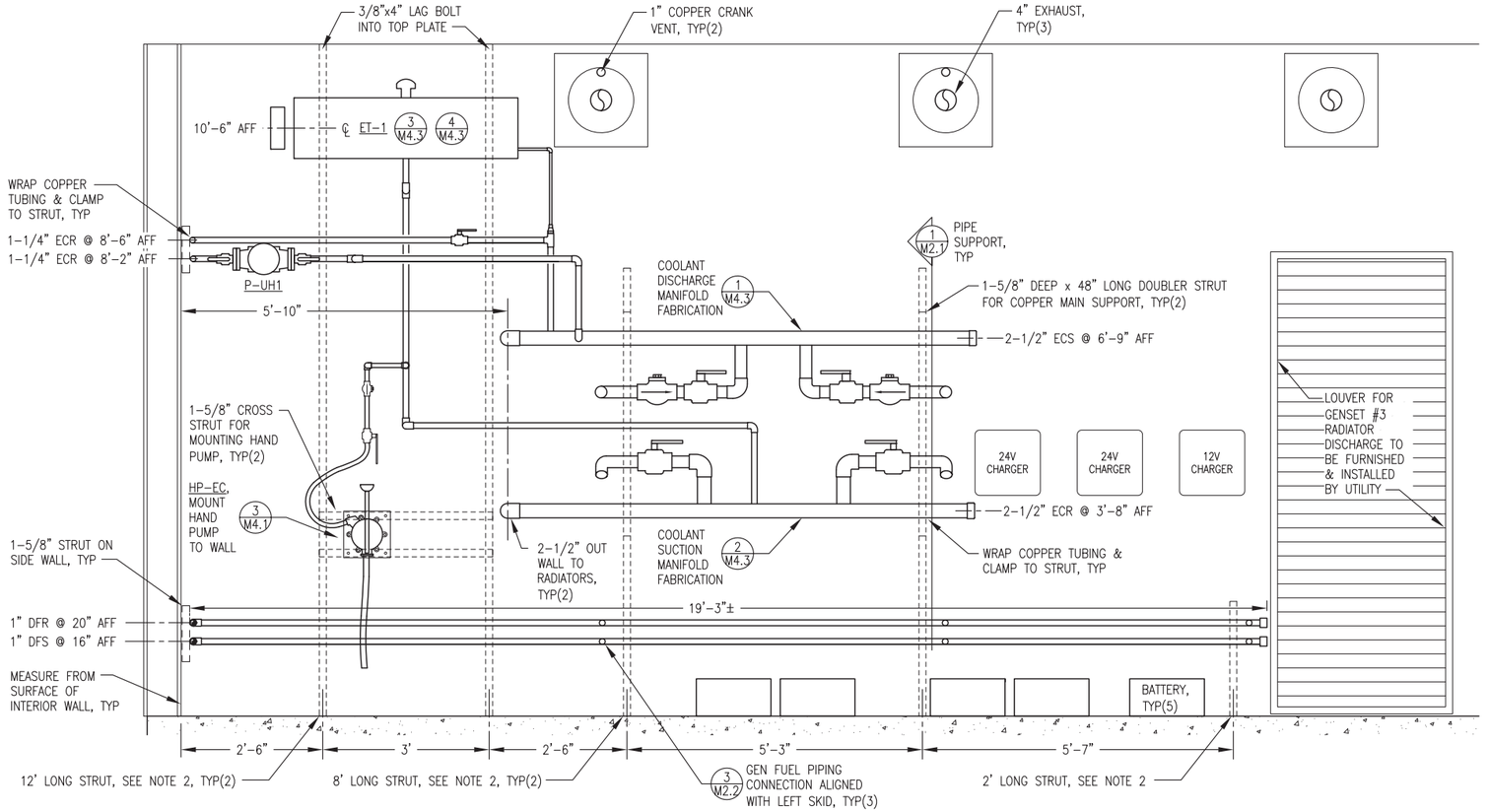
TITLE: GENSET FABRICATION DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/18/20
FILE NAME: CIRDERA M1-4 | SHEET: M3 OF 4
PROJECT NUMBER:

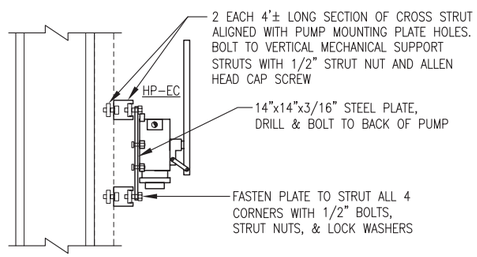


1 M4.1 COOLANT PIPING PLAN
3/8"=1'-0"



NOTES:
1) NOT ALL PIPING & DEVICES SHOWN THIS ELEVATION FOR CLARITY. SEE ISOMETRIC 1/M4.2 FOR ADDITIONAL DETAIL.
2) ALL VERTICAL STRUT THIS WALL 1-5/8" DEEP STRUT WITH DOUBLER STRUT WHERE INDICATED. FASTEN TO WALL SHEATHING WITH 1/4"x2-1/2" LAG BOLTS & FENDER WASHERS AT 12"O.C.

2 M4.1 BACK WALL PIPING ELEVATION
3/4"=1'-0"



3 M4.1 HAND PUMP HP-EC SUPPORT
NO SCALE

EXCLUSIONS: COOLANT PIPING, EQUIPMENT, AND LOUVERED OPENING AS INDICATED.

ISSUED FOR CONSTRUCTION FEB 2020

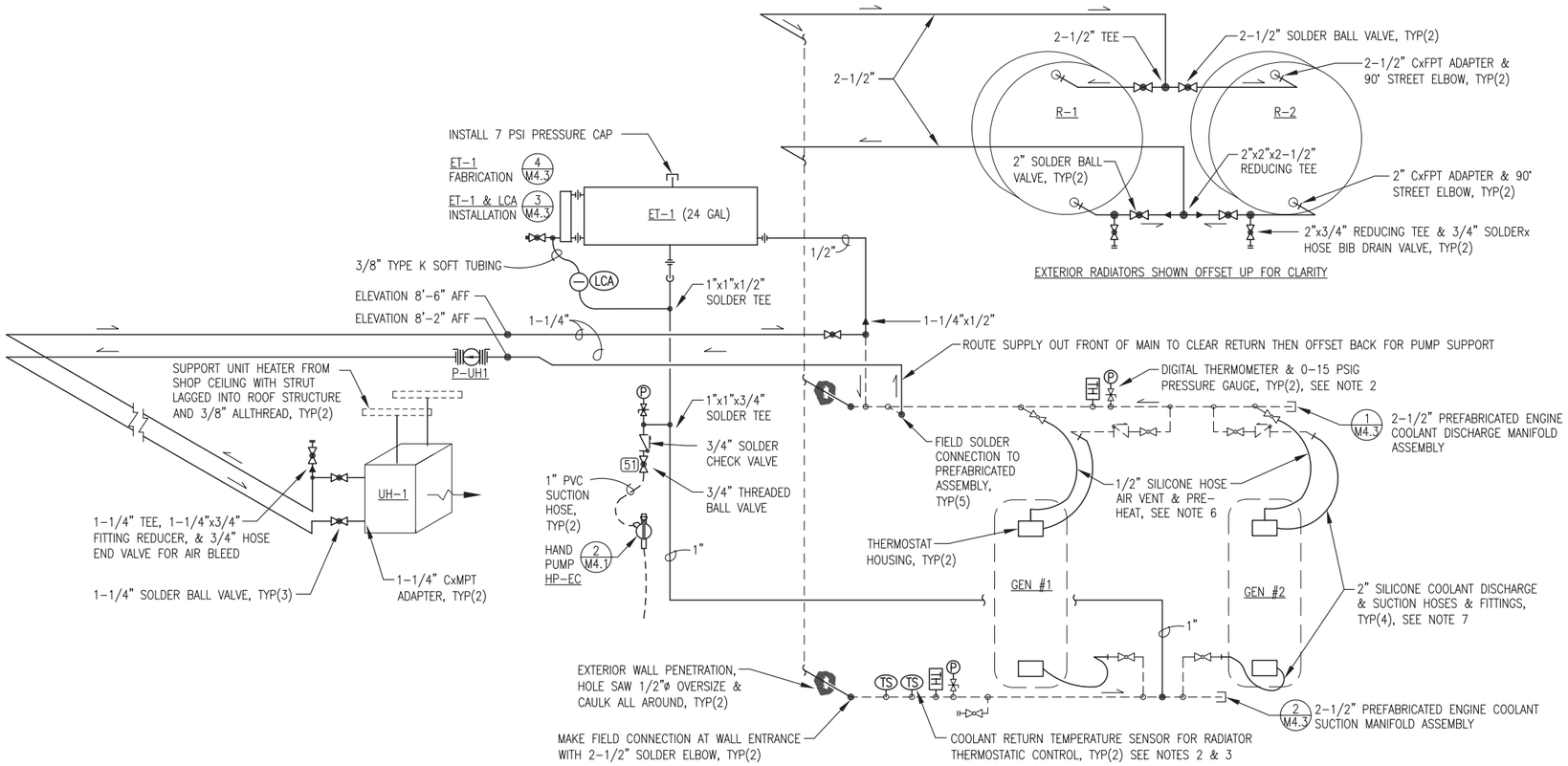
STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
CIRCLE POWER PLANT UPGRADE

TITLE: PIPING & EQUIPMENT INSTALLATION PLAN, ELEVATION, & DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/18/20
FILE NAME: CIRDERA M1-4 | SHEET: M4.1 OF 4
PROJECT NUMBER:

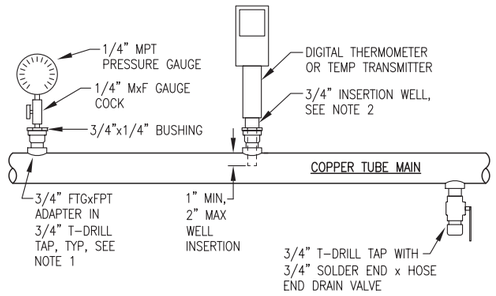


1 M4.2 COOLING SYSTEM PIPING ISOMETRIC

NO SCALE

COOLING SYSTEM ISOMETRIC NOTES:

1. ALL PIPING SHOWN THIS ISOMETRIC TYPE "L" COPPER WITH SOLDER JOINTS, 2-1/2"ø EXCEPT WHERE SPECIFICALLY INDICATED OTHERWISE. FIELD INSTALLED PIPING SHOWN WITH DARK SOLID LINES AND PREFABRICATED SHOP ASSEMBLES SHOWN WITH LIGHT DASHED LINES.
2. MAKE ALL CONNECTIONS FOR INSTRUMENTATION WITH AS SHOWN ON DETAIL 2/M4.2.
3. SEE ELECTRICAL INSTRUMENTATION SCHEDULE FOR TEMPERATURE SENSORS.
4. UPON COMPLETION OF FABRICATION VALVE OFF CABINET UNIT HEATER AND FLUSH PIPING TO REMOVE ALL DEBRIS, SEE SPECIFICATIONS.
5. ALL PIPING NOT INSULATED.
6. AS PART OF DERA PROJECT FURNISH AND INSTALL 3/4"MPTx5/8" BARB BRASS KING NIPPLE, 1/2" SILICONE HOSE AND HOSE CLAMPS FOR ENGINE VENT & PRE-HEAT.
7. AS PART OF DERA PROJECT FURNISH AND INSTALL 2"MPTx2" BARB BRASS KING NIPPLE, 2" SILICONE HOSE AND HOSE CLAMPS FOR ENGINE COOLING.



NOTES:

1) USE T-DRILL TAPS AS SHOWN FOR INSTALLATIONS IN 1-1/4" AND LARGER COPPER MAINS. USE LINE SIZE TEE FITTINGS FOR INSTALLING INSTRUMENTATION IN 1" AND SMALLER MAINS.
2) TEMPERATURE TRANSMITTER INSTALLATION SIMILAR TO THERMOMETER EXCEPT USE 3/4"x1/2" BUSHING.
3) FOR MAINS SMALLER THAN 2" USE COPPER TUBE RISER AS SHOWN, LENGTH AS REQUIRED FOR 1" TO 2" WELL INSERTION INTO MAIN. FOR LARGER PIPES OMIT RISER AND INSERT 3/4" FTGxFPT ADAPTER INTO T-DRILL TAP.

2 M.2 TYPICAL INSTRUMENT INSTALLATION

NO SCALE

EXCLUSIONS: ALL WORK THIS SHEET.

ISSUED FOR CONSTRUCTION FEB 2020

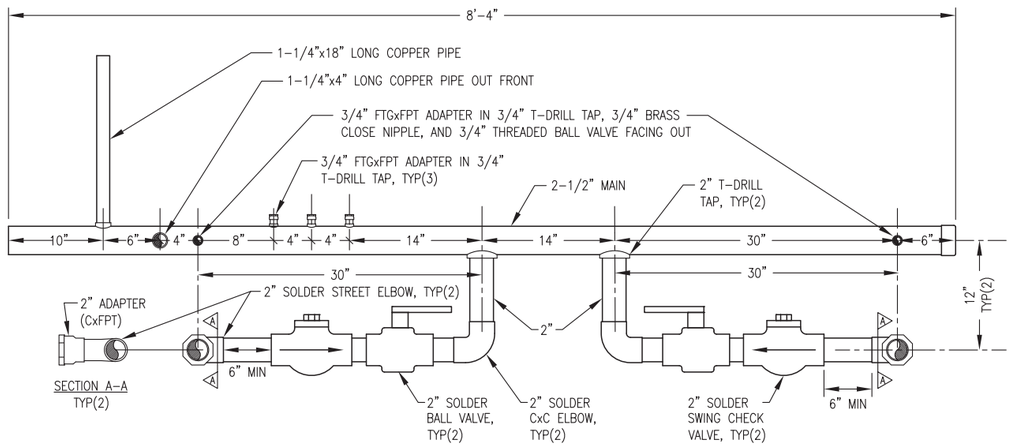
STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
CIRCLE POWER PLANT UPGRADE

TITLE: COOLANT PIPING ISOMETRIC & DETAILS

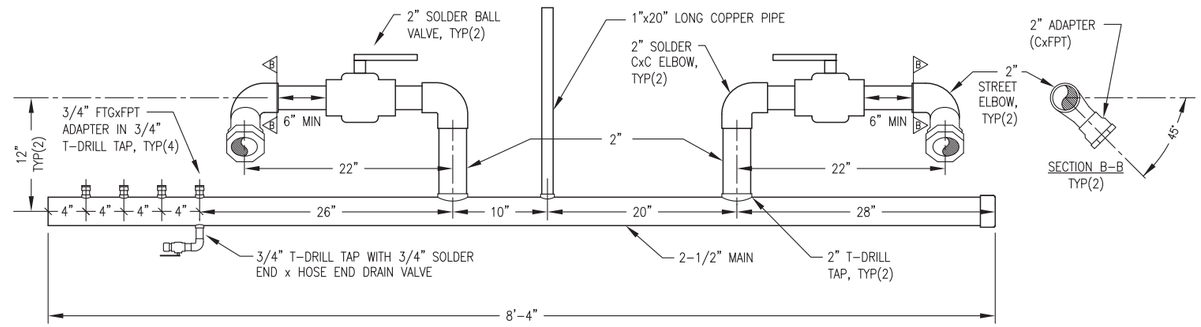
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/18/20
FILE NAME: CIRDERA M1-4 | SHEET: M4.2 OF 4
PROJECT NUMBER:



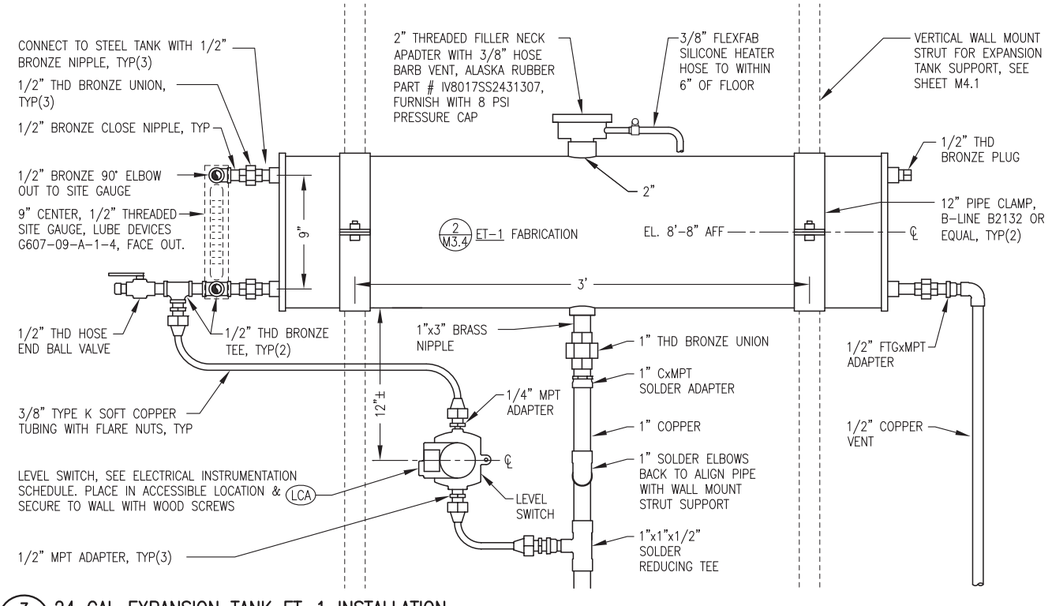
NOTES:
1) ALL PIPING TYPE L COPPER TUBE, SIZE AS INDICATED.
2) MAKE ALL MAIN & INSTRUMENTATION BRANCH CONNECTIONS WITH BRAZED T-DRILL TAPS.

1 M4.3 PREFABRICATED COOLANT DISCHARGE MANIFOLD
1-1/2"=1'-0"



NOTES:
1) ALL PIPING TYPE L COPPER TUBE, SIZE AS INDICATED.
2) MAKE ALL BRANCH CONNECTIONS WITH BRAZED T-DRILL TAPS.

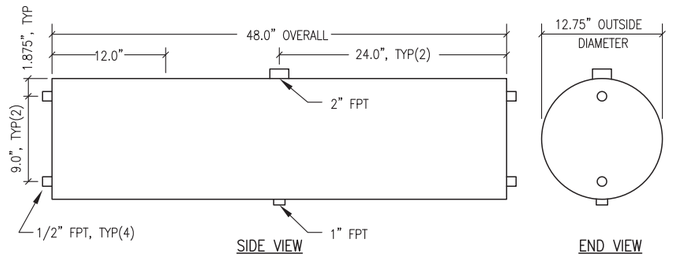
2 M4.3 PREFABRICATED COOLANT SUCTION MANIFOLD
1-1/2"=1'-0"



3 M4.3 24 GAL EXPANSION TANK ET-1 INSTALLATION
NO SCALE

EXPANSION TANK GENERAL NOTES:

1. FABRICATE SINGLE WALL 24 GALLON NOMINAL CAPACITY GLYCOL EXPANSION TANK.
2. FABRICATE SHELL FROM MINIMUM 10 GAUGE ASTM A-36 PLATE STEEL ROLLED AND WELDED OR SCHEDULE 5 LIGHTWALL ASTM A53 STEEL PIPE. FABRICATE HEADS FROM 3/16" THICK ASTM A-36 PLATE STEEL. MAKE ALL JOINTS WITH CONTINUOUS FULL-PENETRATION WELDS.
3. PROVIDE WITH ALL OPENINGS INDICATED USING MINIMUM 3000# FORGED STEEL PIPE HALF COUPLINGS IN ACCORDANCE WITH U.L 142 FIGURE 7.1 #2.
4. PRESSURE TEST COMPLETED ASSEMBLY TO 15 PSIG MINIMUM.
5. UPON COMPLETION OF FABRICATION, ROUND ALL CORNERS AND SHARP EDGES. SANDBLAST TANK EXTERIOR AND ALL ATTACHMENTS IN ACCORDANCE WITH SSPC-SP-6. PRIME WITH RED OXIDE PRIMER, PPG MULTIPRIME 4160 OR APPROVED EQUAL. FINISH WITH TWO COATS OF ALKYD ENAMEL, PPG DEVGUARD 4308 OR APPROVED EQUAL, COLOR ANSI 61 GRAY.
6. UPON COMPLETION FLUSH INTERIOR OF TANK TO REMOVE ALL DIRT AND DEBRIS, AIR DRY INTERIOR, AND SEAL ALL TANK OPENINGS WITH PLASTIC PLUGS.



4 M4.3 24 GALLON GLYCOL EXPANSION TANK ET-1 FABRICATION
1-1/2"=1'-0"

EXCLUSIONS: ALL WORK THIS SHEET.

ISSUED FOR CONSTRUCTION FEB 2020

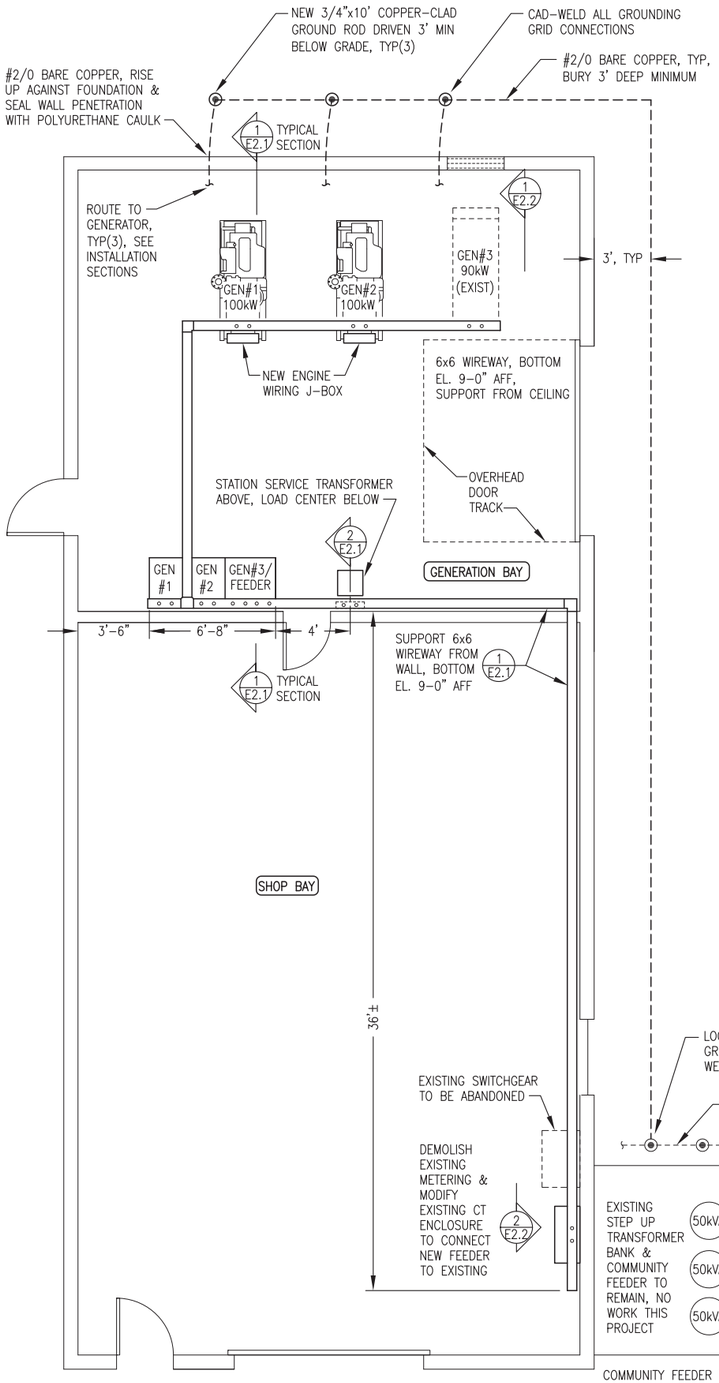
STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT CIRCLE POWER PLANT UPGRADE

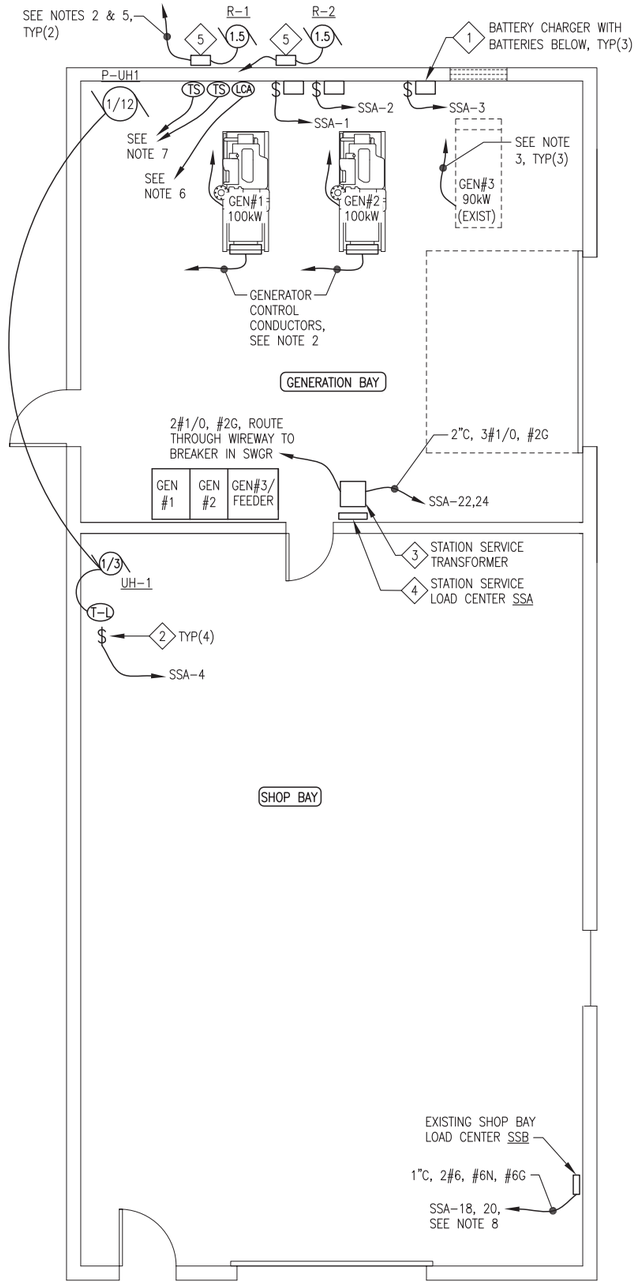
TITLE: COOLANT PIPING DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/18/20
FILE NAME: CIRDERA M1-4 | SHEET: M4.3 OF 4
PROJECT NUMBER:



1 E1 WIREWAY, POWER, AND GROUNDING PLAN
1/4"=1'-0"



2 E1 STATION SERVICE & INSTRUMENTATION PLAN
1/4"=1'-0"

GENERAL NOTES:

1. EXISTING EQUIPMENT TO BE RELOCATED AND REMAIN IN SERVICE SHOWN WITH LIGHT DASHED LINES.
2. NEW EQUIPMENT TO BE INSTALLED SHOWN WITH DARK SOLID LINES.

STATION SERVICE NOTES:

1. ALL WIRING RUNS 2#12, #12G UNLESS SPECIFICALLY NOTED OTHERWISE.
2. SEE SWITCHGEAR SHOP DRAWINGS FOR TERMINATION OF ALL POWER AND CONTROL WIRING.
3. ROUTE EXTRA-FLEX BATTERY CABLES FROM SKID TO BATTERIES, SEE INSTALLATION SECTIONS.
4. MOUNT BATTERY CHARGER TO WALL AND BATTERIES IN RACK BELOW, SEE DETAIL 3/E2.2.
5. 3/4"C, 3#12, #12G RADIATOR POWER CONDUCTORS, ROUTE THROUGH WIREWAY TO SWITCHGEAR.
6. INSTALL LOW COOLANT LEVEL ALARM SWITCH WHERE SHOWN ON DETAIL 3/M4.3. CONNECT TO N.C. SWITCH (WHITE & RED) AND ROUTE 2#14 IN WIREWAY TO SWITCHGEAR. SEE NOTE 2.
7. INSTALL SENSORS FOR RADIATOR THERMOSTATIC CONTROL WHERE SHOWN ON PIPING ISOMETRIC 1/M4.2. ROUTE #18 SHIELDED PAIR FROM EACH TO SWITCHGEAR THROUGH WIREWAY. SEE NOTE 2.
8. EXISTING 240V, SINGLE PHASE SHOP BAY LOAD CENTER SSB TO BE SUB-FED FROM 60A 2-POLE BREAKER IN NEW GENERATION BAY LOAD CENTER SSB. ROUTE CONDUCTORS IN WIREWAY WITH FEEDER CONDUCTORS.

ELECTRICAL EQUIPMENT/DEVICE SCHEDULE

SYMBOL	SERVICE	DESCRIPTION	MANUFACTURER/MODEL
1	BATTERY CHARGER	12/24-VOLT SOLID STATE 20-AMP AUTO-EQUALIZING BATTERY CHARGER FOR 120 VAC INPUT, WITH OPTIONAL HIGH/LOW VOLTAGE, AC POWER FAILURE, & REMOTE SUMMARY ALARM RELAYS	SENS NRG22-20-RCLS
2	1ø SMALL MOTOR DISCONNECT	SINGLE POLE SNAP SWITCH WITH RED PILOT LIGHT, 120V, 20A, 1-1/2HP RATED, INSTALL IN 4"x4" STEEL BOX WITH METAL COVER	HUBBELL 1221-PL
3	STATION SERVICE TRANSFORMER	DRY TYPE, ENCLOSURE TYPE 3R WITH INTEGRAL WALL MOUNT BRACKETS, SINGLE PHASE, 25kVA, HV 240X480, LV 120/240	HAMMOND HPS SENTINEL G SG3N0025LE
4	STATION SERVICE PANELBOARD	COPPER BUS, SINGLE PHASE, SURFACE MOUNT, NEMA 1, 3-WIRE, 120/240V, 100A, 24 CIRCUITS, PLUG-IN BREAKERS QUANTITY & RATING AS INDICATED ON DETAIL	SIEMENS P2424B1100SCU
5	RADIATOR MOTOR DISCONNECT	NON-FUSED LOCKABLE SAFETY SWITCH, NEMA 3R ENCLOSURE, 3PST, 240V, 30A, 3HP RATED	SIEMENS GNF321

ELECTRICAL INSTRUMENTATION SCHEDULE

SYMBOL	SERVICE	DESCRIPTION	MANUFACTURER/MODEL
TS	TEMPERATURE SENSOR	PTC TEMPERATURE PROBE FOR PENN CONTROLLER IN SWITCHGEAR WITH 2.0 METER LONG PVC JACKETED CABLE & 1/2" NPT WELL	PENN A99BA-200C SENSOR PENN WEL11A-601R WELL
LCA	GLYCOL TANK LOW COOLANT ALARM	LOW COOLANT LEVEL ALARM FLOAT SWITCH, SEE MECHANICAL FOR INSTALLATION DETAILS	MURPHY EL-150-K1
T-L	LINE VOLTAGE THERMOSTAT	HEATING/COOLING THERMOSTAT, 16 FLA @ 120V, SPDT, 50F TO 80F RANGE.	DAYTON 1UHH2

EQUIPMENT REQUIREMENTS FOR APPROVED EQUALS (APPLIES ALL SCHEDULES):
SPECIFIC PARTS MANUFACTURER AND MODEL SELECTED NOT ONLY TO MEET PERFORMANCE FUNCTION BUT ALSO TO COORDINATE AND INTERFACE WITH OTHER DEVICES AND SYSTEMS. APPROVED EQUAL SUBSTITUTIONS WILL BE ALLOWED ONLY BY ENGINEER'S APPROVAL. TO OBTAIN APPROVAL, SUBMITTALS MUST CLEARLY DEMONSTRATE HOW SUBSTITUTE ITEM MEETS OR EXCEEDS SPECIFIED ITEM QUALITY AND PERFORMANCE CHARACTERISTICS AND ALSO COMPLIES WITH MECHANICAL AND/OR ELECTRICAL CONNECTIONS AND PHYSICAL LAYOUT REQUIREMENTS.

ISSUED FOR CONSTRUCTION
FEB 2020

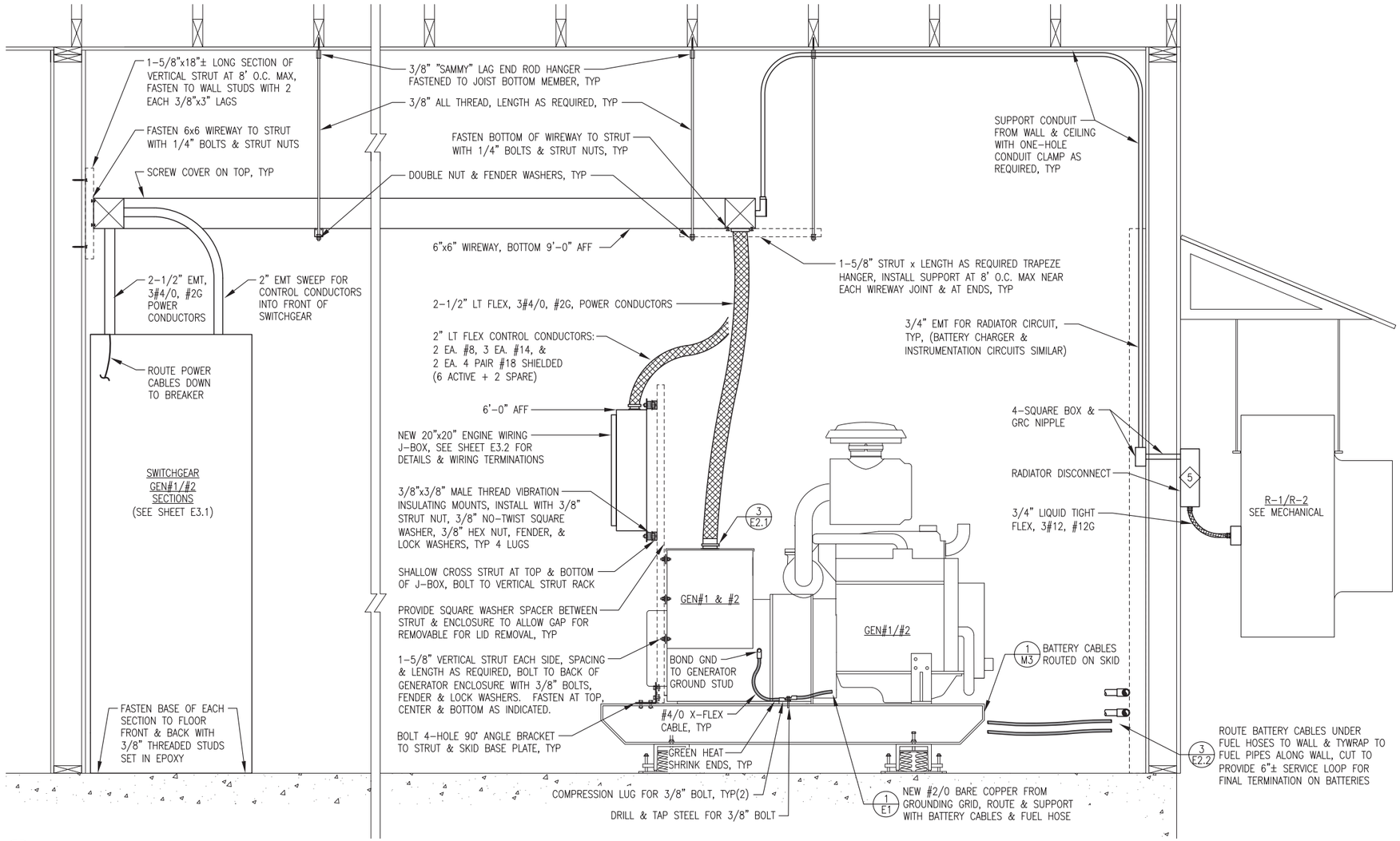
STATE OF ALASKA 49TH
CLOIS W. VERSYP
EE 7802
REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
CIRCLE POWER PLANT UPGRADE

TITLE: ELECTRICAL WORK PLAN & EQUIPMENT SCHEDULE

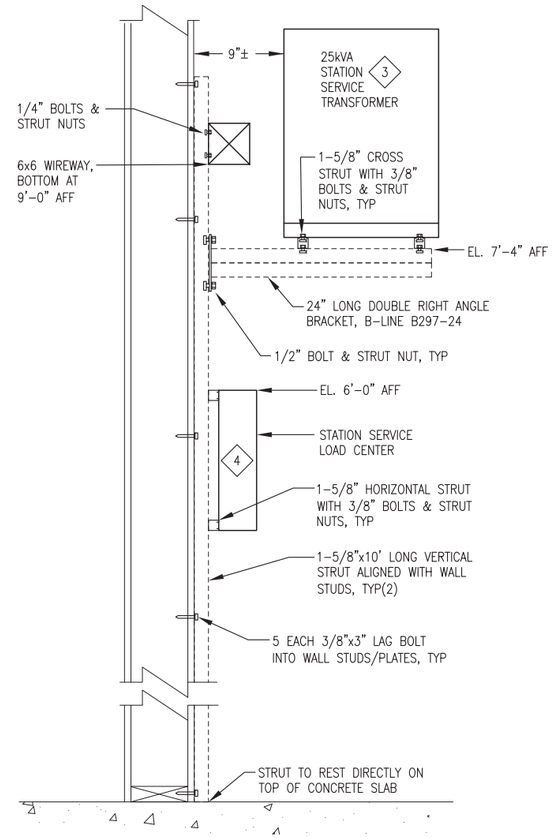
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD
DESIGNED BY: CWV/BCG
FILE NAME: CIRDERA E1-3
PROJECT NUMBER:
SCALE: AS NOTED
DATE: 3/18/20
SHEET: E1 OF 3



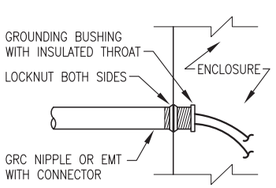
1 E2.1 TYPICAL GENERATION BAY SECTION

1"=1'-0"



2 E2.1 STATION SERVICE TRANSFORMER & LOAD CENTER SUPPORT

NO SCALE



NOTES:

1) THIS DETAIL APPLIES TO CONNECTIONS TO WIREWAY, GENERATOR ENCLOSURES, SWITCHGEAR, AND PANELS.
2) AT A MINIMUM INSTALL GROUNDING BUSHING ON ALL GENERATOR POWER CONDUIT, COMMUNITY FEEDER CONDUIT, STATION SERVICE FEEDERS, AND WHERE OTHERWISE INDICATED OR REQUIRED. BOND GROUNDING BUSHING TO EQUIPMENT GROUNDING CONDUCTOR.
3) INSTALL PLASTIC BUSHING WHERE GROUNDING BUSHING IS NOT REQUIRED.
4) ON GENERATOR ENCLOSURES MAKE ALL CONNECTIONS AS TIGHT AS POSSIBLE.

3 E2.1 TYP ENCLOSURE CONNECTION

NO SCALE

ISSUED FOR CONSTRUCTION
FEB 2020

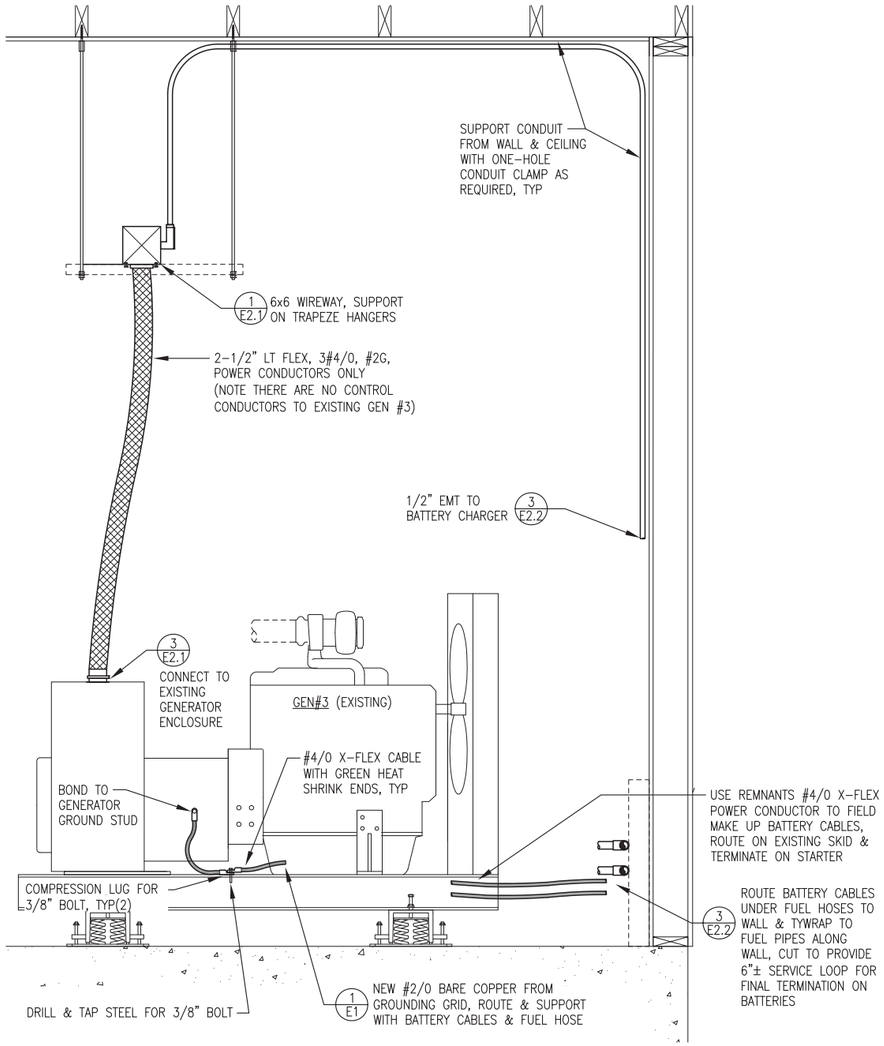
STATE OF ALASKA 49TH
CLOIS W. VERSYP
EE 7802
REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
CIRCLE POWER PLANT UPGRADE

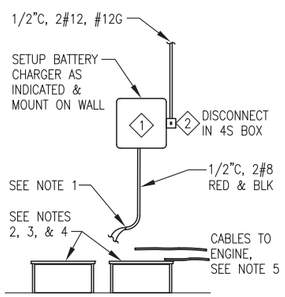
TITLE: TYPICAL GENERATION BAY SECTION & DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: NO SCALE
DESIGNED BY: CWV/BCG | DATE: 3/18/20
FILE NAME: CIRDERA E1-3 | SHEET: E2.1 OF 3
PROJECT NUMBER:



1 E2.2 GENSET #3 SECTION
1"=1'-0"



BATTERY INSTALLATION NOTES:

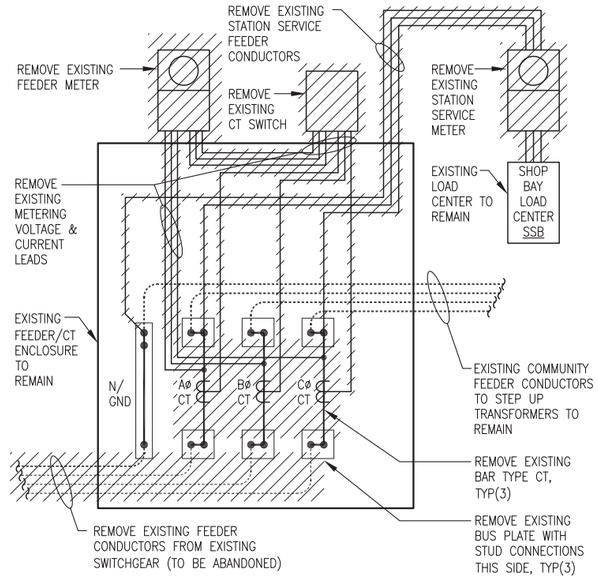
1) INSTALL BUSHING IN END OF EMT & ROUTE 2#8 CHARGING LEADS TO BATTERY.
2) GENSETS #1 & #2 (24V): PROVIDE TWO EACH MINIMUM 800 COLD CRANK AMP 12-VOLT STARTING BATTERIES FOR EACH GENERATOR. BATTERIES SHALL BE SEALED MAINTENANCE FREE, OPTIMA RED TOP NAPA PART# BAT N993478RED OR APPROVED EQUAL. PLACE BATTERIES OUT OF TRAFFIC AREA IN CONVENIENT LOCATION NEAR BACK WALL.
3) GENSET #3 (12V): IDENTICAL TO GENSETS #1 & #2 EXCEPT ONLY ONE BATTERY FOR EXISTING 12V ENGINE.
4) INSTALL EACH BATTERY IN A RACK SIZED TO SECURELY HOLD THE BATTERY.
5) X-FLEX BATTERY CABLES TO GENSET, SEE INSTALLATION SECTIONS FOR SIZE, ROUTING, AND SUPPORT.

BATTERY CHARGER SETUP NOTES:

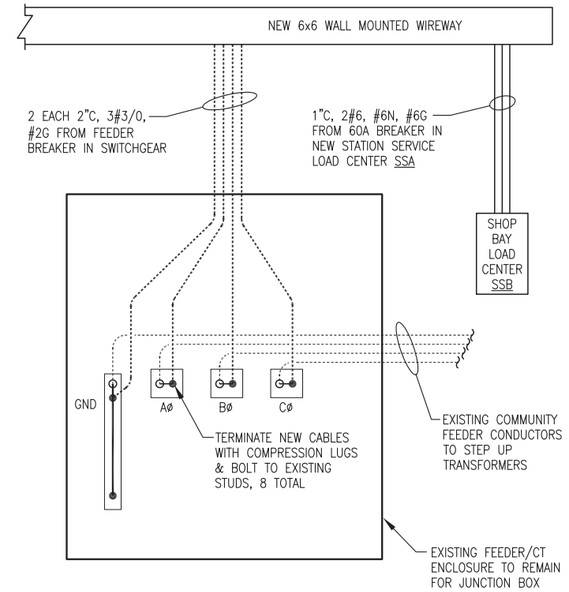
MAKE THE FOLLOWING SETTINGS PRIOR TO ENERGIZING:

A) AC LINE VOLTAGE SWITCH TO "115V".
B) AUTO BOOST JUMPER TO "NORM".
C) FLOAT VOLTAGE JUMPER TO "13.50/27.00" (FOR GEL CELL).
D) BATTERY RANGE JUMPER TO "24V" (FOR GENSETS #1 & #2).
E) BATTERY RANGE JUMPER TO "12V" (FOR GENSET #3).

3 E2.2 BATTERIES, CHARGER, & CABLE INSTALLATION
NO SCALE"

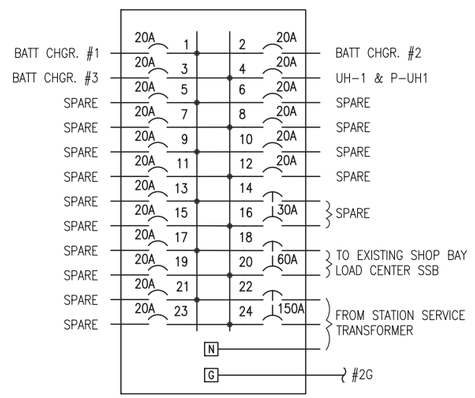


DEMOLITION SCHEMATIC



NEW WORK SCHEMATIC

2 E2.2 EXISTING FEEDER/CT ENCLOSURE 3-LINE MODIFICATION SCHEMATIC
NO SCALE



4 E2.2 NEW LOAD CENTER "SSA"
NO SCALE"

ISSUED FOR CONSTRUCTION FEB 2020

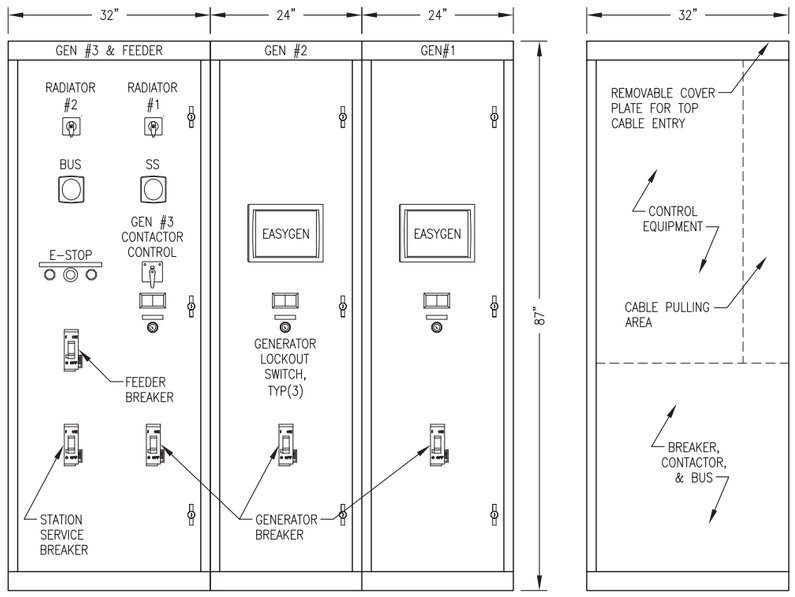
STATE OF ALASKA 49TH — CLOIS W. VERSYP EE 7802 — REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT CIRCLE POWER PLANT UPGRADE

TITLE: DETAILS & GENSET #3 SECTION

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: NO SCALE
DESIGNED BY: CWV/BCG | DATE: 3/18/20
FILE NAME: CIRDERA E1-3 | SHEET: E2.2 OF 3
PROJECT NUMBER:



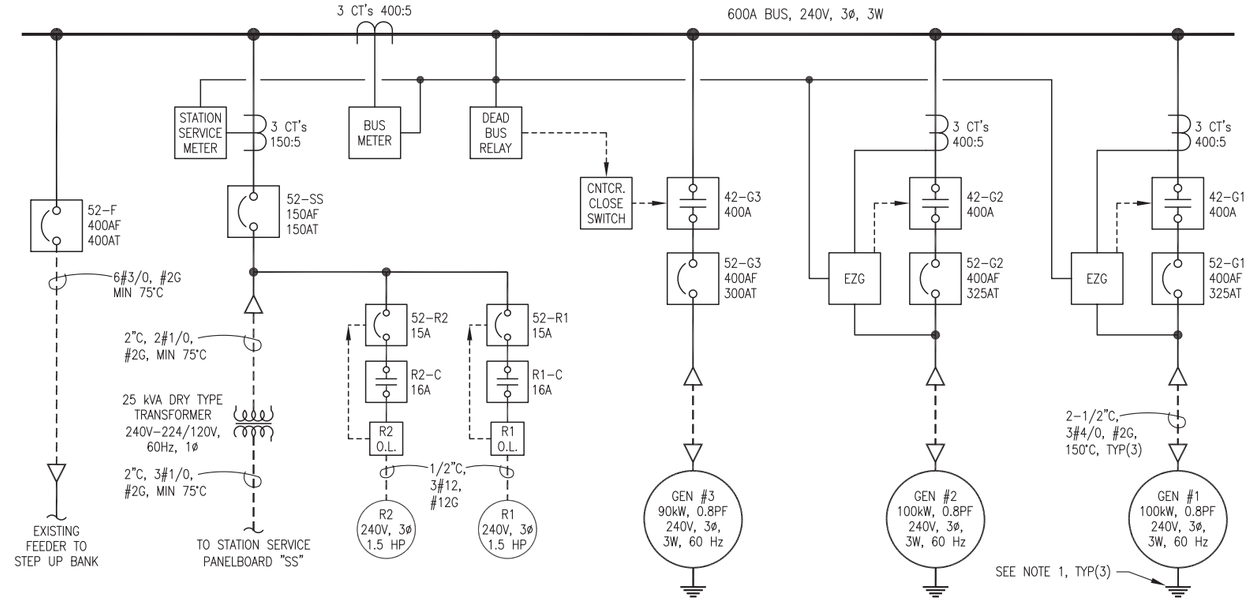
NOTE: PACKAGE AS A SINGLE UNIT WITHOUT SHIPPING SPLITS.

FRONT ELEVATION

TYPICAL CROSS SECTION

1 E3.1 SWITCHGEAR ENCLOSURE LAYOUT

NO SCALE



NOTES:

1) CONNECT EACH GENERATOR 3 PHASE 240V DELTA. INDEPENDENTLY GROUND EACH GENERATOR FRAME TO SWITCHGEAR GROUND BUS & PROVIDE SECOND GROUND DIRECTLY TO GROUND GRID.
2) ALL GENERATOR POWER CONDUCTORS 150°C CABLE. TERMINATE WITH COPPER COMPRESSION LUGS RATED FOR THE FULL AMPACITY OF THE CABLE AT RATED TEMPERATURE. ALL FEEDER AND STATION SERVICE CONDUCTORS MINIMUM 75°C.

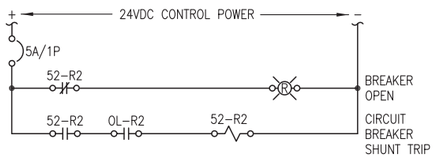
2 E3.1 SWITCHGEAR ONE-LINE DIAGRAM

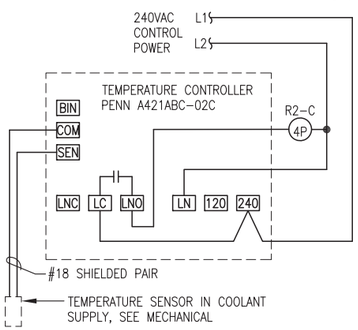
NO SCALE

RADIATOR R1 SETTINGS:
175F = ON
165F = OFF

RADIATOR R2 SETTINGS:
180F = ON
170F = OFF

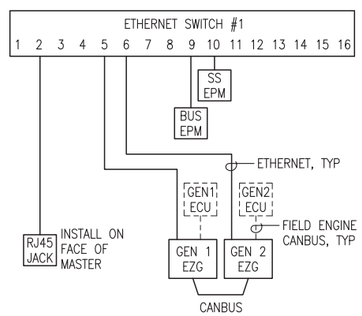
AFTER SELECTING VALUES INSTALL JUMPER FOR RESTRICTED MODE





3 E3.1 TYPICAL RADIATOR CONTROL LOGIC DIAGRAM

NO SCALE



4 E3.1 COMMUNICATION SCHEMATIC

NO SCALE

ELECTRICAL CONDUCTOR SCHEDULE

SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL	NOTES:
GENERATOR LEADS & FEEDERS (480V) & ENGINE STARTER CABLES (24VDC)	HIGH TEMPERATURE, EXTRA FLEXIBLE CABLE, TIN COATED COPPER CONDUCTOR. THERMOSET EPDM INSULATION, UL 3340/3374, MINIMUM 600V, LISTED 150°C FOR NON-FLEXING	COBRA CABLE, BELDEN, OR OMINI	TERMINATE WITH COPPER COMPRESSION LUGS RATED FOR THE FULL AMPACITY OF THE CABLE AT 150°C.
GENERAL USE CONDUCTORS	CLASS B CONCENTRIC STRANDED, SOFT DRAWN COPPER. TYPE XHHW INSULATION, 600V AND 75C RATED.		
SHIELDED/TWISTED INSTRUMENT & CONTROL & CANBUS CONDUCTORS	#18 AWG STRANDED TINNED COPPER CONDUCTORS, 600V POLYETHYLENE INSULATION, 100% COVERAGE ALUMINUM FOIL-POLYESTER TAPE SHIELD WITH STRANDED TINNED COPPER DRAIN WIRE & PVC OUTER JACKET	BELDEN PART #'S SINGLE PAIR: #1120A FOUR PAIR: #1049A SINGLE TRIAD: #1121A	GROUND SHIELD DRAIN WIRE AT PANEL END ONLY.

COLOR CODING - UNLESS SPECIFICALLY INDICATED OTHERWISE COLOR CODE CONDUCTORS AS FOLLOWS:
- 120/240 VOLT POWER CONDUCTORS
  - PHASE A - BLACK
  - PHASE B - RED
  - PHASE C - BLUE
  - NEUTRAL - WHITE
- 24 VOLT DC CONDUCTORS
  - +24VDC - RED
  - -24VDC - BLACK

CONTROL & INSTRUMENT CONDUCTORS COLOR CODED PER MANUFACTURER'S STANDARD

NOTES:

1) FOR NO. 6 AWG AND SMALLER CONDUCTORS COLOR CODING SHALL BE PROVIDED BY USING CONDUCTORS WITH CONTINUOUS COLOR EMBEDDED IN THE INSULATION. FOR ALL CONDUCTORS LARGER THAN NO. 6 SCOTCH 35 MARKING TAPE OR EQUIVALENT MAY BE USED TO COLOR CODE THE CABLE. WHERE MARKING TAPE IS USED THE CABLE SHALL BE IDENTIFIED AT EVERY ACCESSIBLE LOCATION. PROVIDE A MINIMUM OF 2 INCHES OF TAPE AT EACH LOCATION.
2) GROUNDING - PROVIDE A SEPARATE EQUIPMENT GROUNDING CONDUCTOR IN EACH RACEWAY. DO NOT USE THE CONDUIT AS AN EQUIPMENT GROUNDING CONDUCTOR. EQUIPMENT GROUNDING CONDUCTORS SHALL BE OF THE SAME TYPE AS THE PHASE CONDUCTORS AND SHALL BE SIZED AS INDICATED ON THE DRAWINGS. CONDUCTORS NOT INDICATED SHALL BE SIZED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.

SWITCHGEAR SYMBOL LEGEND

- TRANSFORMER
  PT=POTENTIAL XFRMR
  CPT=CONTROL POWER XFRMR
- CURRENT TRANSFORMER
  M.R. - INDICATES MULTIRATIO
  CT'S RATING FACTOR RF=2.0
- CIRCUIT BREAKER
  AT=AMP TRIP RATING
  AF=AMP FRAME RATING
- EZG - WOODWARD EASYGEN GENSET CONTROLLER
- SHOP INSTALLED POWER WIRING/BUS
- FIELD INSTALLED POWER WIRING
- SHOP INSTALLED CONTROL WIRING

ISSUED FOR CONSTRUCTION
FEB 2020

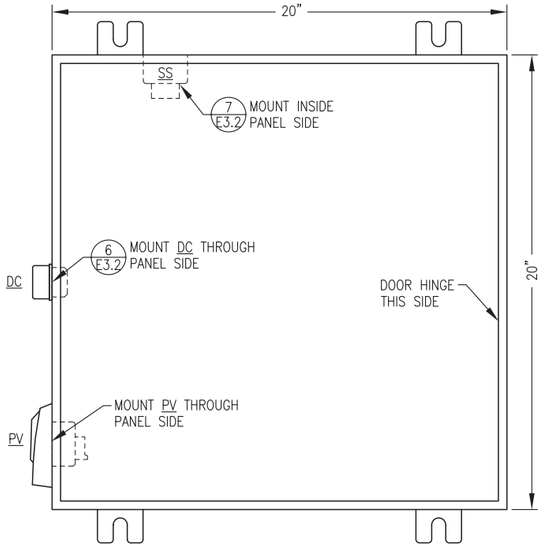
STATE OF ALASKA 49TH — CLOIS W. VERSYP EE 7802 — REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
CIRCLE POWER PLANT UPGRADE

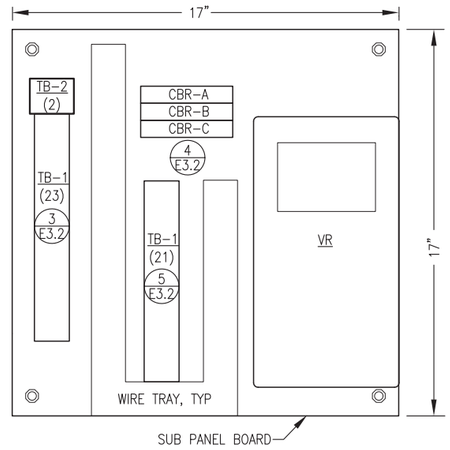
TITLE: SWITCHGEAR LAYOUT, ONE-LINE, SCHEMATICS, & CONDUCTOR SCHEDULE

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD
DESIGNED BY: CWV/BCG
FILE NAME: CIRDERA E1-3
PROJECT NUMBER:
SCALE: NO SCALE
DATE: 3/18/20
SHEET: E3.1 OF 3



1 E3.2 JUNCTION BOX FRONT PANEL LAYOUT
NO SCALE



2 E3.2 JUNCTION BOX SUB PANEL LAYOUT
NO SCALE

BILL OF MATERIALS			
TAG	MANUFACTURER	MODEL	DESCRIPTION
ENCL.	HOFFMAN	A20H20ALP	20x20x8" NEMA 12
	HOFFMAN	A20P20	BACK PANEL
VR	BASLER	DECS-150 5NS1V1N1S	DIGITAL VOLTAGE REGULATOR
CBR	ALLEN-BRADLEY	1489-M1-C010	RAIL MOUNT CIRCUIT BREAKER, 1-POLE, 1A
DC	JOHN DEERE	57M7919	DIAGNOSTIC CONNECTOR, 9-PIN, CAN-BUS
	DEUTSCH	HD18-009	CONNECTOR STRAIN RELIEF
	DEUTSCH	HDC16-9	CONNECTOR PROTECTIVE DUST CAP
	DEUTSCH	HD10-9-GKT	CONNECTOR GASKET
	DEUTSCH	JDL062397	CONNECTOR LANYARD
PV	MURPHY	PV101-C-MSTD	POWER VIEW W/HARNESS
SS	CATERPILLAR	9X-8124	STARTER AUXILIARY SOLENOID, 24V
TB-1	IDEC	BNH15LW	15A DIN RAIL-MOUNT TERMINAL BLOCK
TB-2	IDEC	BNH50W	50A DIN RAIL-MOUNT TERMINAL BLOCK

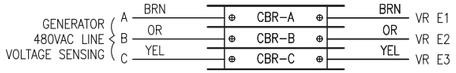
NOTE: SPECIFIC PARTS MANUFACTURER AND MODEL SELECTED NOT ONLY TO MEET PERFORMANCE FUNCTION BUT ALSO TO COORDINATE AND INTERFACE WITH OTHER DEVICES AND SYSTEMS. APPROVED EQUAL SUBSTITUTIONS WILL BE ALLOWED ONLY BY ENGINEER'S APPROVAL. TO OBTAIN APPROVAL, SUBMITTALS MUST CLEARLY DEMONSTRATE HOW SUBSTITUTE ITEM MEETS OR EXCEEDS SPECIFIED ITEM QUALITY AND PERFORMANCE CHARACTERISTICS AND ALSO COMPLIES WITH MECHANICAL AND/OR ELECTRICAL CONNECTIONS AND PHYSICAL LAYOUT REQUIREMENTS.

SHOP FABRICATION NOTES:

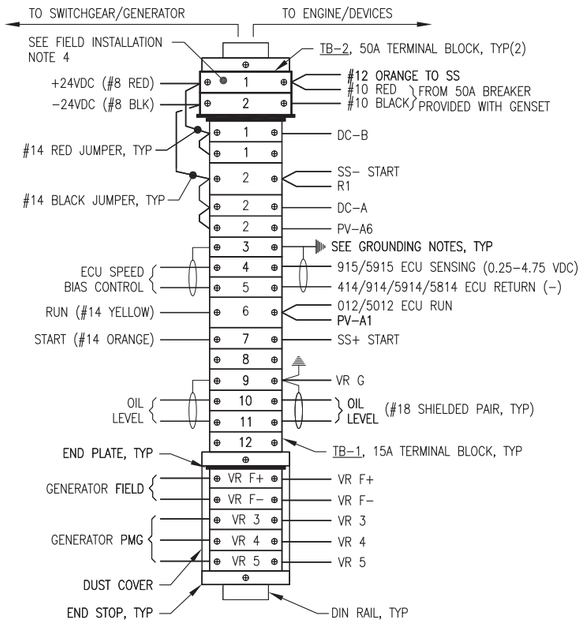
1) PROVIDE ASSEMBLY WITH ALL DEVICES AND WIRING INDICATED.
2) INSTALL IN A NEMA 12 ENCLOSURE WITH MOUNTING FLANGES AT BACK, A MIN 14 GAUGE INTERIOR BACK PANEL AND HINGED LOCKABLE DOOR. SIZE AS INDICATED.
3) PROVIDE DIN RAIL, TERMINAL END PLATES, TERMINAL END STOPS, TERMINAL DUST COVERS AND OTHER MISCELLANEOUS HARDWARE AS REQUIRED TO MATCH TERMINALS. LABEL ALL TERMINALS EXACTLY AS INDICATED ON THE DETAILS.
4) ALL WIRE #14AWG EXCEPT WHERE SPECIFICALLY INDICATED OTHERWISE. LABEL BOTH ENDS OF ALL JUMPERS WITH THE ENGINE PANEL TERMINAL NUMBER.
5) PROVIDE MECHANICAL GROUND LUGS FASTENED TO BACK PANEL AND GROUNDED TO ENGINE-GENERATOR. GROUND ALL SHIELD DRAIN WIRES TO LUGS AT PANEL END ONLY.
6) PROVIDE WIRING HARNESSES FOR CONNECTION TO GENERATOR AND TO ENGINE. INSTALL WIRES IN LIQUID TIGHT FLEX OR FLEXIBLE PLASTIC WIRE LOOM AND PROVIDE SERVICE LOOPS IN ACCORDANCE WITH SPECIFICATIONS.
7) SHOP TEST EACH ENGINE-GENERATOR WITH ASSOCIATED JUNCTION BOX PERMANENTLY CONNECTED. UPON COMPLETION OF TESTING, COIL WIRING HARNESSES AND SECURE JUNCTION BOX TO GENERATOR FOR SHIPPING.

FIELD INSTALLATION NOTES:

1) PERFORM ALL FIELD WIRING IN ACCORDANCE WITH SPECIFICATIONS. LABEL BOTH ENDS OF ALL FIELD WIRING WITH THE ENGINE PANEL TERMINAL NUMBER.
2) ON SHIELDED CONDUCTORS GROUND ALL SHIELD DRAIN WIRES TO LUGS AT PANEL END ONLY.
3) FIELD CONDUCTORS FROM GENERATOR TO SWITCHGEAR ARE EXISTING. USE EXISTING UNUSED SHIELDED TRIADS TO SERVE AS SHIELDED PAIRS AND PULL ADDITIONAL #18 SHIELDED PAIRS AS REQUIRED. FOR ALL UNUSED CONDUCTORS COIL, TAPE ENDS, & LEAVE IN PLACE.
4) RELABEL ALL TERMINALS IN SWITCHGEAR TO MATCH NEW J-BOX TERMINAL NUMBERS

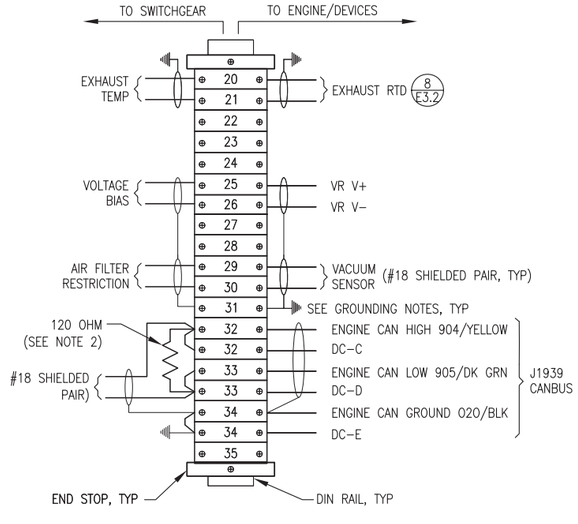


4 E3.2 CIRCUIT BREAKER CONNECTIONS
NO SCALE



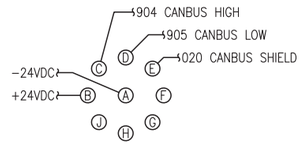
NOTE: TYPICAL JOHN DEERE ECU CONNECTION NUMBERS SHOWN. SEE WIRING HARNESS FOR EACH ENGINE FOR ACTUAL ECU CONNECTIONS.

3 E3.2 TERMINAL STRIP CONNECTIONS
NO SCALE

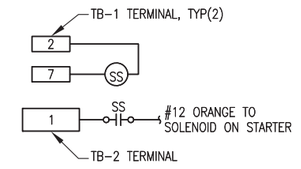


NOTES: 1) ALL RESISTORS 0.25W.
2) REMOVE RESISTOR IF ENGINE WIRING HARNESS HAS 120 OHM END OF LINE RESISTOR.

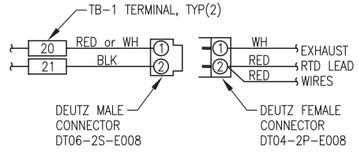
5 E3.2 TERMINAL STRIP CONNECTIONS
NO SCALE



6 E3.2 DIAGNOSTIC CONNECTOR WIRING
NO SCALE



7 E3.2 STARTER AUX SOLENOID SS WIRING
NO SCALE



8 E3.2 EXHAUST RTD CONNECTOR
NO SCALE

ISSUED FOR CONSTRUCTION
FEB 2020

PROJECT: FFY17-18 DERA PROJECT
CIRCLE POWER PLANT UPGRADE

TITLE: GENSET #1 & #2 24V ENGINE WIRING JUNCTION BOX

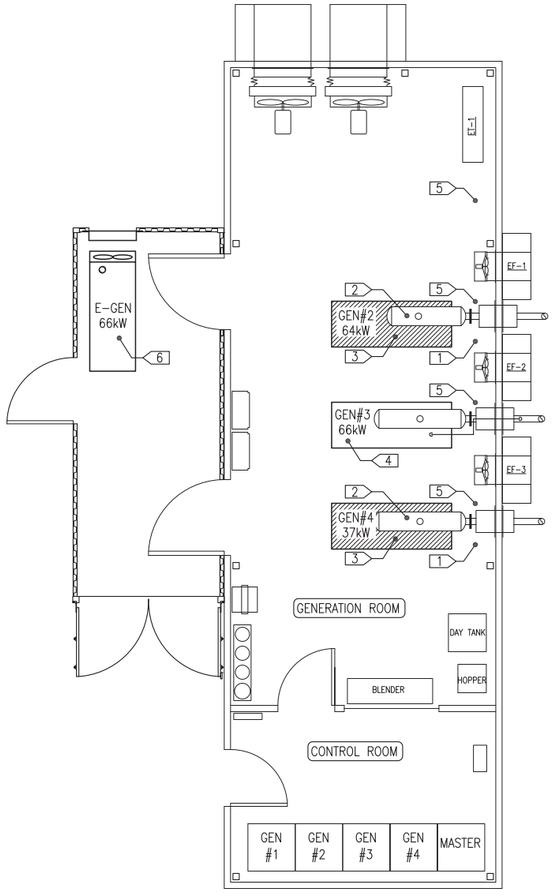
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: NO SCALE
DESIGNED BY: CWV/BCG | DATE: 3/18/20
FILE NAME: CIRDERA E1-3 | SHEET: E3.2 OF 3
PROJECT NUMBER:

PROJECT DESCRIPTION

1. THE EXISTING TAKOTNA POWER PLANT WAS ORIGINALLY CONSTRUCTED IN 2006. SEVERAL MODIFICATIONS HAVE BEEN MADE SINCE ORIGINAL CONSTRUCTION. THE PLANT PRESENTLY HAS MULTIPLE MECHANICAL AND ELECTRICAL DEFICIENCIES REQUIRING UPGRADES TO PROVIDE RELIABLE PRIME POWER SERVICE FOR THE COMMUNITY.
2. THE PRIMARY PURPOSE OF THIS PROJECT IS TO INSTALL TWO NEW TIER 3 MARINE DIESEL ENGINE–GENERATOR SETS (GENSETS) AND TO RESTORE FULL MANUAL AND AUTOMATIC PARALLELING CONTROL OF THE NEW AND THE EXISTING GENSETS.
3. THE SEPARATE ENGINE–GENERATOR DESIGNATED AS "E–GEN" IS CAPABLE OF OPERATING THROUGH THE SWITCHGEAR OR ALTERNATELY THROUGH A MANUAL TRANSFER SWITCH. COORDINATE WITH THE LOCAL UTILITY OPERATORS TO OPERATE ON THE E–GEN AS REQUIRED TO MAINTAIN COMMUNITY POWER WHILE WORKING ON THE SWITCHGEAR AND THE OTHER GENSETS.
4. EXISTING GENSETS #2 AND #4 WILL BE REMOVED AND REPLACED WITH NEW COMPLETE SKID MOUNTED GENSETS.
5. THE EXISTING SWITCHGEAR WILL BE RETROFIT WITH NEW CONTROLS.
6. IN ADDITION, MINOR MODIFICATIONS WILL BE MADE TO THE PLANT MECHANICAL AND ELECTRICAL SYSTEMS AS INDICATED.

SCHEDULE OF DRAWINGS



1 M1 DEMOLITION PLAN
1/4"=1'–0"

DEMOLITION GENERAL NOTES:

1. EXISTING EQUIPMENT AND PIPING TO BE REMOVED INDICATED BY HATCHING
2. TAKE ALL PRECAUTIONS TO MINIMIZE DAMAGE TO GENERATION EQUIPMENT BEING REMOVED DURING DEMOLITION. TARP GENERATOR ENDS AND SEAL ALL EXPOSED CONNECTIONS PRIOR TO REMOVING FROM PLANT. TURN ALL REMOVED EQUIPMENT OVER TO THE UTILITY FOR FINAL DISPOSITION.
3. GENS #2 AND #4 WERE SCHEDULED TO BE DECOMMISSIONED AND DRAINED OF ALL FLUIDS AS PART OF A PREVIOUS PROJECT. IN ORDER TO COMPLY WITH THE APPROVED DERA WORKPLAN, CONFIRM THAT THE REMOVED GENSET ENGINES HAVE BEEN DRAINED AND ARE RENDERED UNUSABLE (SEE NOTE 4). SAVE ANY REMAINING GLYCOL AND DIESEL FUEL FOR RE–USE IN NEW SYSTEMS. TURN USED OIL OVER TO THE UTILITY FOR FINAL DISPOSITION
4. ENGINE BLOCKS FOR GENSET #2 & #4 MUST BE RENDERED UNUSABLE BY CUTTING A MINIMUM 3"x3" HOLE IN ENGINE BLOCK. PROVIDE PHOTOGRAPHIC DOCUMENTATION OF HOLE & ASSOCIATED ENGINE NAMEPLATE. COMPLETE DERA CERTIFICATE OF ENGINE DESTRUCTION.
5. SEE ELECTRICAL PLANS FOR ADDITIONAL DEMOLITION.

DEMOLITION SPECIFIC NOTES:

ON GENSET #2 & #4 REMOVE ALL REMAINING HOSES FOR ENGINE COOLANT, FUEL, & OIL.

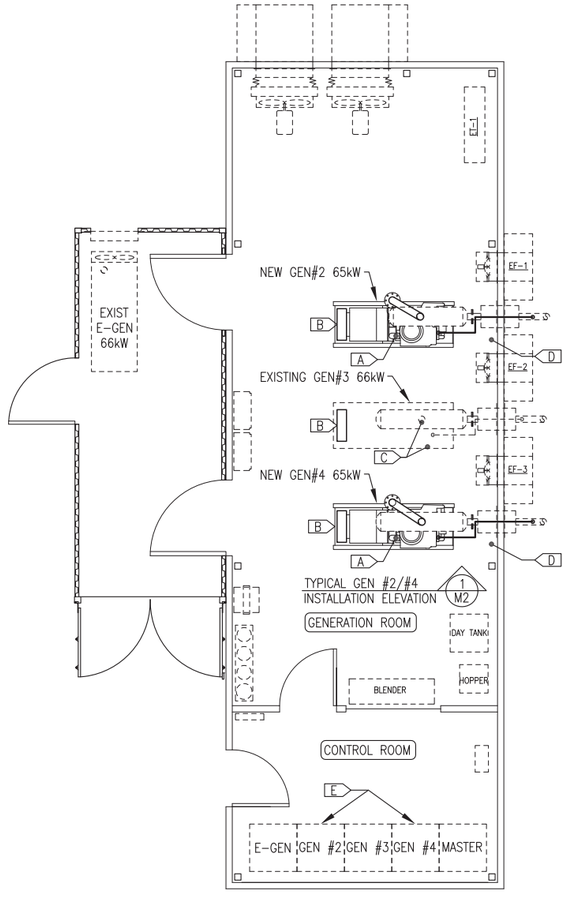
2 1 ~~ON GENSET #2 & #4 REMOVE FLANGED EXHAUST RISERS~~ FROM ENGINE TO MUFFLER. MUFFLERS AND DISCHARGE EXHAUST PIPING TO REMAIN.

3 REMOVE EXISTING GENSET #2 & #4 IN THEIR ENTIRETY. SEE ELECTRICAL FOR ADDITIONAL DEMOLITION NOTES.

4 REMOVE CONTROLLER. SEE ELECTRICAL.

5 REMOVE RETURN TEMPERATURE SENSOR FROM ENGINE BRANCH PIPING & PLUG OPENING WITH 3/4" THREADED PIPE PLUG.

6 E–GEN TO REMAIN AS IS WITHOUT MODIFICATION THIS PROJECT.



2 M1 NEW WORK PLAN
1/4"=1'–0"

NEW WORK GENERAL NOTES:

1. EXISTING EQUIPMENT AND PIPING TO REMAIN IN SERVICE SHOWN WITH LIGHT DASHED LINES.
2. NEW EQUIPMENT AND PIPING TO BE INSTALLED SHOWN WITH DARK SOLID LINES.

NEW WORK SPECIFIC NOTES:

A INSTALL NEW COMPLETE SKID MOUNTED GENSETS #2 & #4 INCLUDING COOLANT, EXHAUST, & CRANK VENT CONNECTIONS. SEE TYPICAL INSTALLATION ELEVATION 1/M2. SEE ELECTRICAL FOR ADDITIONAL DETAIL.

B INSTALL NEW ENGINE WIRING JUNCTION BOX, SEE ELECTRICAL

C FURNISH & INSTALL NEW SENSORS ON EXISTING ENGINE IN ACCORDANCE WITH SPECIFICATIONS. WELD 1/4" FPT COUPLING TO EXISTING 4" STEEL EXHAUST PIPE IN ACCESSIBLE LOCATION FOR INSTALLATION OF EXHAUST GAS TEMPERATURE SENSOR. TAP EXISTING AIR INTAKE FOR INSTALLATION OF AIR FILTER VACUUM SENSOR. INSTALL OIL LEVEL SITE GAUGE/SWITCH IN ACCORDANCE WITH DETAIL 3/M3. SEE ELECTRICAL FOR ADDITIONAL DETAIL.

D INSTALL NEW BATTERY CHARGER & BATTERIES FOR GENSETS #2 & #4. SEE ELECTRICAL

E MODIFY SWITCHGEAR. SEE ELECTRICAL

ISSUED FOR CONSTRUCTION
FEB 2020

STATE OF ALASKA 49TH
BRIAN C. GRAY
ME 8210
REGISTERED PROFESSIONAL ENGINEER

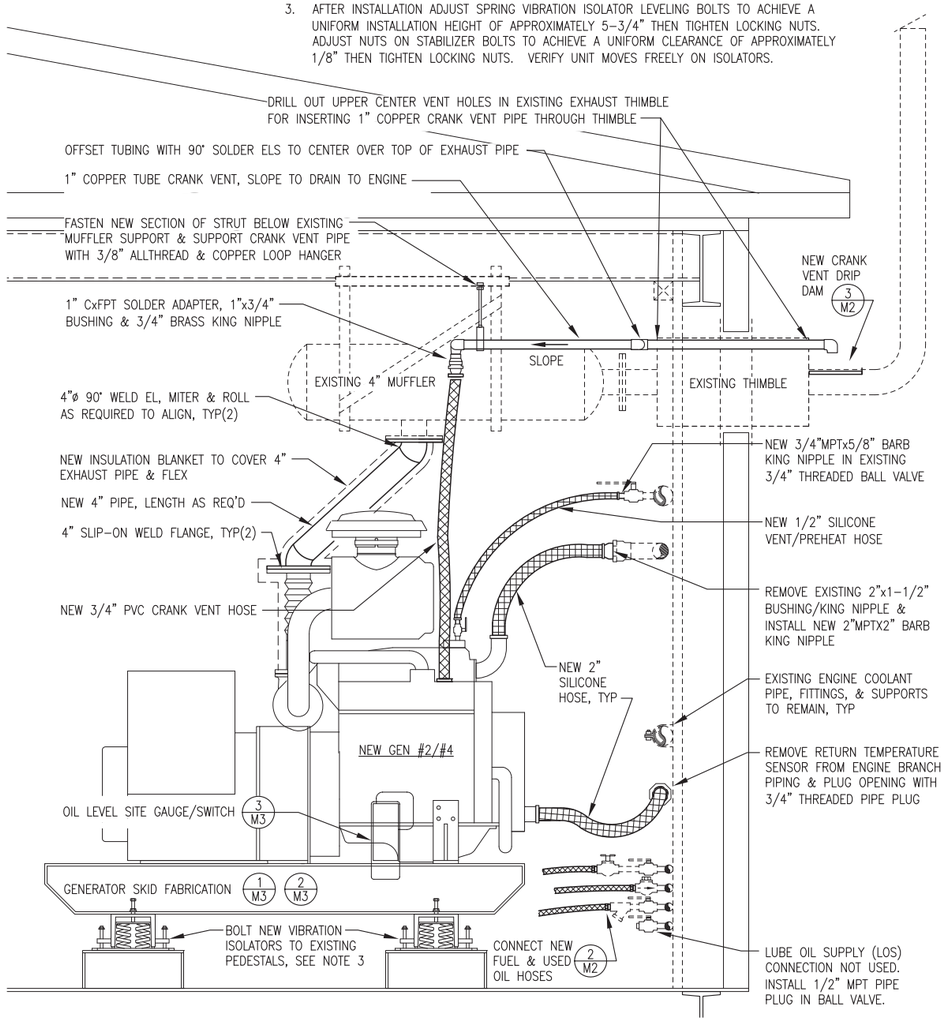
PROJECT: FFY17–18 DERA PROJECT
TAKOTNA POWER PLANT UPGRADE

TITLE: PROJECT DESCRIPTION, SCHEDULE OF DRAWINGS, & MECHANICAL WORK PLANS

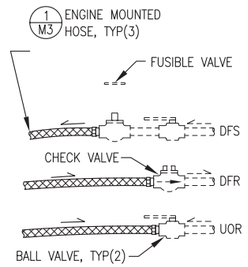
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 3/18/20
FILE NAME: TAKDERA M1–M3	SHEET: M1 OF 3
PROJECT NUMBER:	

NOTES:
1. ALL EXISTING PIPING & EQUIPMENT TO REMAIN SHOWN WITH LIGHT DASHED LINES.
2. ALL NEW EQUIPMENT TO BE INSTALLED THIS PROJECT SHOWN WITH DARK SOLID LINES.
3. AFTER INSTALLATION ADJUST SPRING VIBRATION ISOLATOR LEVELING BOLTS TO ACHIEVE A UNIFORM INSTALLATION HEIGHT OF APPROXIMATELY 5-3/4" THEN TIGHTEN LOCKING NUTS. ADJUST NUTS ON STABILIZER BOLTS TO ACHIEVE A UNIFORM CLEARANCE OF APPROXIMATELY 1/8" THEN TIGHTEN LOCKING NUTS. VERIFY UNIT MOVES FREELY ON ISOLATORS.

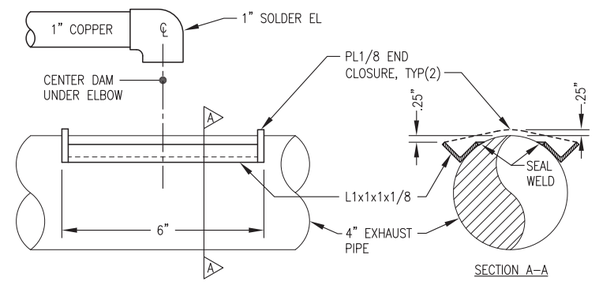


1 M2 GENSET #2 & #4 INSTALLATION ELEVATION
1"=1'-0"



NOTES:
1) EXISTING PIPING & VALVES 1/2" THREADED.
2) FIELD CUT NEW ENGINE MOUNTED HOSES TO LENGTH & REINSTALL JIC FITTINGS.

2 M2 GEN#3 FUEL/USED OIL PIPING CONNECTIONS
NO SCALE



3 M2 CRANKCASE DRIP DAM FABRICATION DETAIL
NO SCALE

ISSUED FOR CONSTRUCTION FEB 2020

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
TAKOTNA POWER PLANT UPGRADE

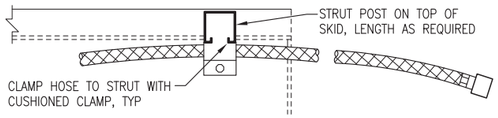
TITLE: GENSET #2 & #4 INSTALLATION DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

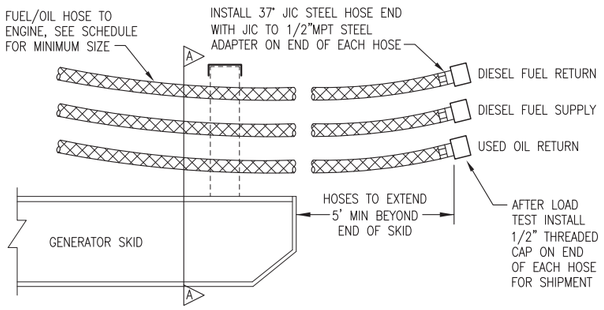
DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/18/20
FILE NAME: TAKDERA M1-M3 | SHEET: M2 OF 3
PROJECT NUMBER:

MINIMUM HOSE SIZE SCHEDULE		
FUEL SUPPLY	FUEL RETURN	USED OIL
#8	#8	#10

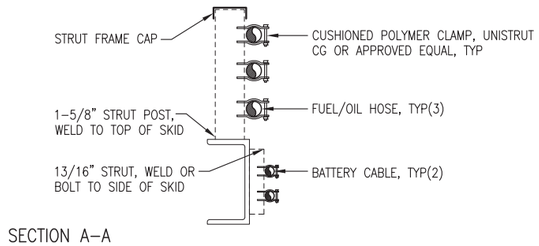
NOTE:
ON 4045'S GROUP HOSES ON LEFT SKID AS SHOWN TO COORDINATE WITH COOLANT HOSES.



LEFT SKID PLAN (TOP) VIEW

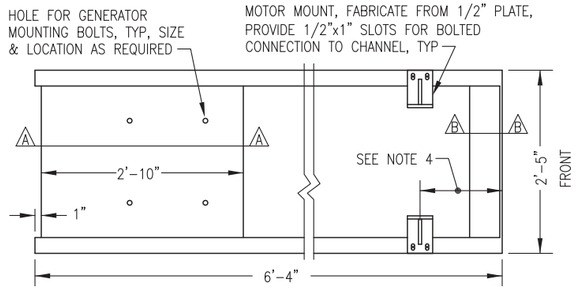


ELEVATION (SIDE) VIEW

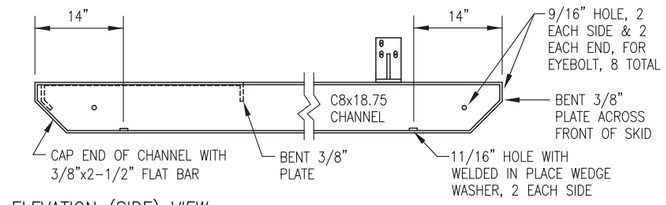


SECTION A-A

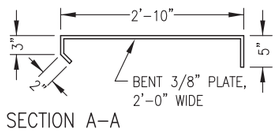
1/M3 FUEL/OIL HOSE & BATTERY CABLE INSTALLATION ON SKID
NO SCALE



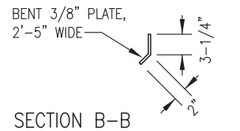
PLAN (TOP) VIEW



ELEVATION (SIDE) VIEW



SECTION A-A

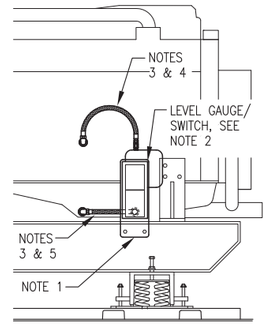


SECTION B-B

NOTES:

1) FABRICATE FROM ASTM A-36 STEEL. BEND PLATES & CUT ENDS OF CHANNELS AT 90° & 45° AS SHOWN.
2) EXCEPT WHERE INDICATED AS BOLTED MAKE ALL CONNECTIONS WITH CONTINUOUS WELDS (FILLET OR FULL-PENETRATION GROOVE AS REQUIRED) IN ACCORDANCE WITH CURRENT AWS STANDARD CODE.
3) ROUND ALL CORNERS & GRIND WELDS SMOOTH AFTER FABRICATION. PAINT TO MATCH ENGINE-GENERATOR.
4) PLACE UNIT ON SKID SO THAT THE EXHAUST RISER CENTERLINE IS 3'-3" FROM THE FRONT OF THE SKID.

2/M3 GENSET #2 & #4 (4045) SKID FABRICATION
NO SCALE



NOTES:

1) 1/4" STEEL SUPPORT PLATE PRE-DRILLED TO MATCH GAUGE/SWITCH MOUNTS, CHANNEL SKID HOLES AND BOTTOM HOSE ENTRANCE. BOLT TO INSIDE (BACK) OF CHANNEL SKID AT HEIGHT AS REQUIRED TO CENTER GAUGE AT NORMAL FULL OIL LEVEL. ADJUST SWITCH CONTACTS 1/2" ABOVE & BELOW.
2) SEE ENGINE GENERATOR SPECIFICATIONS FOR LEVEL/GUAGE SWITCH. MOUNT TO STEEL SUPPORT PLATE WITH RUBBER SHOCK MOUNTS.
3) #8 HOSE WITH 1/2" OR 3/8" NPT JIC SWIVEL ENDS AS REQUIRED.
4) CONNECT TOP (VENT) PORT TO ENGINE CRANK CASE WITH HOSE. ROUTE UPPER HOSE TO AVOID LOW POINT TRAPS.
5) CONNECT BOTTOM PORT TO ENGINE OIL PAN WITH HOSE. DO NOT TEE INTO OIL DRAIN LINE. ROUTE LOWER HOSE BACK THROUGH PRE-DRILLED HOLE IN STEEL PLATE.

3/M3 TYPICAL OIL LEVEL GAUGE/SWITCH INSTALLATION
NO SCALE

ISSUED FOR CONSTRUCTION FEB 2020

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
TAKOTNA POWER PLANT UPGRADE

TITLE: GENSET FABRICATION DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/18/20
FILE NAME: TAKDERA M1-M3 | SHEET: M3 OF 3
PROJECT NUMBER:

PRIME POWER COORDINATION REQUIREMENTS:

1. THIS PLANT PROVIDES PRIME POWER TO THE COMMUNITY OF TAKOTNA. KEEP OUTAGES TO A MINIMUM AND COORDINATE ALL REQUIRED OUTAGES WITH THE UTILITY.

2. THE ENGINE–GENERATOR DESIGNATED AS "E–GEN" IS OPERATED BY AN ENGINE–MOUNTED CONTROLLER. IT CAN RUN THROUGH THE SWITCHGEAR OR ALTERNATELY THROUGH A MANUAL TRANSFER SWITCH. THERE ARE TWO OPTIONS FOR POWERING THE COMMUNITY WITH THE E–GEN. COORDINATE WITH THE UTILITY TO MAINTAIN COMMUNITY POWER WHILE WORKING ON THE SYSTEM.

OPTION 1:
A TRANSFER SWITCH LOCATED ON THE EXTERIOR OF THE POWER PLANT MAY BE USED TO CONNECT THE E–GEN DIRECTLY TO THE STEP UP TRANSFORMER (GRID). THIS OPTION COMPLETELY ISOLATES THE MODULE FROM THE GRID, RESULTING IN LOSS OF POWER METERING AND STATION SERVICE POWER. THIS OPTION SHOULD BE USED WHEN REQUIRED FOR WORKING ON THE SWITCHGEAR.

OPTION 2:
A MANUAL CONTACTOR OPEN/CLOSE SWITCH IS LOCATED ON THE OLD GEN #1 (E–GEN) SWITCHGEAR SECTION. THIS SWITCH WILL FUNCTION ONLY AGAINST A DEAD BUS AND IS LOCKED OUT IF ANY OTHER GENERATOR IS ON LINE. CONNECTING THE E–GEN TO THE GRID USING THIS SWITCH WILL ENERGIZE THE SWITCHGEAR BUS PROVIDING POWER METERING AND STATION SERVICE POWER. GENSETS AND OTHER EQUIPMENT WILL NEED TO BE LOCKED OUT AND TAGGED OUT.

ELECTRICAL EQUIPMENT/DEVICE SCHEDULE

SYMBOL	SERVICE	DESCRIPTION	MANUFACTURER/MODEL
◇1	BATTERY CHARGER	12/24–VOLT SOLID STATE 20–AMP AUTO–EQUALIZING BATTERY CHARGER FOR 120 VAC INPUT, WITH OPTIONAL HIGH/LOW VOLTAGE, AC POWER FAILURE, & REMOTE SUMMARY ALARM RELAYS	SENS NRG22–20–RCLS OR EQUAL

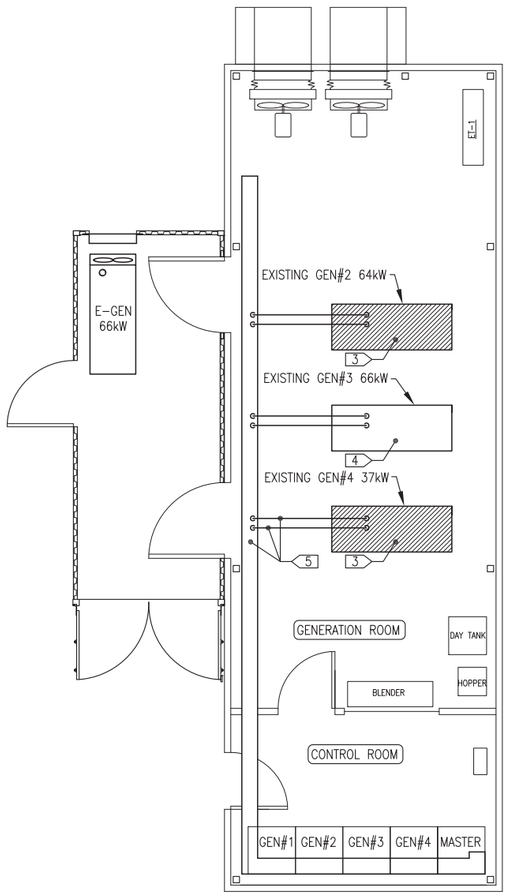
ELECTRICAL CONDUCTOR SCHEDULE

COLOR CODING – UNLESS SPECIFICALLY INDICATED OTHERWISE COLOR CODE CONDUCTORS AS FOLLOWS:
- 480–VOLT POWER CONDUCTORS
  - PHASE A – BROWN
  - PHASE B – ORANGE
  - PHASE C – YELLOW
  - NEUTRAL – WHITE WITH YELLOW STRIPE
- 120/208–VOLT POWER CONDUCTORS
  - PHASE A – BLACK
  - PHASE B – RED
  - PHASE C – BLUE
  - NEUTRAL – WHITE
- 24 VOLT DC CONDUCTORS
  - +24VDC – RED or RED WITH GRAY STRIPE
  - –24VDC – BLACK or BLACK WITH GRAY STRIPE

CONTROL & INSTRUMENT CONDUCTORS COLOR CODED PER MANUFACTURER'S STANDARD

NOTES:
1) FOR NO. 6 AWG AND SMALLER CONDUCTORS COLOR CODING SHALL BE PROVIDED BY USING CONDUCTORS WITH CONTINUOUS COLOR EMBEDDED IN THE INSULATION. FOR ALL CONDUCTORS LARGER THAN NO. 6 SCOTCH 35 MARKING TAPE OR EQUIVALENT MAY BE USED TO COLOR CODE THE CABLE. WHERE MARKING TAPE IS USED THE CABLE SHALL BE IDENTIFIED AT EVERY ACCESSIBLE LOCATION. PROVIDE A MINIMUM OF 2 INCHES OF TAPE AT EACH LOCATION.

2) GROUNDING – PROVIDE A SEPARATE EQUIPMENT GROUNDING CONDUCTOR IN EACH RACEWAY. DO NOT USE THE CONDUIT AS AN EQUIPMENT GROUNDING CONDUCTOR. EQUIPMENT GROUNDING CONDUCTORS SHALL BE OF THE SAME TYPE AS THE PHASE CONDUCTORS AND SHALL BE SIZED AS INDICATED ON THE DRAWINGS. CONDUCTORS NOT INDICATED SHALL BE SIZED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.



1 E1 DEMOLITION PLAN
1/4"=1'–0"

DEMOLITION GENERAL NOTES:

1) ALL ITEMS TO REMAIN UNLESS SPECIFICALLY INDICATED FOR REMOVAL.

2) ENSURE ALL EQUIPMENT AND CIRCUITS TO BE REMOVED ARE DE–ENERGIZED PRIOR TO BEGINNING DEMOLITION. LOCK AND TAG OUT ALL AFFECTED CIRCUIT BREAKERS AND DISCONNECTS.

3) TAKE ALL PRECAUTIONS TO MINIMIZE DAMAGE TO ELECTRICAL EQUIPMENT AND CONDUCTORS BEING SALVAGED FOR REUSE. TURN ALL REMOVED MATERIALS AND EQUIPMENT OVER TO THE UTILITY FOR FINAL DISPOSITION IF NOT REUSED.

DEMOLITION SPECIFIC NOTES:

1> SEE MECHANICAL.

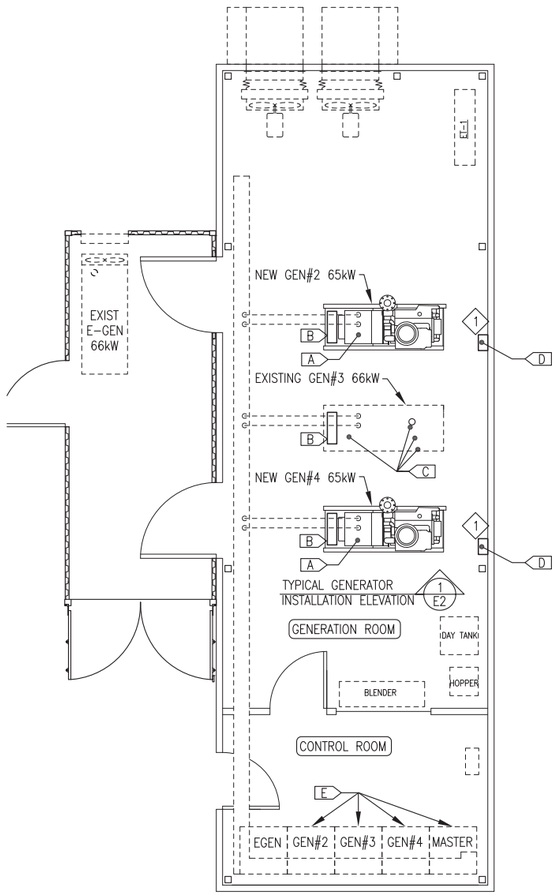
2> SEE MECHANICAL.

3> REMOVE EXISTING GENSET #2 & #4 IN THEIR ENTIRETY. EXISTING POWER & CONTROL CONDUCTORS & ASSOCIATED CONDUIT & FITTINGS TO REMAIN IN SERVICE FOR RECONNECTION TO NEW GENSETS. CAREFULLY SEPARATE EXISTING MOGULS & FITTINGS FROM GENERATOR ENCLOSURES & DISCONNECT ALL CONDUCTORS. COIL CONDUCTORS IN SECURE LOCATION TO PROTECT FROM DAMAGE DURING GENSET REPLACEMENT. SEE TYPICAL GENSET INSTALLATION ELEVATION FOR MODIFICATIONS TO CONTROL CONDUIT & NEW CONNECTIONS TO NEW ENGINE WIRING J–BOXES.

4> REMOVE EXISTING ENGINE MOUNTED CONTROLLER & VOLTAGE REGULATOR FROM GENSET #3 IN PREPARATION FOR INSTALLATION OF NEW ENGINE WIRING J–BOX & RECONNECTION OF CONTROL WIRING TO SWITCHGEAR.

5> ALL EXISTING GENERATOR WIREWAY, CONDUIT, POWER CONDUCTORS, & CONTROL WIRING TO REMAIN EXCEPT FOR TYPE J THERMOCOUPLE WIRING TO BE REMOVED. SEE SHEET E3.2 FIELD INSTALLATION NOTES.

6> E–GEN TO REMAIN AS IS WITHOUT MODIFICATION THIS PROJECT.



2 E1 NEW WORK PLAN
1/4"=1'–0"

NEW WORK GENERAL NOTES:

1. EXISTING EQUIPMENT TO REMAIN IN SERVICE SHOWN WITH LIGHT DASHED LINES.

2. NEW EQUIPMENT TO BE INSTALLED SHOWN WITH DARK SOLID LINES.

3. RECONNECT EXISTING POWER & CONTROL CONDUCTORS & ASSOCIATED CONDUIT & FITTINGS TO TO NEW GENSETS AS INDICATED.

NEW WORK SPECIFIC NOTES:

A> CONNECT EXISTING POWER CONDUCTORS TO NEW GENSET. SEE ELEVATION 1/E2.

B> INSTALL NEW ENGINE WIRING JUNCTION BOX AND TERMINATE EXISTING CONTROL WIRES AS REQUIRED. REUSE EXISTING CONTROL CONDUCTORS FROM GENERATOR TO SWITCHGEAR. SEE ELEVATION 1/E2 FOR J–BOX INSTALLATION AND SHEET E3.2 FOR WIRING TERMINATION DETAILS.

C> INSTALL NEW SENSORS ON EXISTING GENSET #3 AS INDICATED BELOW. SEE SPECIFICATIONS & MECHANICAL FOR ADDITIONAL DETAIL. ROUTE #18 SHIELDED PAIR FROM EACH DEVICE TO NEW ENGINE WIRING J–BOX. CONNECT EXISTING GENERATOR CONTROL WIRING SHIELDED PAIRS FROM SWITCHGEAR TO TERMINALS IN J–BOX.
- EXHAUST GAS TEMPERATURE SENSOR
- AIR FILTER VACUUM SENSOR
- OIL LEVEL SITE GAUGE/SWITCH

D> REMOVE EXISTING 12V BATTERY CHARGER & BATTERY. INSTALL NEW 24V BATTERY CHARGER & TWO NEW BATTERIES. SEE DETAIL 3/E2.

E> MODIFY SWITCHGEAR FOR AUTOMATIC PARALLELING OPERATION, SEE SHEET E3.1 AND SPECIFICATIONS.

ISSUED FOR CONSTRUCTION
FEB 2020

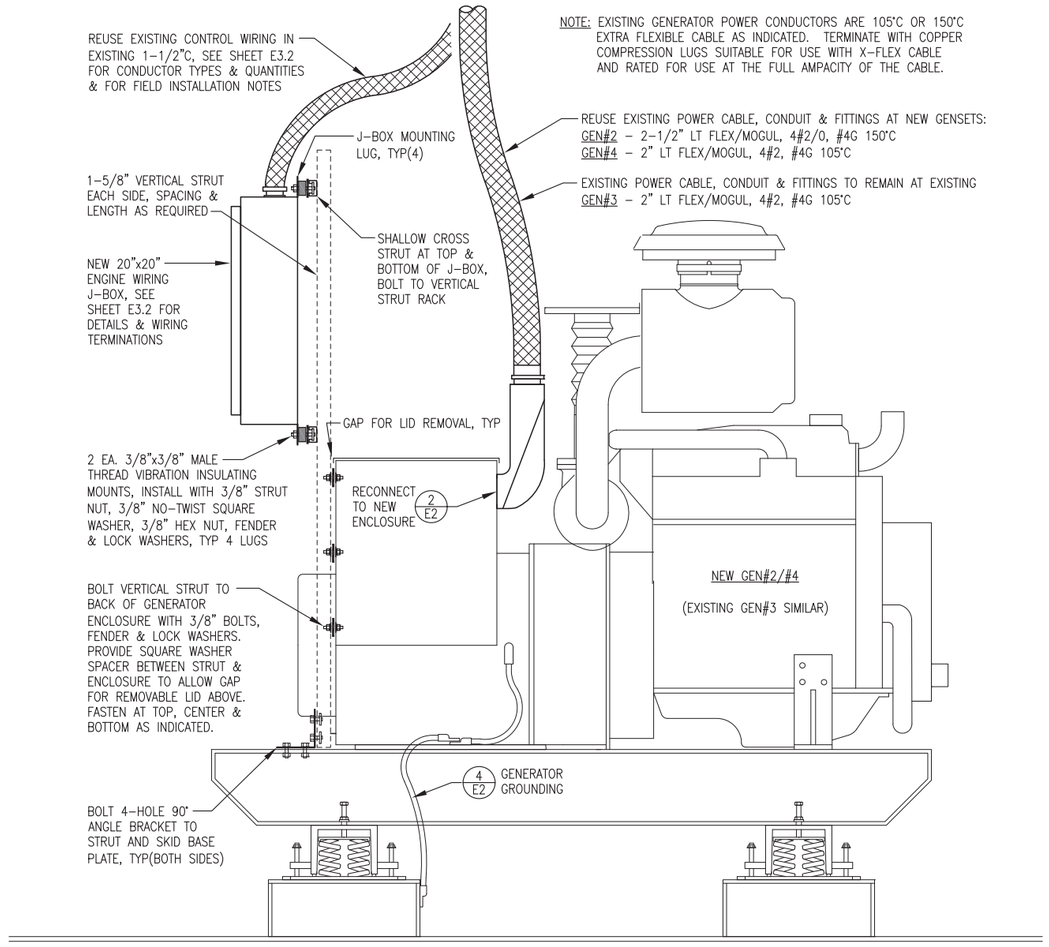
STATE OF ALASKA 49TH
CLOIS W. VERSYP
EE 7802
REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17–18 DERA PROJECT
TAKOTNA POWER PLANT UPGRADE

TITLE: ELECTRICAL WORK PLANS & SCHEDULES

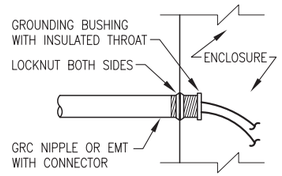
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 3/18/20
FILE NAME: TAKDERA E1–E3	SHEET: E1 OF 3
PROJECT NUMBER:	

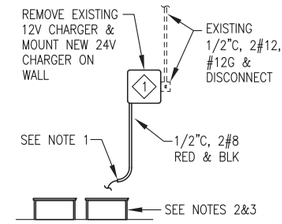


1 E2 TYPICAL GENERATOR INSTALLATION
1-1/2"=1'-0"

NOTES:
1) THIS DETAIL APPLIES TO CONNECTIONS TO WIREWAY, GENERATOR ENCLOSURES, SWITCHGEAR, AND PANELS.
2) AT A MINIMUM INSTALL GROUNDING BUSHING ON ALL GENERATOR POWER CONDUIT, COMMUNITY FEEDER CONDUIT, STATION SERVICE FEEDERS, AND WHERE OTHERWISE INDICATED OR REQUIRED. BOND GROUNDING BUSHING TO EQUIPMENT GROUNDING CONDUCTOR.
3) INSTALL PLASTIC BUSHING WHERE GROUNDING BUSHING IS NOT REQUIRED.
4) ON GENERATOR ENCLOSURES MAKE ALL CONNECTIONS AS TIGHT AS POSSIBLE.

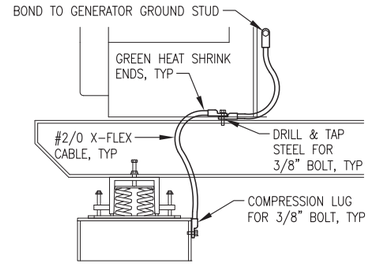


3 E2 TYP ENCLOSURE CONNECTION
NO SCALE



NOTES:
1. INSTALL BUSHING IN END OF EMT & ROUTE 2#8 CHARGING LEADS TO BATTERY.
2. PROVIDE TWO EACH MINIMUM 800 COLD CRANK AMP 12-VOLT STARTING BATTERIES FOR EACH GENERATOR. BATTERIES SHALL BE SEALED MAINTENANCE FREE, OPTIMA RED TOP NAPA PART# BAT N993478RED OR APPROVED EQUAL.
3. INSTALL EACH BATTERY IN A RACK SIZED TO SECURELY HOLD THE BATTERY.

3 E2 BATTERY CHARGER INSTALLATION
NO SCALE



4 E2 GENERATOR GROUNDING
NO SCALE

ISSUED FOR CONSTRUCTION
FEB 2020

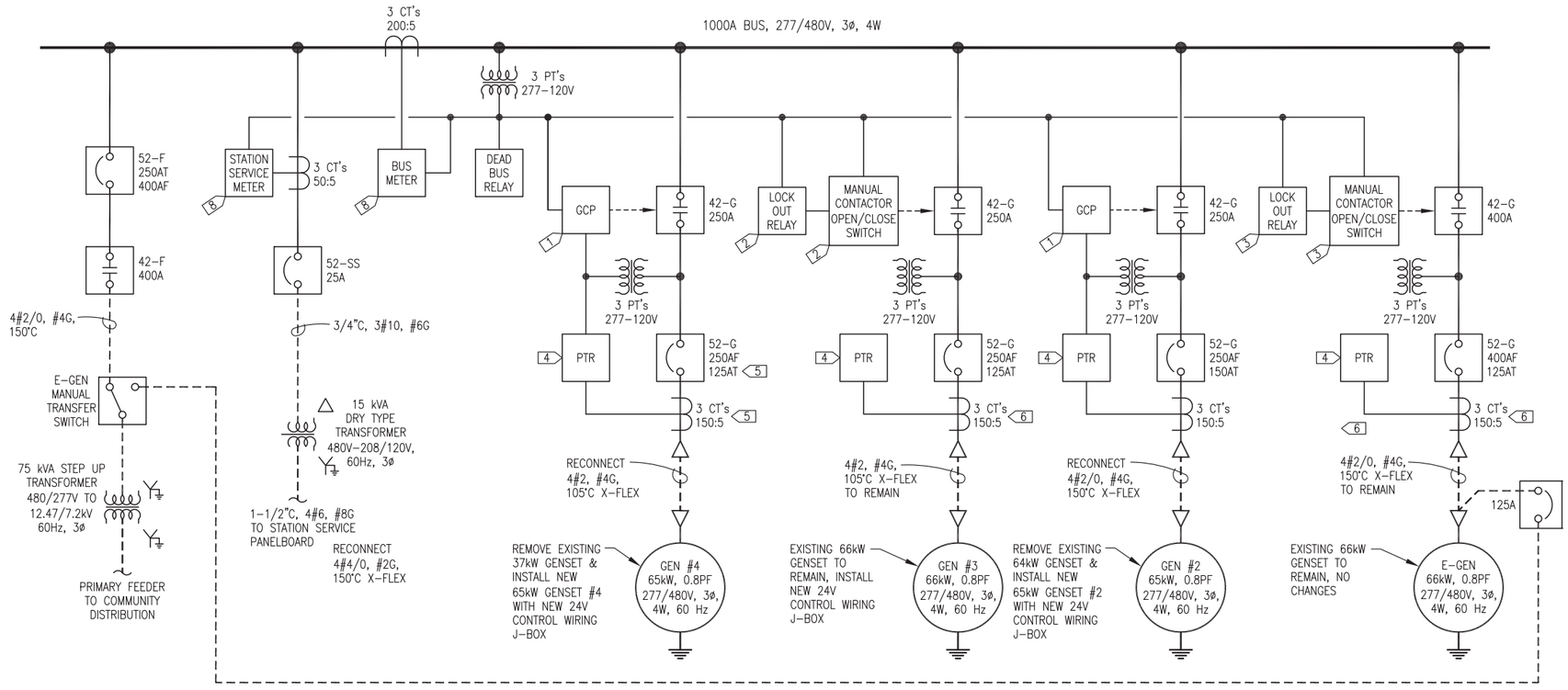
STATE OF ALASKA 49TH
CLOIS W. VERSYP
EE 7802
REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
TAKOTNA POWER PLANT UPGRADE

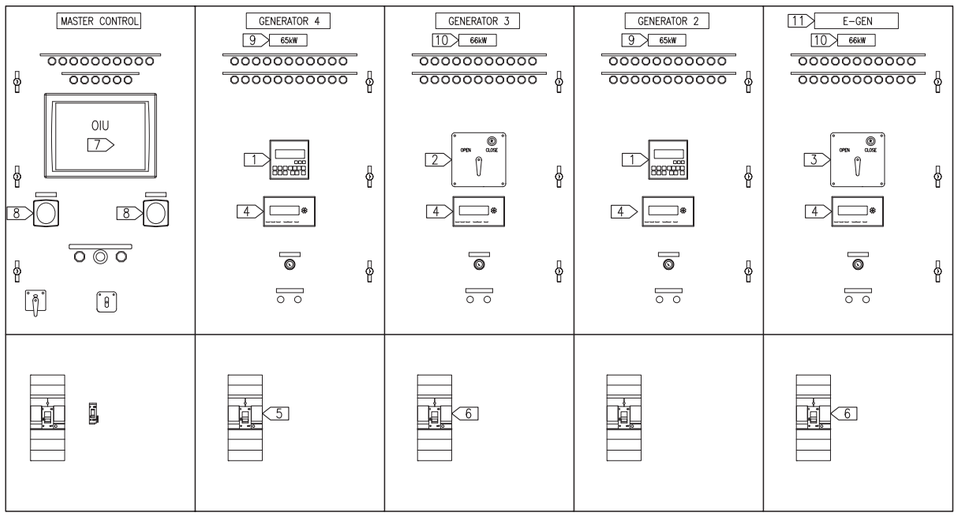
TITLE: ELECTRICAL DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

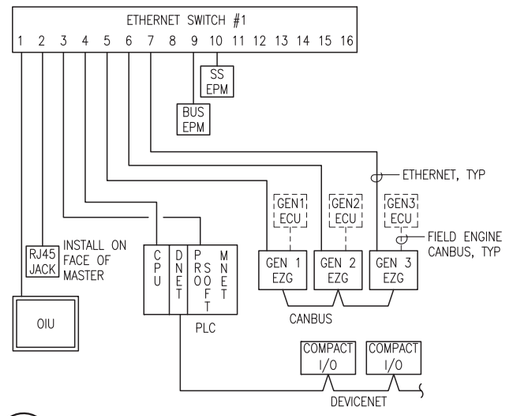
DRAWN BY: JTD | SCALE: NO SCALE
DESIGNED BY: CWV/BCG | DATE: 3/18/20
FILE NAME: TAKDERA E1-E3 | SHEET: E2 OF 3
PROJECT NUMBER:



1 E3.1 SWITCHGEAR MODIFICATION ONE–LINE DIAGRAM
NO SCALE



2 E3.1 SWITCHGEAR MODIFICATION ELEVATION
NO SCALE



3 E3.1 COMMUNICATION SCHEMATIC
NO SCALE

SWITCHGEAR MODIFICATION GENERAL NOTES:

1) ALL ITEMS TO REMAIN UNLESS SPECIFICALLY INDICATED FOR REMOVAL OR REPLACEMENT.
2) ENSURE ALL EQUIPMENT AND CIRCUITS TO BE REMOVED ARE DE–ENERGIZED PRIOR TO BEGINNING DEMOLITION. LOCK AND TAG OUT ALL AFFECTED CIRCUIT BREAKERS AND DISCONNECTS.
3) SEE SPECIFICATION FOR DETAIL ON NEW DEVICES AND EQUIPMENT.

SWITCHGEAR MODIFICATION SPECIFIC NOTES:

1. REMOVE EXISTING GCP & REPLACE WITH NEW EASYGEN.
2. REMOVE EXISTING MANUAL CONTACTOR OPEN/CLOSE SWITCH & LOCK OUT RELAY & REPLACE WITH NEW EASYGEN.
3. EXISTING MANUAL CONTACTOR OPEN/CLOSE SWITCH & LOCK OUT RELAY TO REMAIN FOR E–GEN.
4. REMOVE EXISTING PROTECTIVE TRIP RELAY & ALL ASSOCIATED WIRING & INSTALL BLANK COVER PLATE.
5. REMOVE EXISTING 90A TRIP PLUG AND INSTALL NEW 125A TRIP PLUG. EXISTING BREAKER IS A G.E. SPECTRA RMS CAT. # SGHA36AT0250. REMOVE EXISTING 75:5 CT's AND INSTALL NEW 150:5 CT's.
6. REMOVE EXISTING 75:5 CT's FROM GEN #3 SECTION. REMOVE EXISTING 150:5 CT's FROM E–GEN SECTION AND INSTALL IN GEN #3 SECTION.
7. REMOVE EXISTING PLC, OPERATOR INTERFACE UNIT, & ASSOCIATED DEVICES & REPLACE WITH NEW.
8. EXISTING BUS & STATION SERVICE METERS WERE RECENTLY REPLACED & ARE TO REMAIN.
9. REMOVE EXISTING kW RATING PLACARD & REPLACE WITH NEW "65 kW" PLACARD.
10. REMOVE EXISTING kW RATING PLACARD & REPLACE WITH NEW "66 kW" PLACARD.
11. REMOVE EXISTING "GENERATOR #1" PLACARD & REPLACE WITH NEW "E–GEN" PLACARD.

ISSUED FOR CONSTRUCTION
FEB 2020

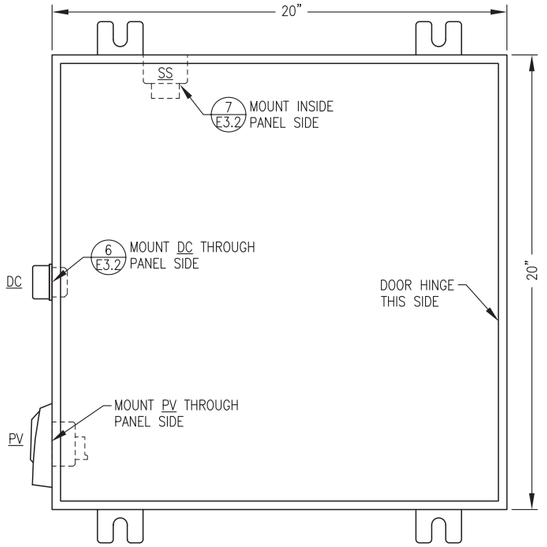
STATE OF ALASKA 49TH
CLOIS W. VERSYP
EE 7802
REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17–18 DERA PROJECT
TAKOTNA POWER PLANT UPGRADE

TITLE: SWITCHGEAR MODIFICATIONS

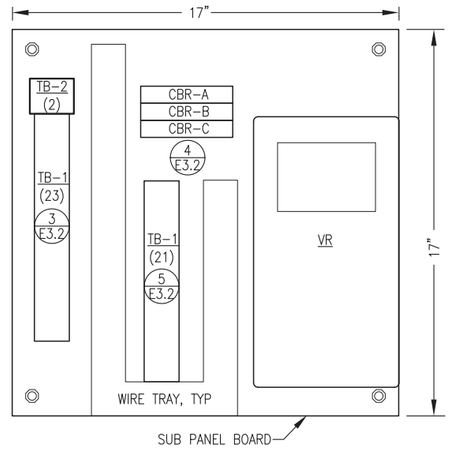
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD
DESIGNED BY: CWV/BCG
FILE NAME: TAKDERA E1–E3
PROJECT NUMBER:
SCALE: NO SCALE
DATE: 3/18/20
SHEET: E3.1 OF 3



1 E4 JUNCTION BOX FRONT PANEL LAYOUT

NO SCALE



2 E4 JUNCTION BOX SUB PANEL LAYOUT

NO SCALE

BILL OF MATERIALS			
TAG	MANUFACTURER	MODEL	DESCRIPTION
ENCL.	HOFFMAN	A20H20ALP	20x20x8" NEMA 12
	HOFFMAN	A20P20	BACK PANEL
VR	BASLER	DECS-150 5NS1V1N1S	DIGITAL VOLTAGE REGULATOR
CBR	ALLEN-BRADLEY	1489-M1-C010	RAIL MOUNT CIRCUIT BREAKER, 1-POLE, 1A
DC	JOHN DEERE	57M7919	DIAGNOSTIC CONNECTOR, 9-PIN, CAN-BUS
	DEUTSCH	HD18-009	CONNECTOR STRAIN RELIEF
	DEUTSCH	HDC16-9	CONNECTOR PROTECTIVE DUST CAP
	DEUTSCH	HD10-9-GKT	CONNECTOR GASKET
	DEUTSCH	JDL062397	CONNECTOR LANYARD
PV	MURPHY	PV101-C-MSTD	POWER VIEW W/HARNESS
SS	CATERPILLAR	9X-8124	STARTER AUXILIARY SOLENOID, 24V
TB-1	IDEC	BNH15LW	15A DIN RAIL-MOUNT TERMINAL BLOCK
TB-2	IDEC	BNH50W	50A DIN RAIL-MOUNT TERMINAL BLOCK

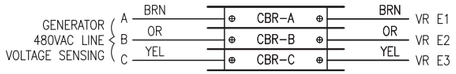
NOTE: SPECIFIC PARTS MANUFACTURER AND MODEL SELECTED NOT ONLY TO MEET PERFORMANCE FUNCTION BUT ALSO TO COORDINATE AND INTERFACE WITH OTHER DEVICES AND SYSTEMS. APPROVED EQUAL SUBSTITUTIONS WILL BE ALLOWED ONLY BY ENGINEER'S APPROVAL. TO OBTAIN APPROVAL, SUBMITTALS MUST CLEARLY DEMONSTRATE HOW SUBSTITUTE ITEM MEETS OR EXCEEDS SPECIFIED ITEM QUALITY AND PERFORMANCE CHARACTERISTICS AND ALSO COMPLIES WITH MECHANICAL AND/OR ELECTRICAL CONNECTIONS AND PHYSICAL LAYOUT REQUIREMENTS.

SHOP FABRICATION NOTES:

1) PROVIDE ASSEMBLY WITH ALL DEVICES AND WIRING INDICATED.
2) INSTALL IN A NEMA 12 ENCLOSURE WITH MOUNTING FLANGES AT BACK, A MIN 14 GAUGE INTERIOR BACK PANEL AND HINGED LOCKABLE DOOR. SIZE AS INDICATED.
3) PROVIDE DIN RAIL, TERMINAL END PLATES, TERMINAL END STOPS, TERMINAL DUST COVERS AND OTHER MISCELLANEOUS HARDWARE AS REQUIRED TO MATCH TERMINALS. LABEL ALL TERMINALS EXACTLY AS INDICATED ON THE DETAILS.
4) ALL WIRE #14AWG EXCEPT WHERE SPECIFICALLY INDICATED OTHERWISE. LABEL BOTH ENDS OF ALL JUMPERS WITH THE ENGINE PANEL TERMINAL NUMBER.
5) PROVIDE MECHANICAL GROUND LUGS FASTENED TO BACK PANEL AND GROUNDED TO ENGINE-GENERATOR. GROUND ALL SHIELD DRAIN WIRES TO LUGS AT PANEL END ONLY.
6) PROVIDE WIRING HARNESSES FOR CONNECTION TO GENERATOR AND TO ENGINE. INSTALL WIRES IN LIQUID TIGHT FLEX OR FLEXIBLE PLASTIC WIRE LOOM AND PROVIDE SERVICE LOOPS IN ACCORDANCE WITH SPECIFICATIONS.
7) SHOP TEST EACH NEW ENGINE-GENERATOR WITH ASSOCIATED JUNCTION BOX PERMANENTLY CONNECTED. UPON COMPLETION OF TESTING, COIL WIRING HARNESSES AND SECURE JUNCTION BOX TO GENERATOR FOR SHIPPING.

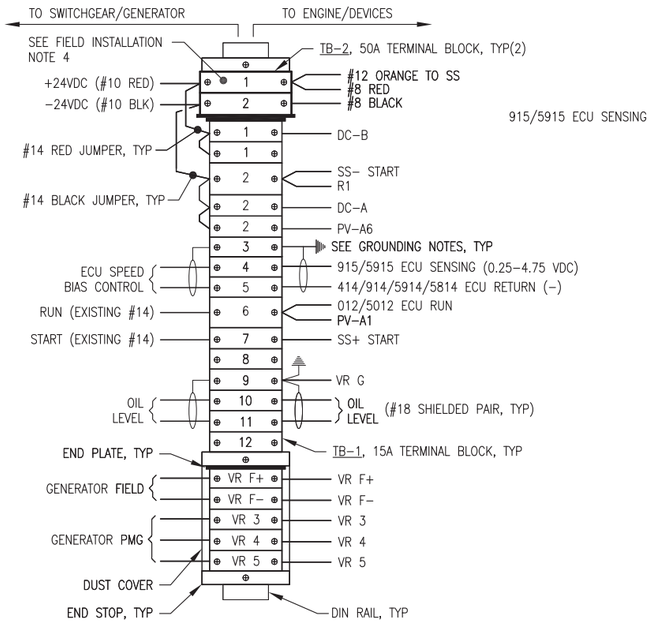
FIELD INSTALLATION NOTES:

1) PERFORM ALL FIELD WIRING IN ACCORDANCE WITH SPECIFICATIONS.
2) GEN #2 & #4 J-BOXES SHOP CONNECTED TO GENSET AS INDICATED. GEN #3 J-BOX TO BE FIELD CONNECTED TO EXISTING GENSET & NEW INSTRUMENTATION DEVICES.
3) ON SHIELDED CONDUCTORS GROUND ALL SHIELD DRAIN WIRES TO LUGS AT PANEL END ONLY.
4) FIELD CONDUCTORS FROM GENERATOR TO SWITCHGEAR ARE EXISTING. USE EXISTING UNUSED SHIELDED TRIAD TO SERVE AS SHIELDED PAIR IF NECESSARY. REMOVE ALL TYPE J THERMOCOUPLE WIRE AND DISCARD. FOR ALL UNUSED CONDUCTORS COIL, TAPE ENDS, & LEAVE IN PLACE.
5) RELABEL ALL TERMINALS IN SWITCHGEAR TO MATCH NEW J-BOX TERMINAL NUMBERS. LABEL BOTH ENDS OF ALL FIELD WIRING WITH THE ENGINE PANEL TERMINAL NUMBER.



4 E3.2 CIRCUIT BREAKER CONNECTIONS

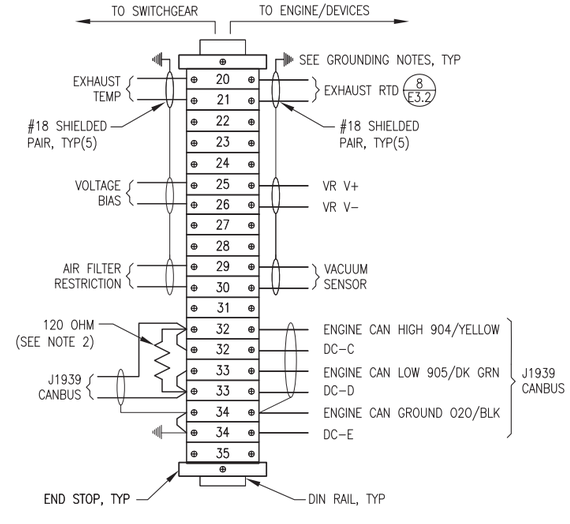
NO SCALE



NOTE: TYPICAL JOHN DEERE ECU CONNECTION NUMBERS SHOWN. SEE WIRING HARNESS FOR EACH ENGINE FOR ACTUAL ECU CONNECTIONS.

3 E3.2 TERMINAL STRIP CONNECTIONS

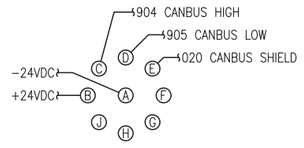
NO SCALE



NOTES: 1) ALL RESISTORS 0.25W.
2) REMOVE RESISTOR IF ENGINE WIRING HARNESS HAS 120 OHM END OF LINE RESISTOR.

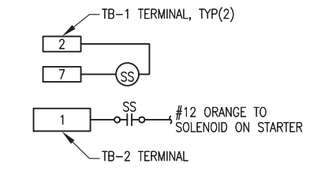
5 E3.2 TERMINAL STRIP CONNECTIONS

NO SCALE



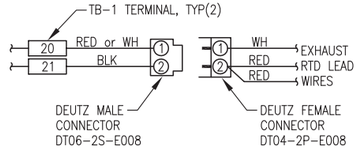
6 E3.2 DIAGNOSTIC CONNECTOR WIRING

NO SCALE



7 E3.2 STARTER AUX SOLENOID SS WIRING

NO SCALE



8 E3.2 EXHAUST RTD CONNECTOR

NO SCALE

ISSUED FOR CONSTRUCTION
FEB 2020

STATE OF ALASKA 49TH
CLOIS W. VERSYP
EE 7802
REGISTERED PROFESSIONAL ENGINEER

PROJECT: FFY17-18 DERA PROJECT
TAKOTNA POWER PLANT UPGRADE

TITLE: 24V ENGINE WIRING JUNCTION BOX

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

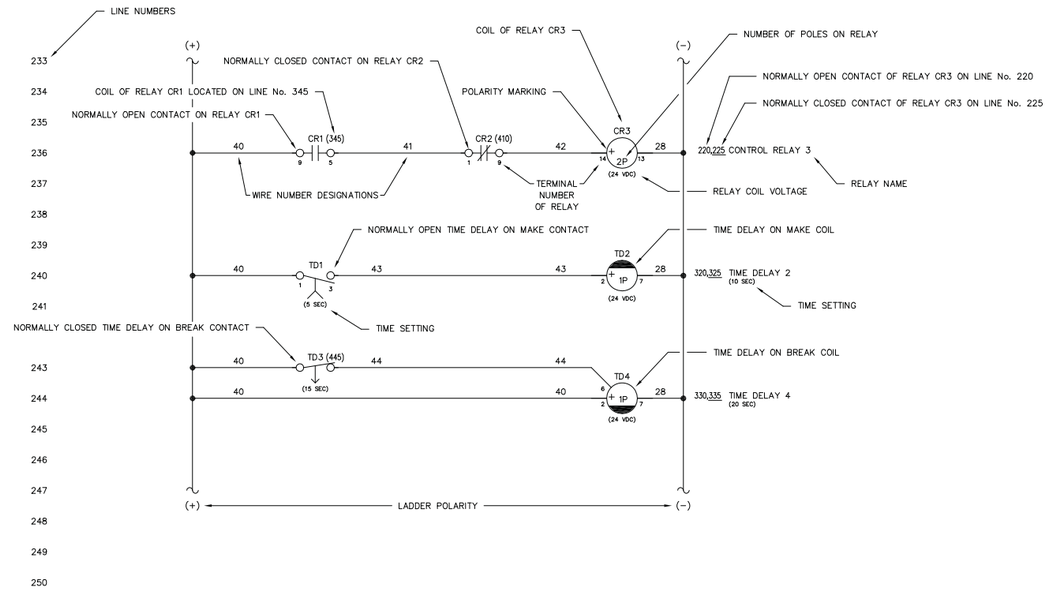
DRAWN BY: JTD | SCALE: NO SCALE
DESIGNED BY: CWV/BCG | DATE: 3/18/20
FILE NAME: TAKDERA E1-E3 | SHEET: E3.2 OF 3
PROJECT NUMBER:

The Lake and Peninsula School District

CHIGNIK LAKE
THE LAKE AND PENINSULA SCHOOL DISTRICT PURCHASE ORDER No. 7086
CONTROLLED POWER, INC. JOB No. 5354

DRAWING No.	DRAWING TITLE
11230CS	COVER SHEET
11231	SCHEMATIC SYMBOL LEGEND AND NOTES
11232	GENERATOR SWITCHGEAR, OUTLINE DIAGRAM
11233	METAL WORK, ASSEMBLY DETAIL
11234	METAL WORK, ASSEMBLY DETAIL
11235	SINGLE LINE, SCHEMATIC DIAGRAM
11236–1	GENERATOR 1 AC THREE LINE, SCHEMATIC DIAGRAM
11236–2	GENERATOR 2 AC THREE LINE, SCHEMATIC DIAGRAM
11236–3	GENERATOR 3 AC THREE LINE, SCHEMATIC DIAGRAM
11236–4	GENERATOR 4 AC THREE LINE, SCHEMATIC DIAGRAM
11237	MASTER AC THREE LINE, SCHEMATIC DIAGRAM
11238–1	GENERATOR 1 DC CONTROL, SCHEMATIC DIAGRAM
11238–2	GENERATOR 2 DC CONTROL, SCHEMATIC DIAGRAM
11238–3	GENERATOR 3 DC CONTROL, SCHEMATIC DIAGRAM
11238–4	GENERATOR 4 DC CONTROL, SCHEMATIC DIAGRAM
11239–1	GENERATOR 1 PLC INPUTS & OUTPUTS, SCHEMATIC DIAGRAM
11239–2	GENERATOR 2 PLC INPUTS & OUTPUTS, SCHEMATIC DIAGRAM
11239–3	GENERATOR 3 PLC INPUTS & OUTPUTS, SCHEMATIC DIAGRAM
11239–4	GENERATOR 4 PLC INPUTS & OUTPUTS, SCHEMATIC DIAGRAM
11240	MASTER DC CONTROL, PLC INPUTS, SCHEMATIC DIAGRAM
11241	MASTER PLC INPUTS & OUTPUTS, BACKUP PLC, SCHEMATIC DIAGRAM
11242	HEATER & LIGHTING CONTROL, SCHEMATIC DIAGRAM
11243	FUEL FLOW SYSTEM, SCHEMATIC DIAGRAM
11244	PLC COMMUNICATION, SCHEMATIC DIAGRAM
11245	EPM & FUEL MONITORING COMMUNICATION, SCHEMATIC DIAGRAM
11246	NAMEPLATE ENGRAVING SCHEDULE, FABRICATION DETAIL
11247	CONTROL SWITCH DEVELOPMENTS, FABRICATION DETAIL
11248	FIELD CONNECTION DIAGRAM

CHIGNIK LAKE SWITCHGEAR SHOP DRAWINGS, 28 SHEETS TOTAL. NOTE THAT THESE DRAWINGS SHOW THE SHOP AS BUILT FROM THE ORIGINAL INSALLATION IN 2003. THEY HAVE NOT BEEN VERIFIED FOR PRESENT AS BUILT CONDITIONS.

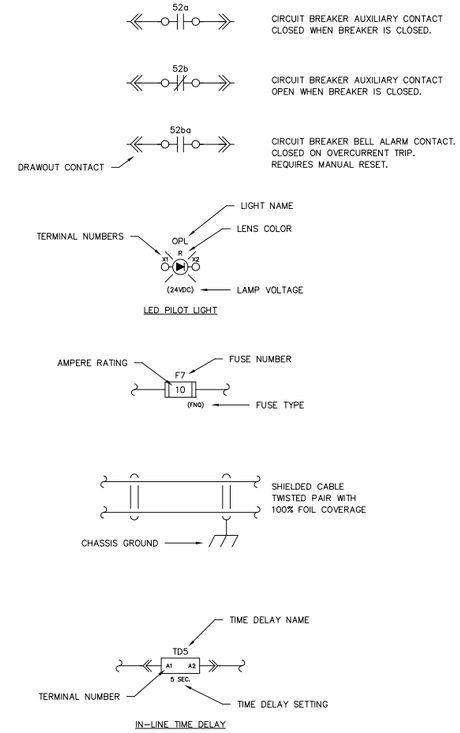


TERMINAL LEGEND

SYMBOL	DESCRIPTION
◈	INDICATES GENERATOR FIELD CONNECTION TERMINALS.
◭	INDICATES MASTER FIELD CONNECTION TERMINALS .
◎	INDICATES GENERATOR SECTION INTERCONNECT TERMINALS.
◬	INDICATES MASTER SECTION INTERCONNECT TERMINALS.

SCHEMATIC NOTES:

1. SCHEMATIC IS SHOWN AS FOLLOWS:
   - ALL AC AND DC POWER REMOVED
   - ALL RELAY CONTACTS DE-ENERGIZED
   - ALL CIRCUIT BREAKERS IN THE OPEN/RESET POSITION
   - ALL EMERGENCY STOP SWITCHES IN THE "NORMAL" POSITION
   - ALL PRESSURE SWITCHES SHOWN WITHOUT FLUID PRESENT
   - ALL LEVEL SWITCHES SHOWN WITHOUT FLUID PRESENT
   - ALL TEMPERATURE SWITCHES SHOWN AT AMBIENT
2. — — INDICATES FIELD WIRING BY OTHERS
3. ALL CONTROL WIRING TO BE No. 14 AWG, 600 VOLT, TYPE SIS EXCEPT AS NOTED. CURRENT TRANSFORMER WIRING TO BE No. 12 AWG.
4. SHIELDED WIRING TO BE No. 18 AWG, 300 VOLT, TWISTED LINE WITH 100% FOIL COVERAGE



REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: SCHEMATIC SYMBOL LEGEND AND NOTES

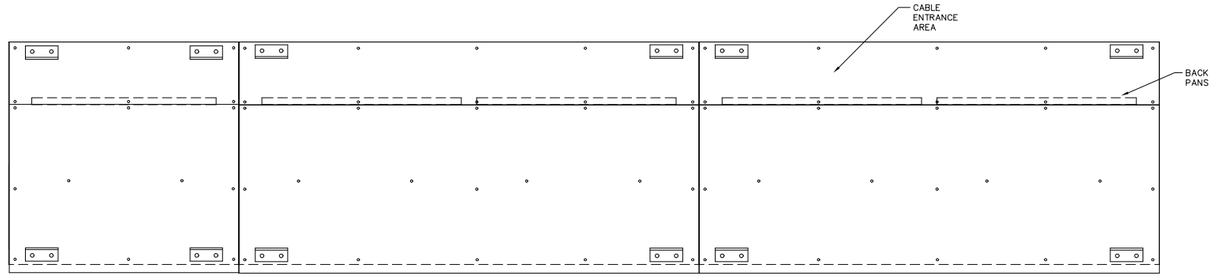
CPI DWG No. 11231

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11231	SHEET: 1 OF 1	CKD. BY: JMD

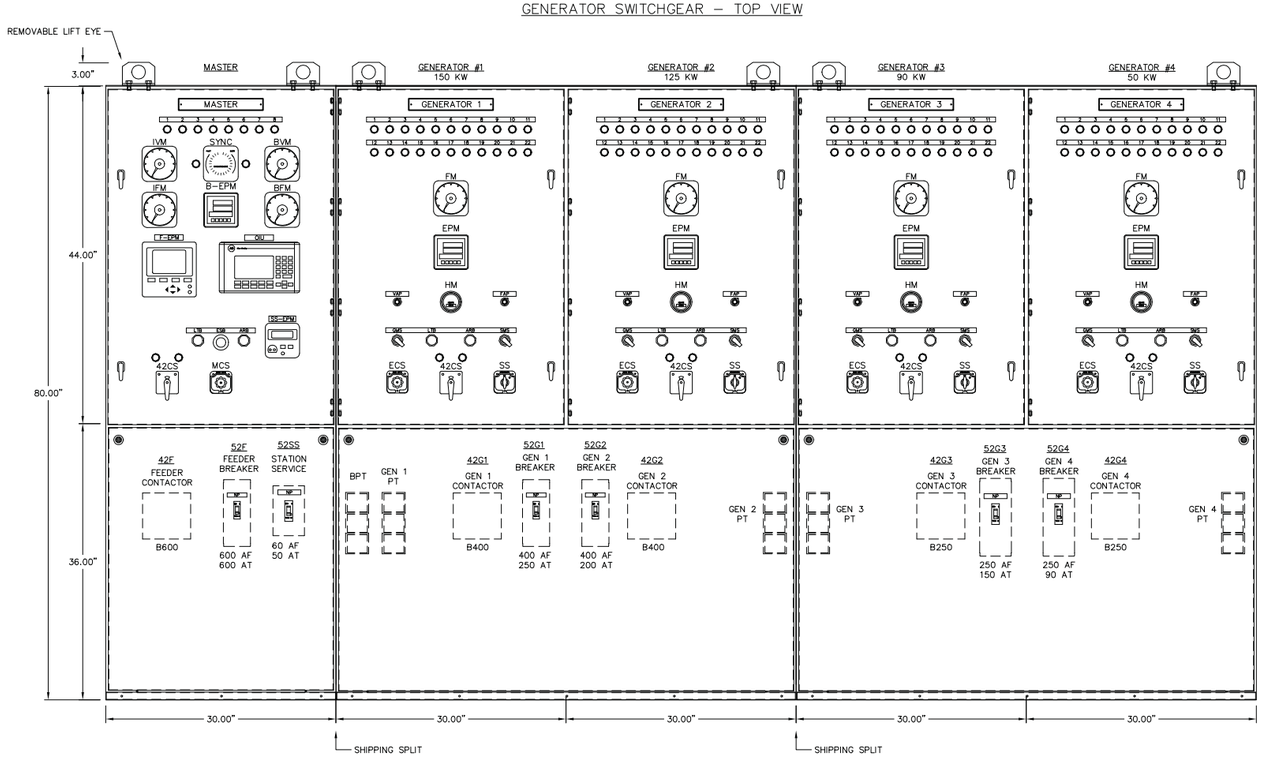
JOB: CHIGNIK LAKE

The Lake and Peninsula School District
101 Jensen Drive
P.O. Box 498
King Salmon, Alaska 99613
Phone (907) 246-4280/Fax (907) 246-4473

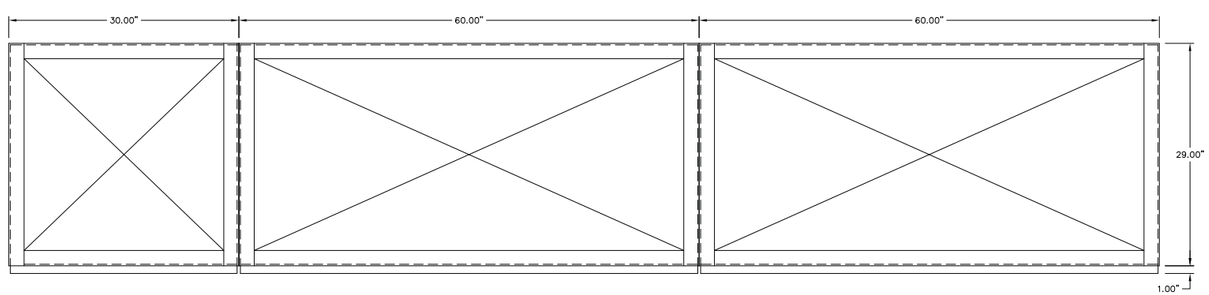
Plot date: 2003/9/17 – 8:50



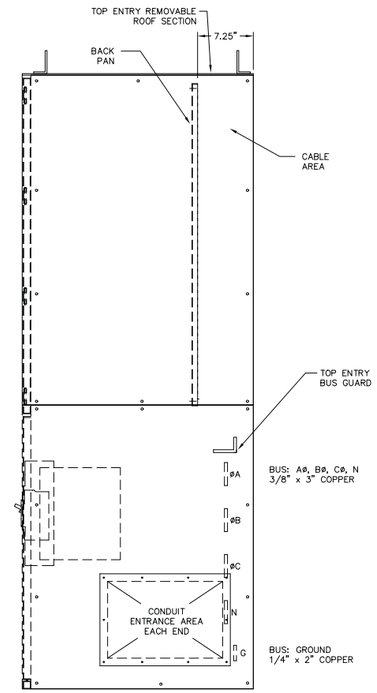
GENERATOR SWITCHGEAR – TOP VIEW



GENERATOR SWITCHGEAR – FRONT VIEW



GENERATOR SWITCHGEAR – PLAN VIEW



GENERATOR SWITCHGEAR – SIDE VIEW

MASTER ANNUNCIATOR LEGEND

1. FIRE ALARM LIGHT
2. EMERGENCY STOP LIGHT
3. SYSTEM LOW WATER LEVEL LIGHT
4. BUS UNDER/OVER VOLTAGE LIGHT
5. BUS UNDER/OVER FREQUENCY LIGHT
6. PRIMARY PLC FAILURE
7. OPERATING ON BACKUP PLC
8. BACKUP PLC FAILURE
9. CONTACTOR OPEN
10. CONTACTOR CLOSED

GENERATOR ANNUNCIATOR LEGEND:

1. ENGINE RUN
2. ENGINE IDLE
3. LOW OIL PRESSURE
4. HIGH WATER TEMPERATURE
5. OVERCRANK
6. OVERSPEED
7. ENGINE ALARM
8. COOLDOWN/LOCKOUT
9. LOW OIL LEVEL
10. BATTERY CHARGER FAILURE
11. REVERSE POWER
12. FAIL TO SYNCHRONIZE
13. NORMAL STOP
14. OVERCURRENT
15. UNDER VOLTAGE
16. OVER VOLTAGE
17. UNDER FREQUENCY
18. OVER FREQUENCY
19. NOT IN AUTO
20. GENERATOR BREAKER OPEN
21. LOSS OF EXCITATION
22. PHASE BALANCE

SYMBOL:	NOMENCLATURE DESCRIPTION:
ARB	ALARM RESET BUTTON
B-EPM	TOTALIZING POWER METER
BFM	BUS FREQUENCY METER
BVM	BUS VOLTMETER
ECS	ENGINE CONTROL SWITCH
EPM	ELECTRONIC POWER METER
ESB	EMERGENCY STOP BUTTON
F-EPM	FEEDER ELECTRONIC POWER METER
FAP	FREQUENCY ADJUST POTENTIOMETER
FM	FREQUENCY METER
GMS	GOVERNOR MODE SWITCH
HM	HOUR METER
IFM	INCOMING FREQUENCY METER
IVM	INCOMING VOLTMETER
LTB	LAMP TEST BUTTON
MCS	SYSTEM MODE SWITCH
OIU	OPERATOR INTERFACE UNIT
SMS	SYNCH MODE SWITCH
SS	SYNCHROSCOPE SWITCH
SS-EPM	STATION SERVICE ELECTRONIC POWER METER
SYNC	SYNCHROSCOPE
VAP	VOLTAGE ADJUST POTENTIOMETER
42xx	CONTACTOR
42CS	CONTACTOR CONTROL SWITCH
52xx	CIRCUIT BREAKER

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: GENERATOR SWITCHGEAR, OUTLINE DIAGRAM

CPI DWG No. 11232

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11232	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CHIGNIK LAKE		

25.4mm 0 25.4mm 50.8mm

10" 0 10" 20"

SCALE: 1"=10"

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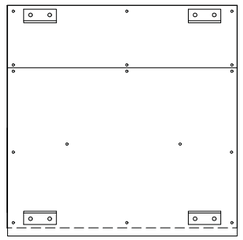
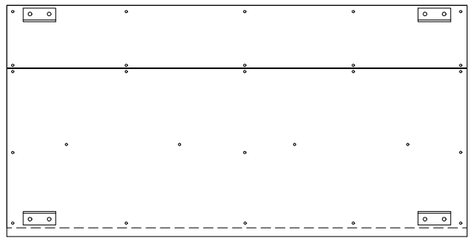
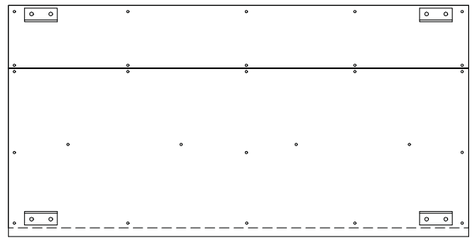


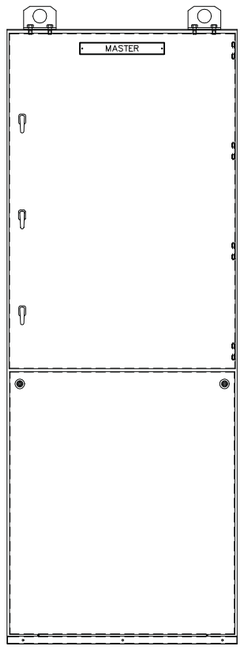
MASTER SECTION – TOP VIEW



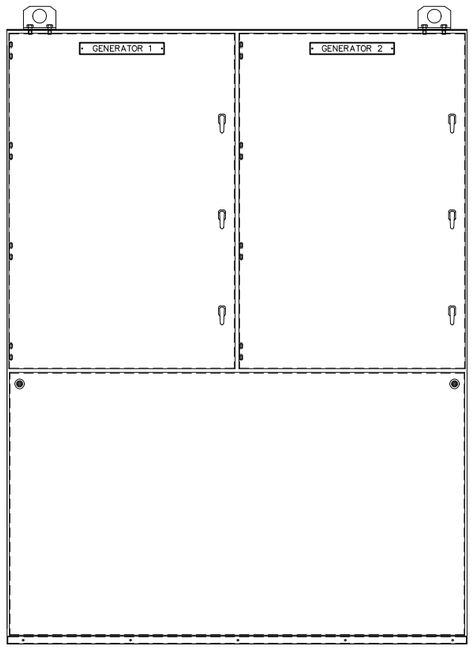
GENERATOR SECTIONS 1 & 2 – TOP VIEW



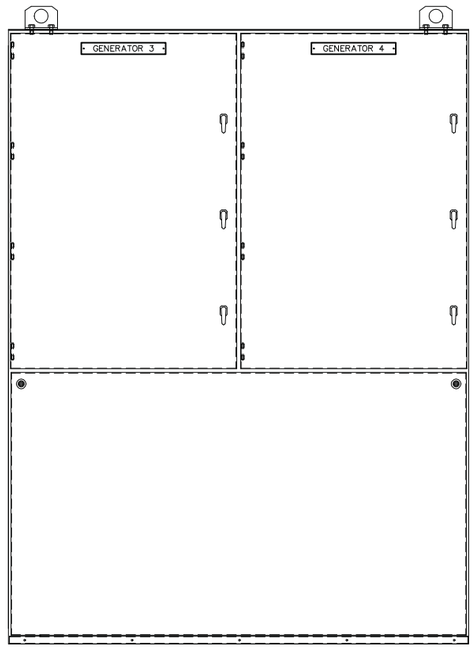
GENERATOR SECTIONS 3 & 4 – TOP VIEW



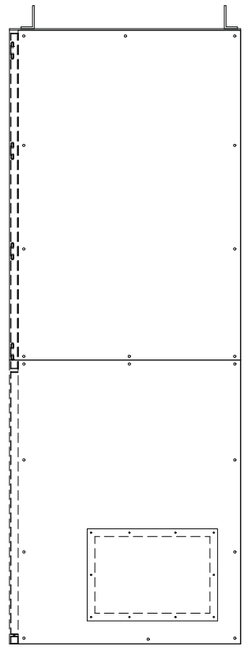
MASTER SECTION – FRONT VIEW



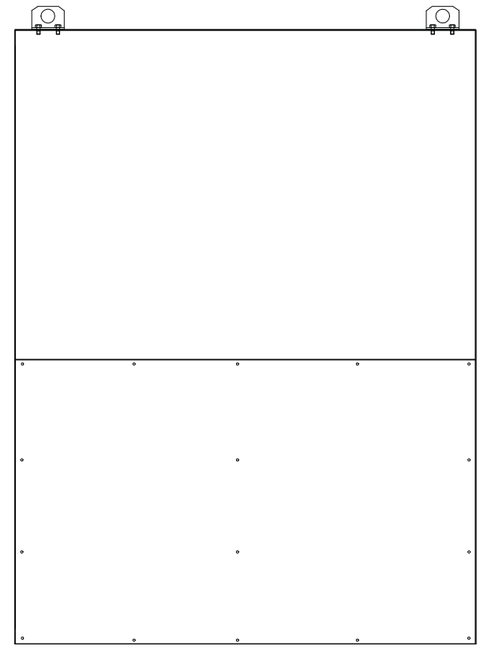
GENERATOR SECTIONS 1 & 2 – FRONT VIEW



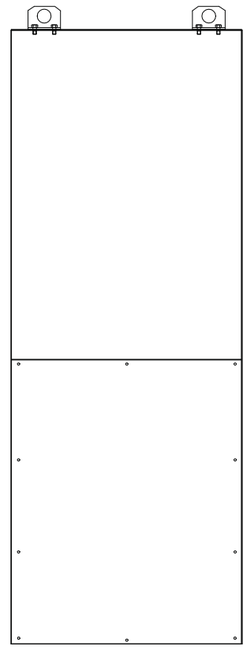
GENERATOR SECTIONS 3 & 4 – FRONT VIEW



TYPICAL SIDE VIEW



GENERATOR SECTIONS 1 & 2 – 3 & 4 – REAR VIEW



MASTER SECTION REAR VIEW

PAINT SPECIFICATION:

1. ALL PARTS TO BE CLEANED PHOSPHATE WASHED AND PRIMED TO MDFT 1–2 MILS.
2. ALL PARTS TO BE FINISHED ONE COAT ELECTROSTATIC PROCESS MDFT 2–4 MILS.
3. ALL PARTS TO BE FINISHED ONE COAT ELECTROSTATIC PROCESS MDFT 2–4 MILS ANSI 61 GRAY EXCEPT HORIZONTAL BARRIERS, PT PANS, BACK PANS & SIDE PANS TO BE PAINTED WHITE.

PROCEDURES FOR SANDBLASTED PARTS

1. BLAST PARTS TO CUSTOMER SPECIFICATION.
2. HANG AND BLOW EXCESS GRIT AND DUST FROM PART. MAY NEED TO PRE BAKE.
3. APPLY POWDER TO SPECIFIED MILL THICKNESS.
4. BAKE POWDER AT MANUFACTURERS TIME AND TEMPERATURE RATING.

PRIMED PARTS

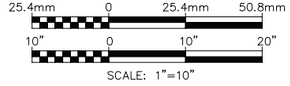
1. BLASTING AND PREPARATION SAME AS ABOVE.
2. APPLY SPECIFIED PRIMER AND CURE PER MANUFACTURERS RECOMMENDATION.
3. POWER APPLICATION AND CURING FINAL COAT SAME AS ABOVE.

PAINT PROCEDURE

1. PARTS ARE RUN THROUGH A 5 STAGE PHOSPHATE LINE THE TANKS ARE AS FOLLOWS.
2. CLEANER TANK OAKITE GARDOCLEAN 338 U.
3. RINSE TANK WATER.
4. PHOSPHATE TANK OAKITE CRYSCOAT 2147.
5. RINSE WATER TANK.
6. SEALER OAKITE CRYSCOAT ULTRA SEAL.

STRUCTURE SPECIFICATION:

1. ALL STEEL ASTM A366
2. FRAME: 2" x 2 x 3/16" STRUCTURAL HOT ROLLED ANGLE.
3. FRONT PANELS, BACK AND END SKINS, 14 GA. PICKLED IN OIL.
4. FRONT CONTROL DOORS AND ROOF SECTIONS 12 GA. PICKLED IN OIL.



SCALE: 1"=10"

REV.	DATE	DESCRIPTION	BY
B	09–05–03	SHOP AS BUILT	CMD
A	06–10–03	SUBMITTAL	CMD

PURCHASE ORDER No. 03–01 (5354) CONTROLLED POWER JOB No. 5354

TITLE: GENERATOR SWITCHGEAR, OUTLINE DIAGRAM

CPI DWG No. 11233

SCALE: 1/10	DATE: 06–10–03	DWN. BY: CMD
DWG. No: 11233	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

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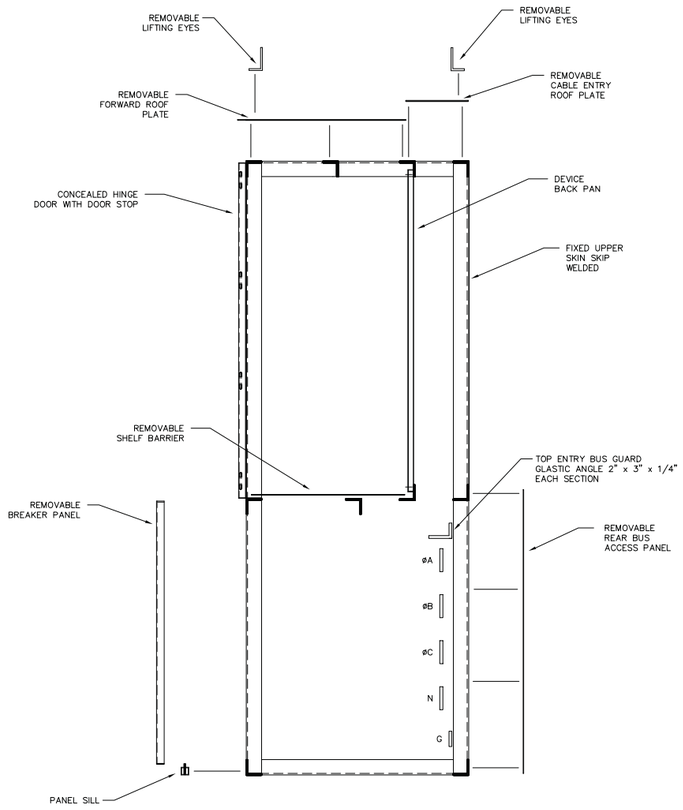
Plot date: 2003/9/17 – 8:55



INTERIOR SIDE VIEW

STRUCTURE SPECIFICATION:

1. ALL STEEL ASTM A366
2. FRAME: 2" x 2 x 3/16" STRUCTURAL HOT ROLLED ANGLE.
3. FRONT PANELS, BACK AND END SKINS, 14 GA. PICKLED IN OIL.
4. FRONT CONTROL DOORS AND ROOF SECTIONS 12 GA. PICKLED IN OIL.

PAINT SPECIFICATION:

1. ALL PARTS TO BE CLEANED PHOSPHATE WASHED AND PRIMED TO MDFT 1–2 MILS.
2. ALL PARTS TO BE FINISHED ONE COAT ELECTROSTATIC PROCESS MDFT 2–4 MILS.
3. ALL PARTS TO BE FINISHED ONE COAT ELECTROSTATIC PROCESS MDFT 2–4 MILS ANSI 61 GRAY EXCEPT HORIZONTAL BARRIERS, PT PANS, BACK PANS & SIDE PANS TO BE PAINTED WHITE.

25.4mm 0 25.4mm 50.8mm

10" 0 10" 20"

SCALE: 1"=10"

REV.	DATE	DESCRIPTION	BY
B	09–05–03	SHOP AS BUILT	CMD
A	06–10–03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: GENERATOR SWITCHGEAR, ASSEMBLY DIAGRAM

CPI DWG No. 11234

SCALE: 1/10	DATE: 06–10–03	DWN. BY: CMD
DWG. No: 11234	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CHIGNIK LAKE		

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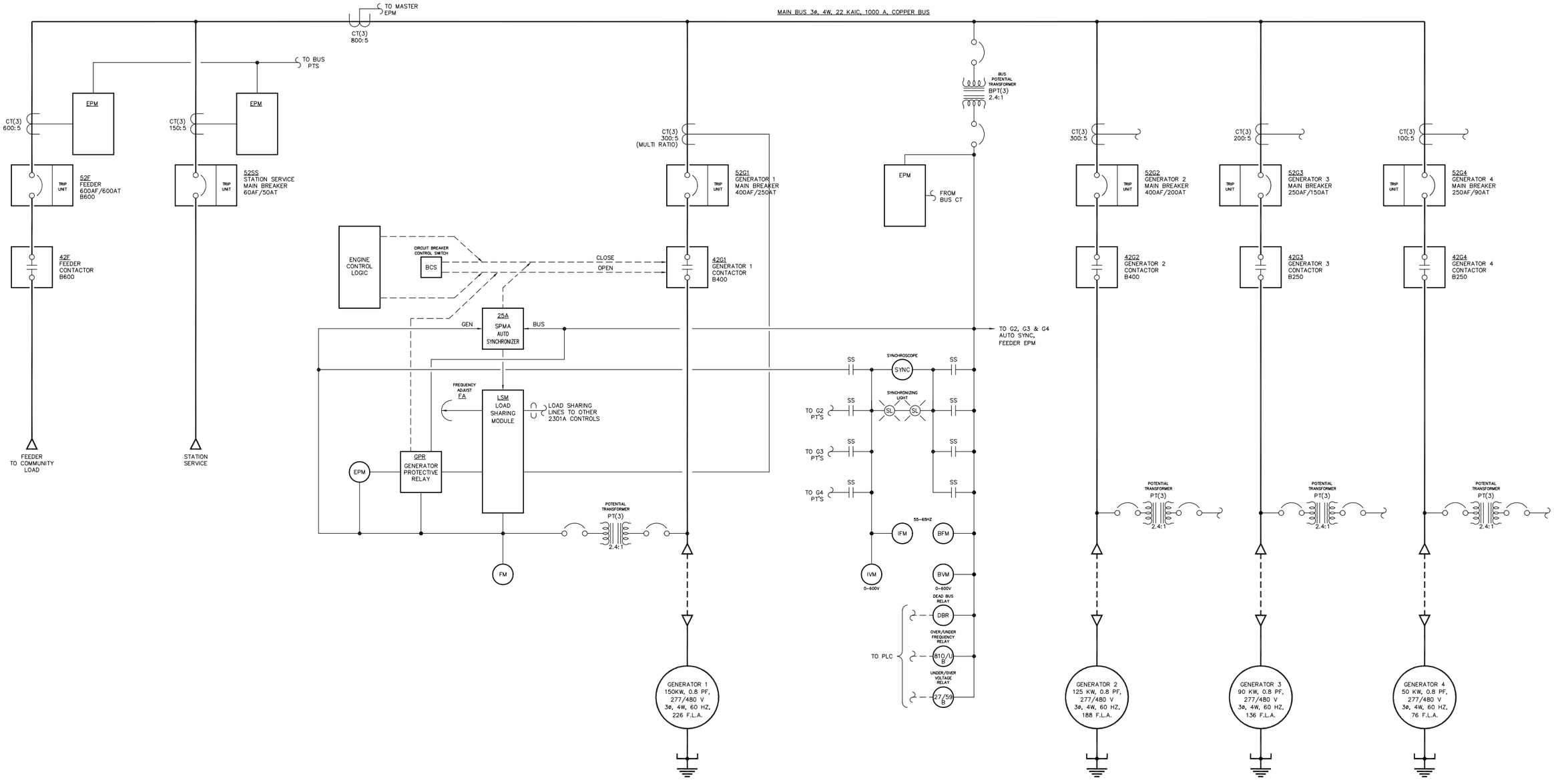

NOTES:

1. ALL BREAKERS ARE MANUALLY OPERATED NON-DRAWOUT TYPE
2. ALL BREAKERS ARE G.E. SPECTRA TYPE, LOW VOLTAGE MOLDED CASE CIRCUIT BREAKERS.
3. GENERATORS 2 , 3 & 4 SIMILAR TO GENERATOR 1

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: SINGLE LINE, SCHEMATIC DIAGRAM

CPI DWG No. 11235

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11235	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CHIGNIK LAKE		

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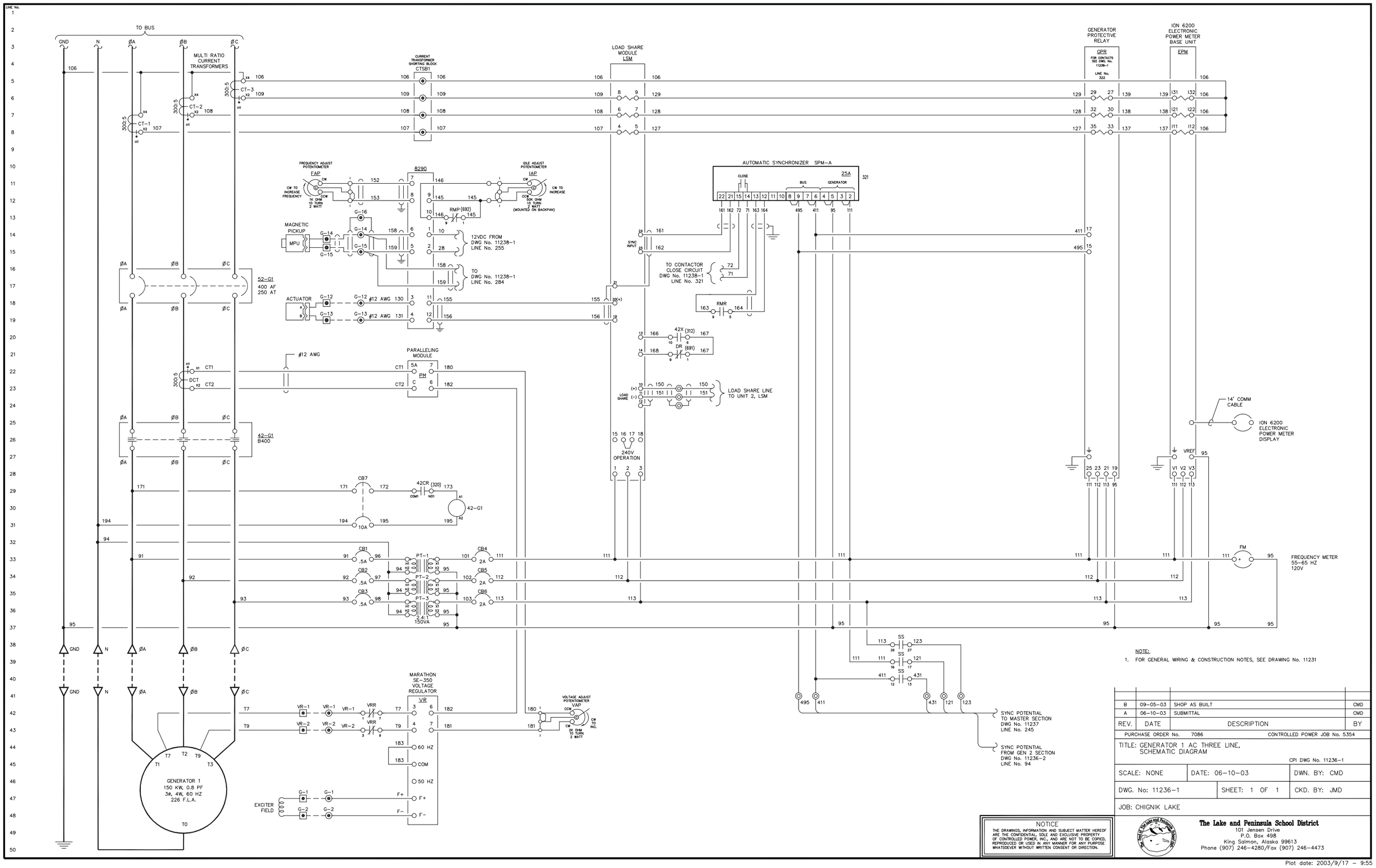

NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 — CONTROLLED POWER JOB No. 5354

TITLE: GENERATOR 1 AC THREE LINE, SCHEMATIC DIAGRAM

CPI DWG No. 11236-1

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11236-1	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

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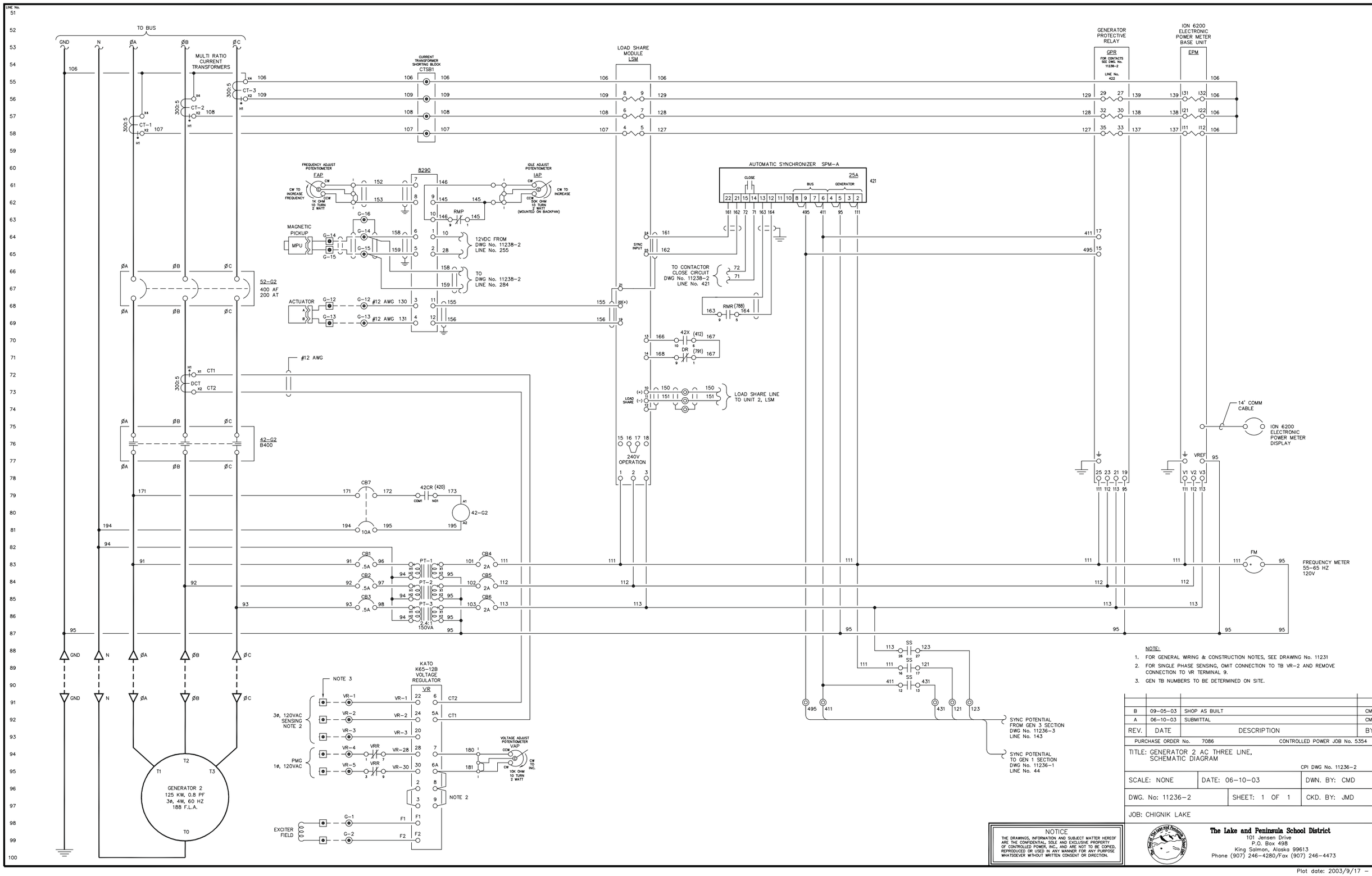
Plot date: 2003/9/17 – 9:55



NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231
2. FOR SINGLE PHASE SENSING, OMIT CONNECTION TO TB VR-2 AND REMOVE CONNECTION TO VR TERMINAL 9.
3. GEN TB NUMBERS TO BE DETERMINED ON SITE.

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: GENERATOR 2 AC THREE LINE, SCHEMATIC DIAGRAM

CPI DWG No. 11236-2

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11236-2	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

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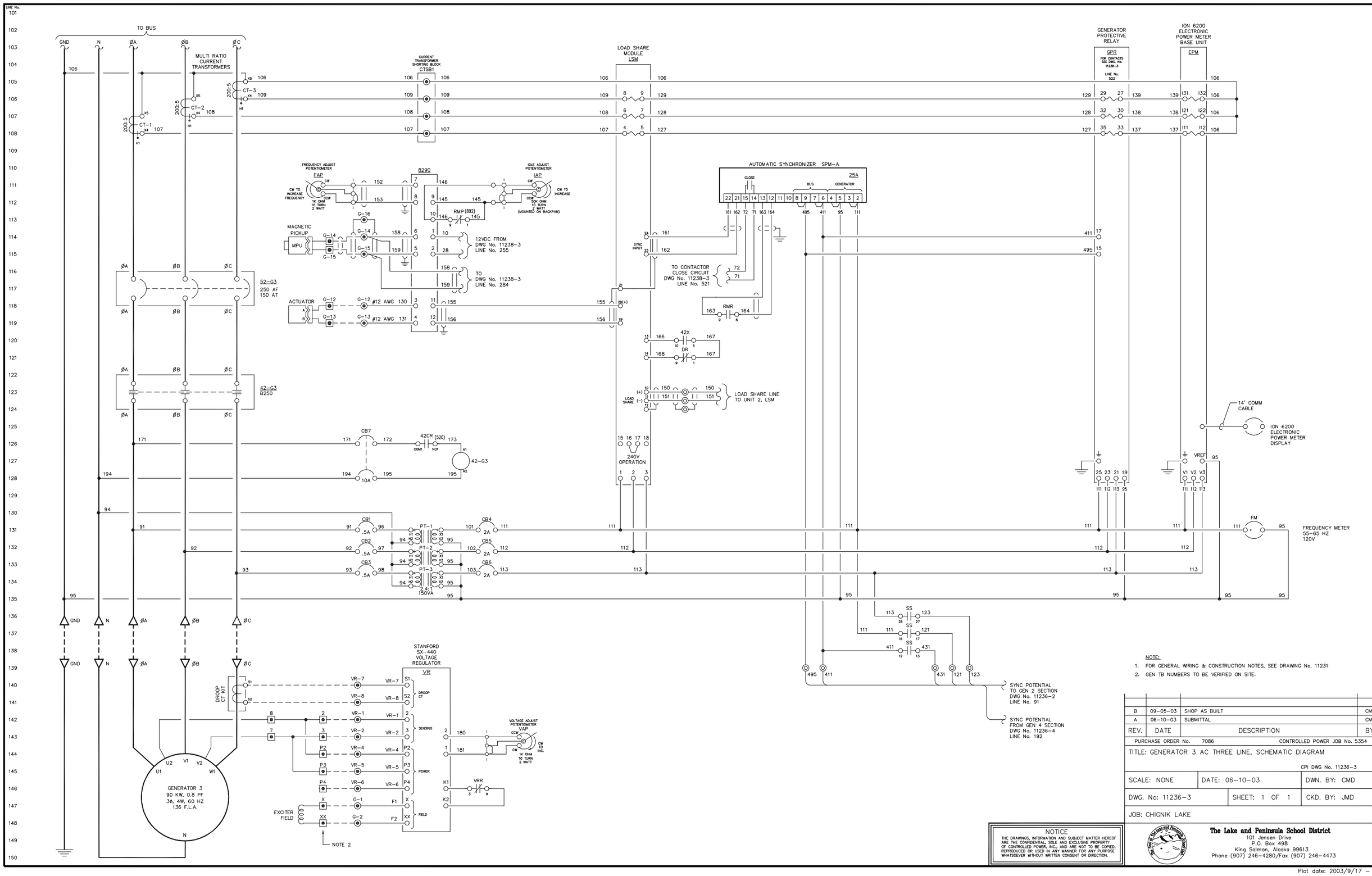
Plot date: 2003/9/17 - 9:42



NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231
2. GEN TB NUMBERS TO BE VERIFIED ON SITE.

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: GENERATOR 3 AC THREE LINE, SCHEMATIC DIAGRAM

CPI DWG No. 11236-3

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11236-3	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

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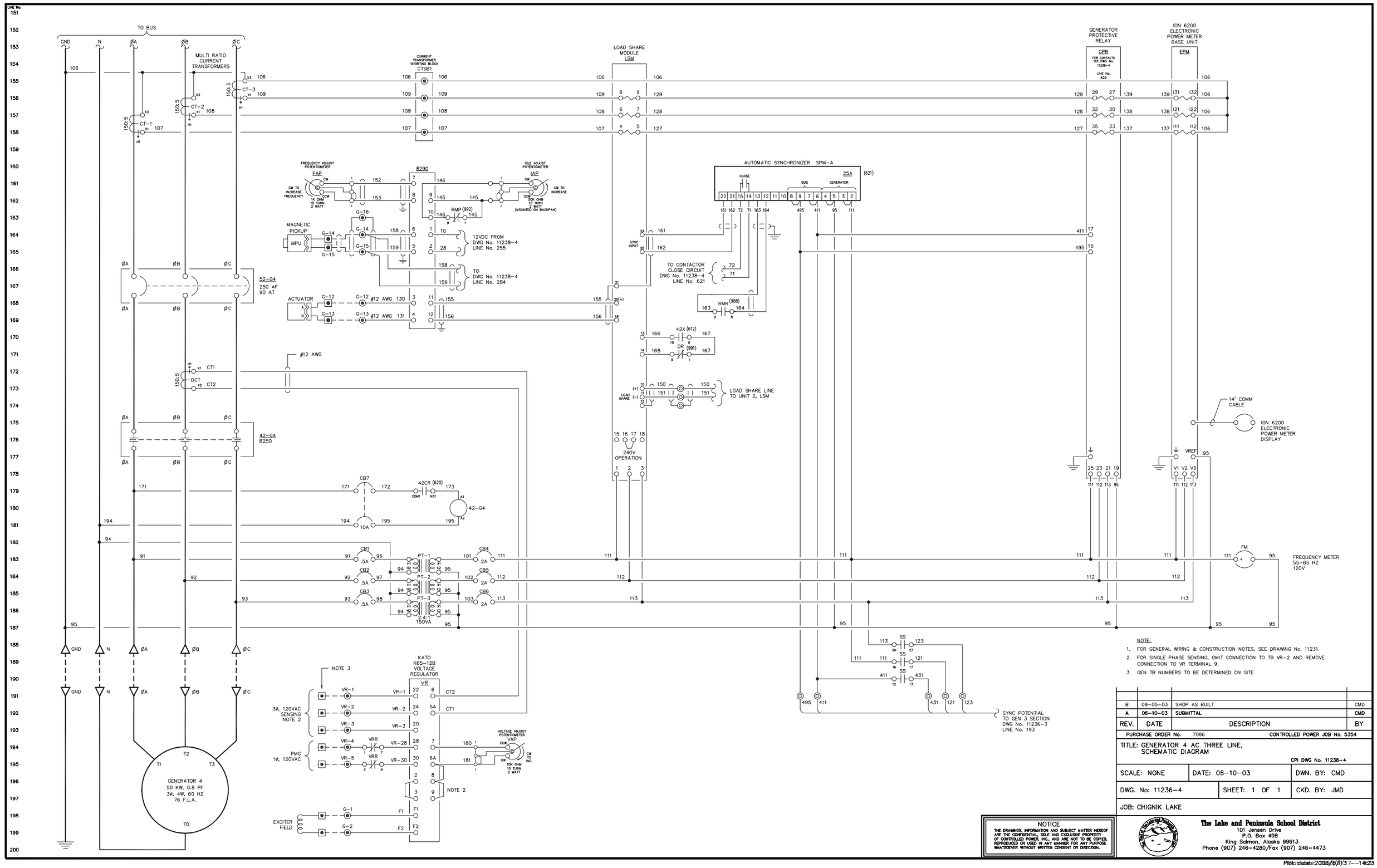
Plot date: 2003/9/17 - 9:41



NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231.
2. FOR SINGLE PHASE SENSING, OMIT CONNECTION TO TB VR-2 AND REMOVE CONNECTION TO VR TERMINAL 9.
3. GEN TB NUMBERS TO BE DETERMINED ON SITE.

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 — CONTROLLED POWER JOB No. 5354

TITLE: GENERATOR 4 AC THREE LINE, SCHEMATIC DIAGRAM

CPI DWG No. 11236-4

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11236-4	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

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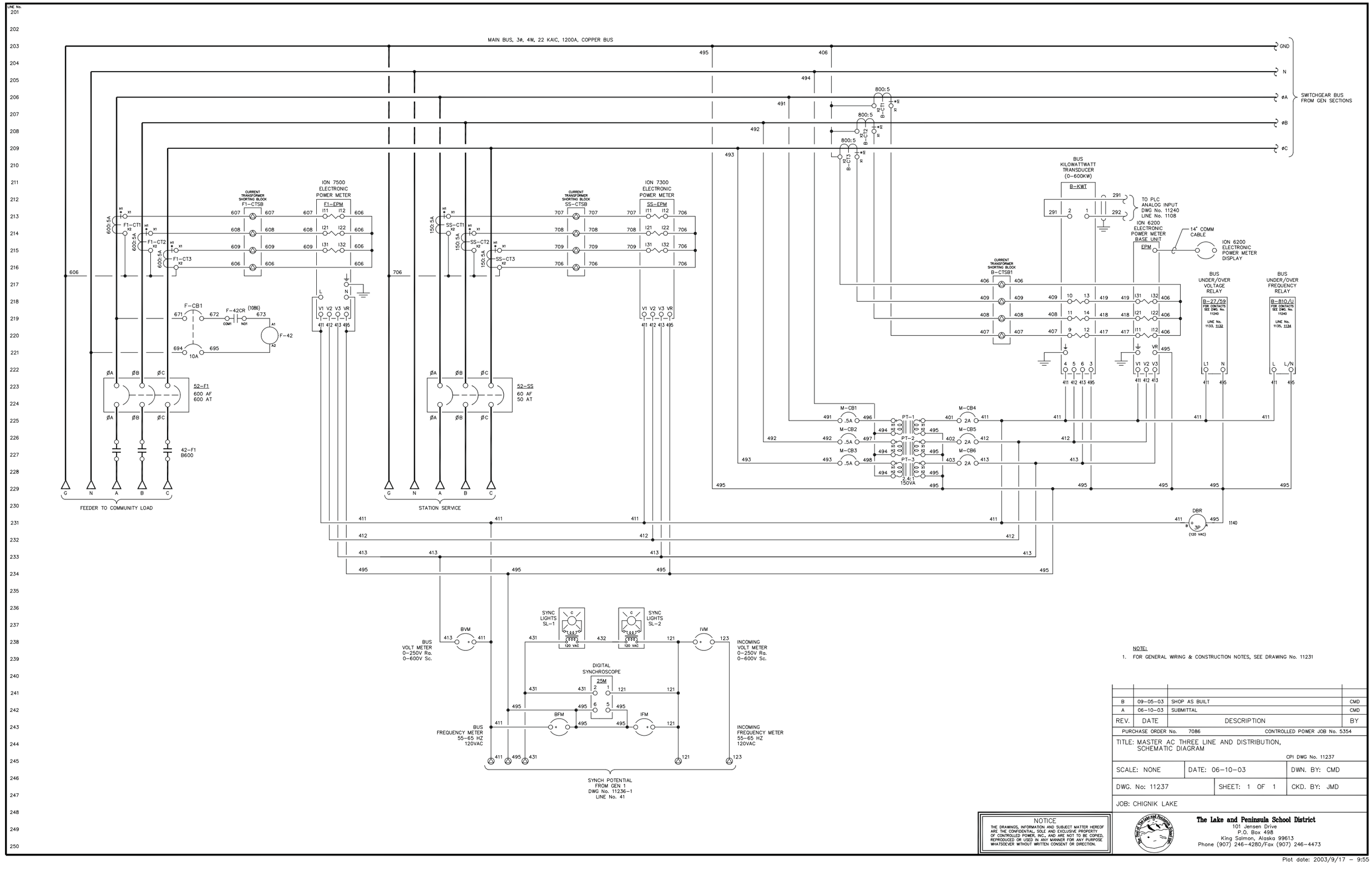

NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: MASTER AC THREE LINE AND DISTRIBUTION, SCHEMATIC DIAGRAM

CPI DWG No. 11237

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11237	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CHIGNIK LAKE		

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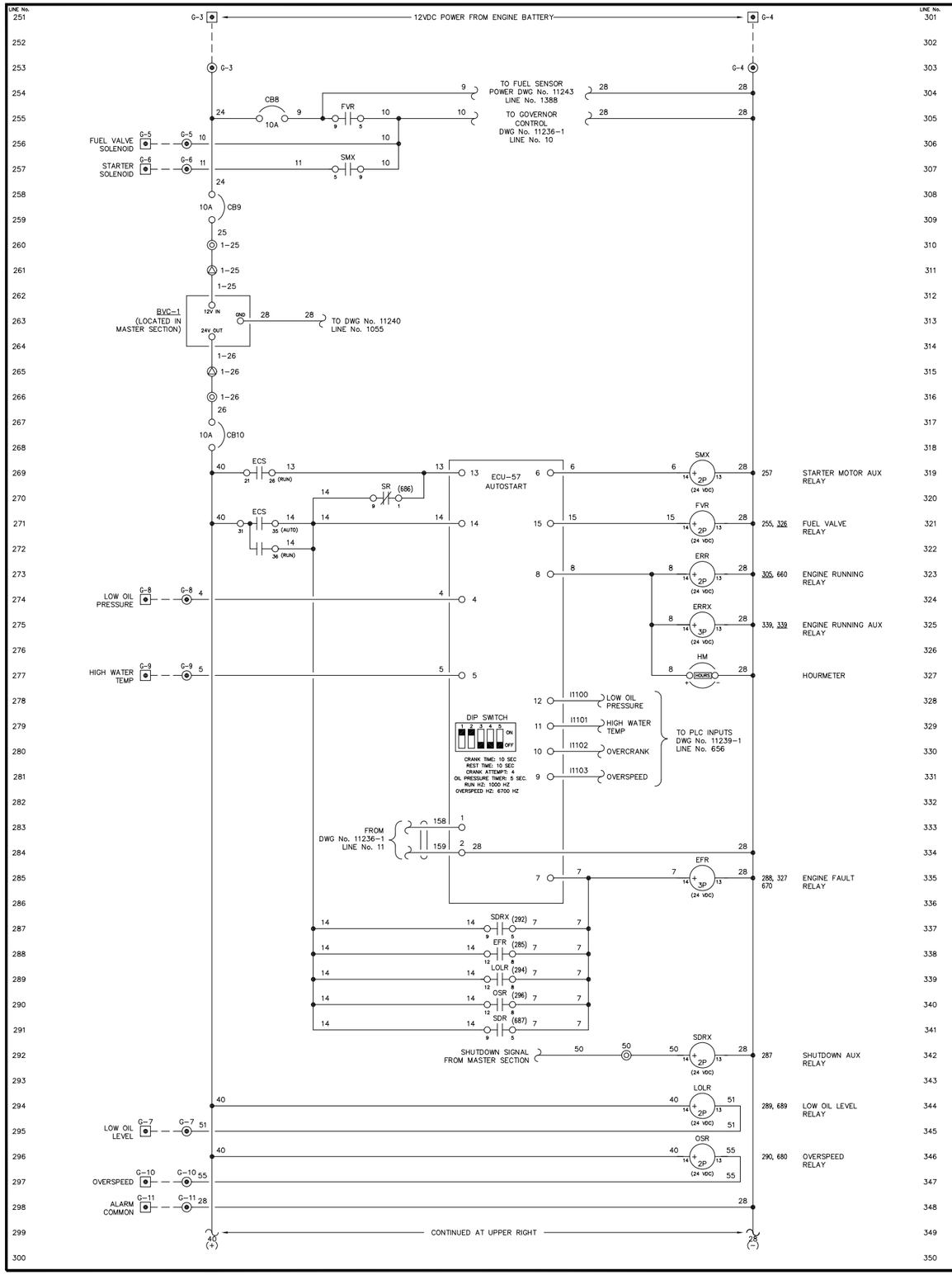
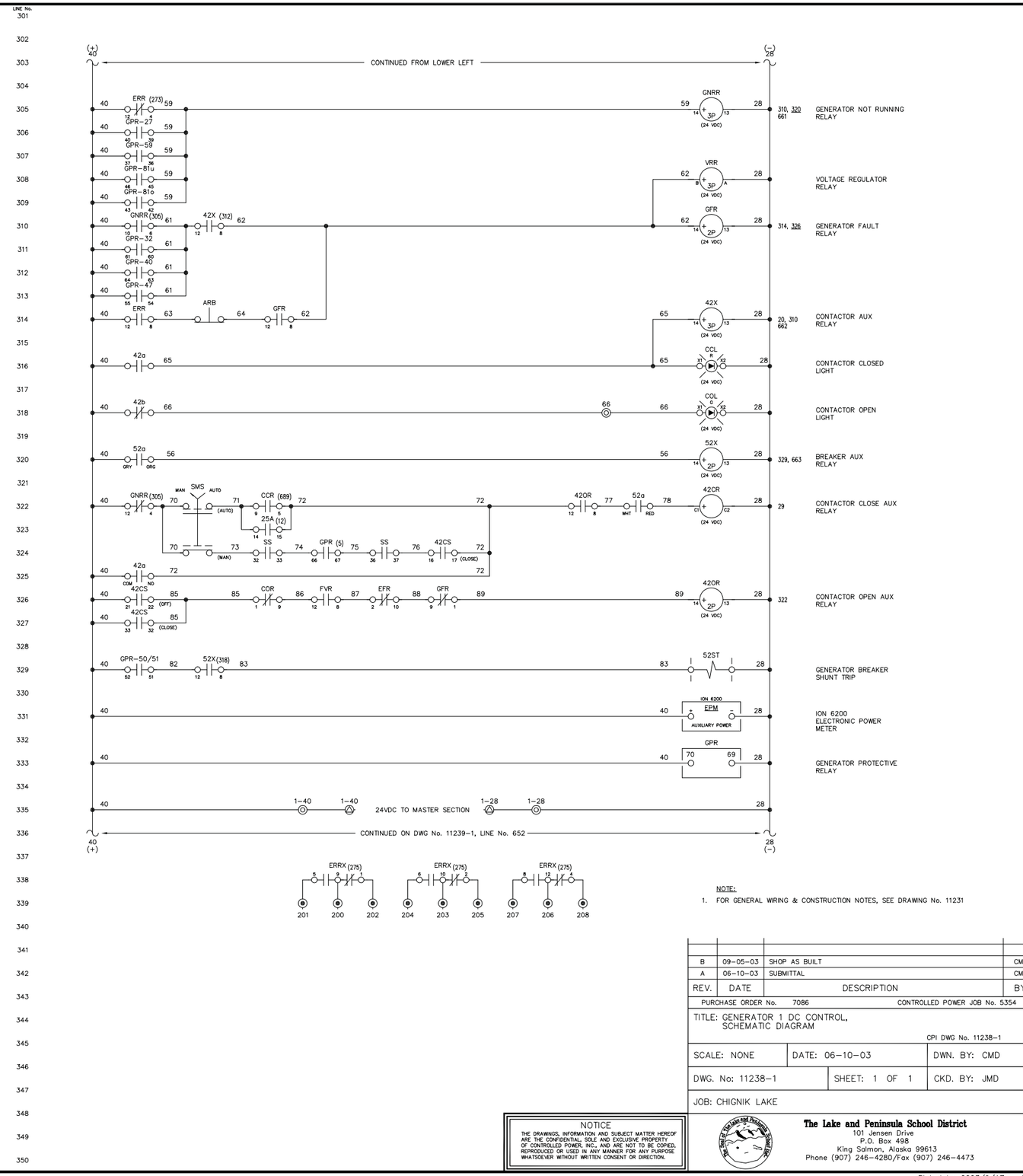
Plot date: 2003/9/17 - 9:55





NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: GENERATOR 1 DC CONTROL, SCHEMATIC DIAGRAM

CPI DWG No. 11238-1

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11238-1	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

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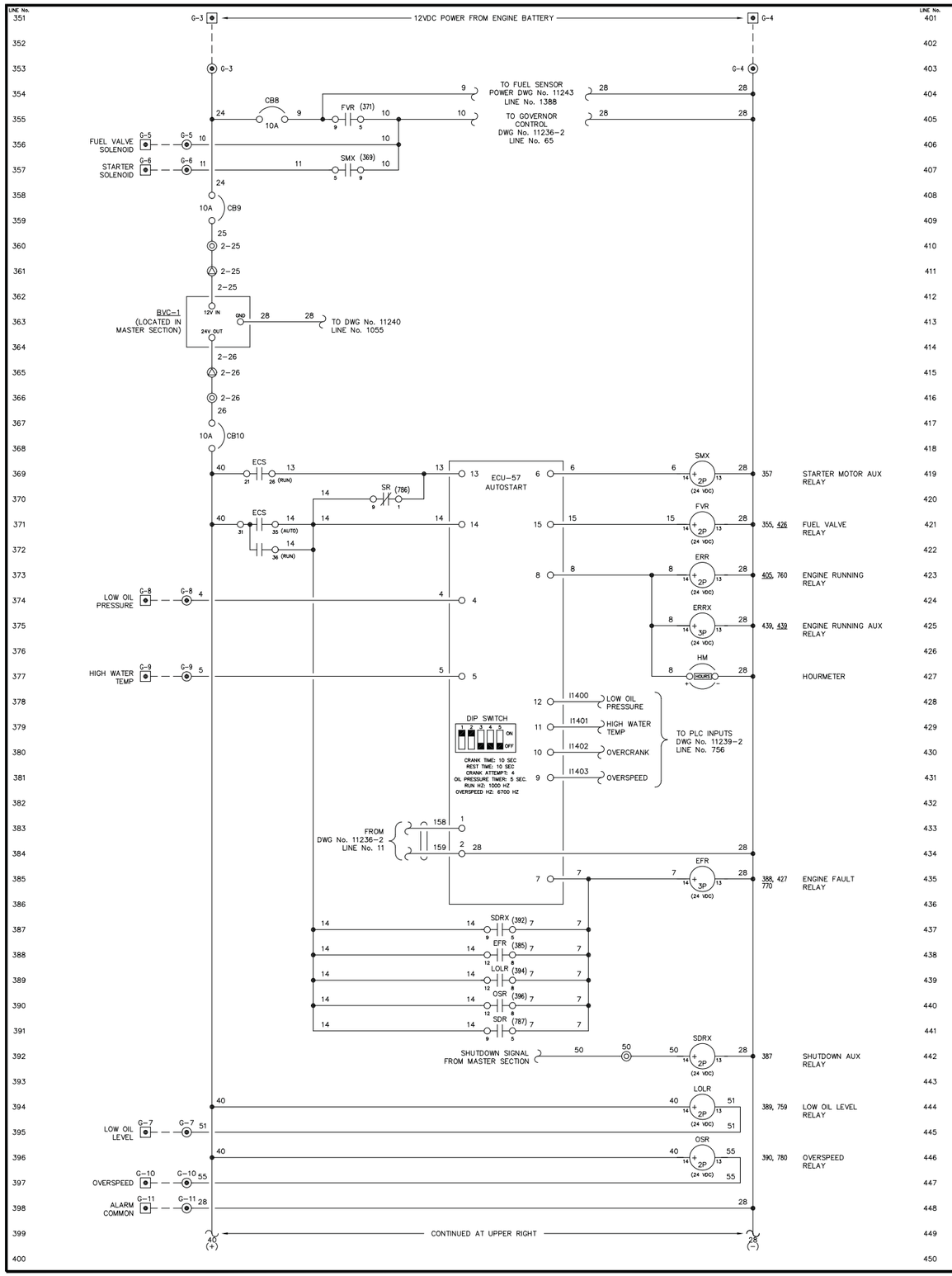
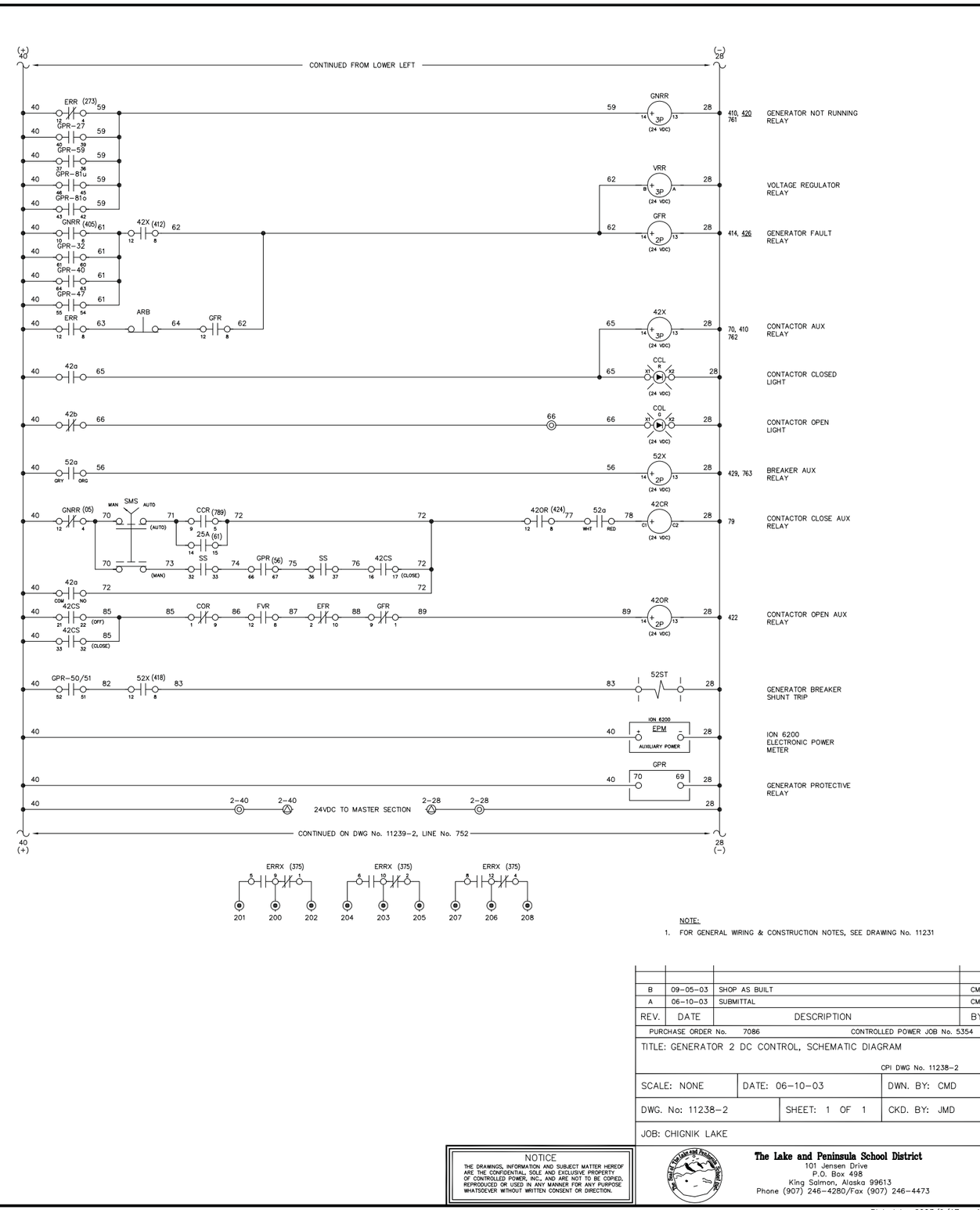
Plot date: 2003/9/17 - 10:01





NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: GENERATOR 2 DC CONTROL, SCHEMATIC DIAGRAM

CPI DWG No. 11238-2

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11238-2	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

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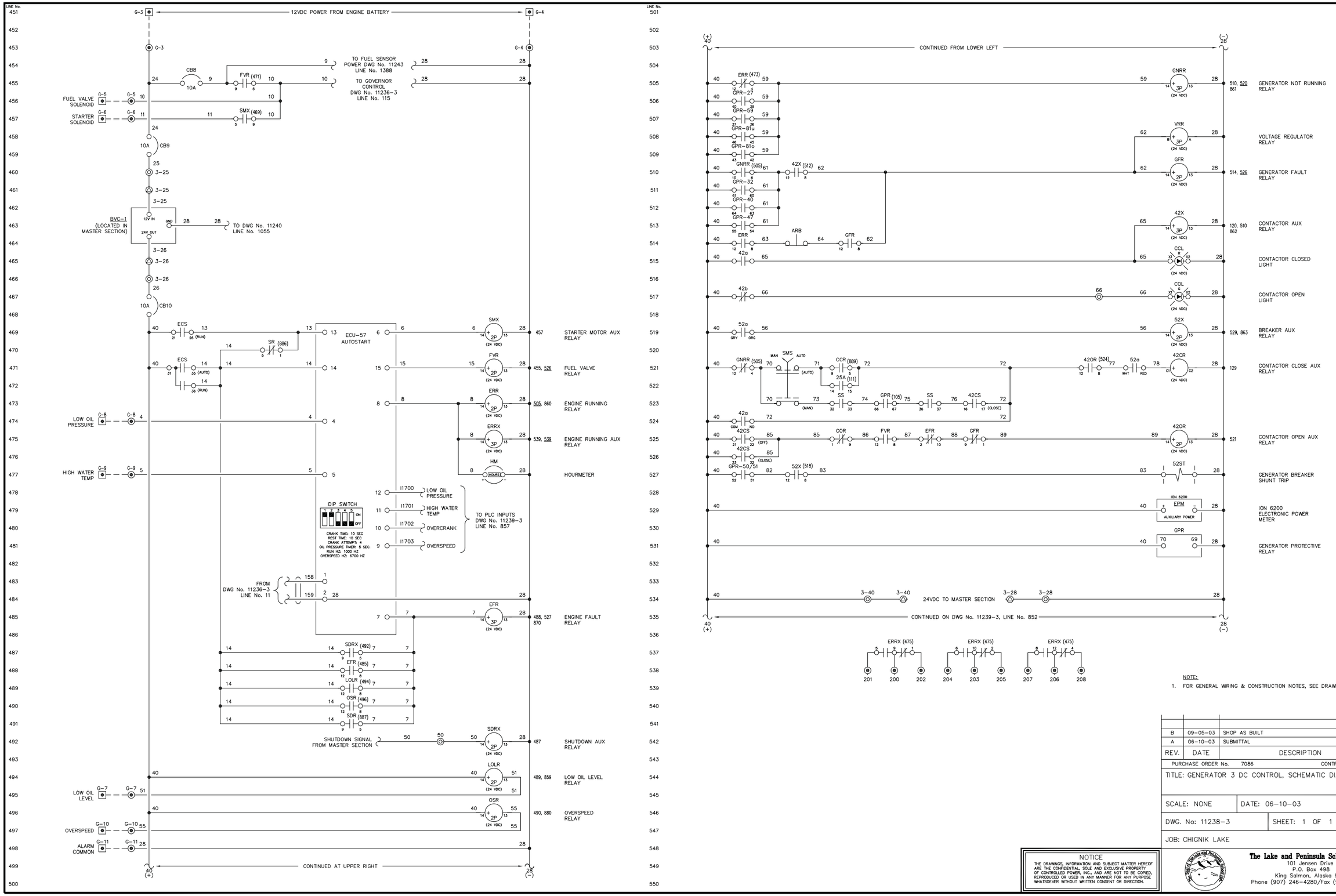
Plot date: 2003/9/17 – 10:16



NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: GENERATOR 3 DC CONTROL, SCHEMATIC DIAGRAM

CPI DWG No. 11238-3

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11238-3	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

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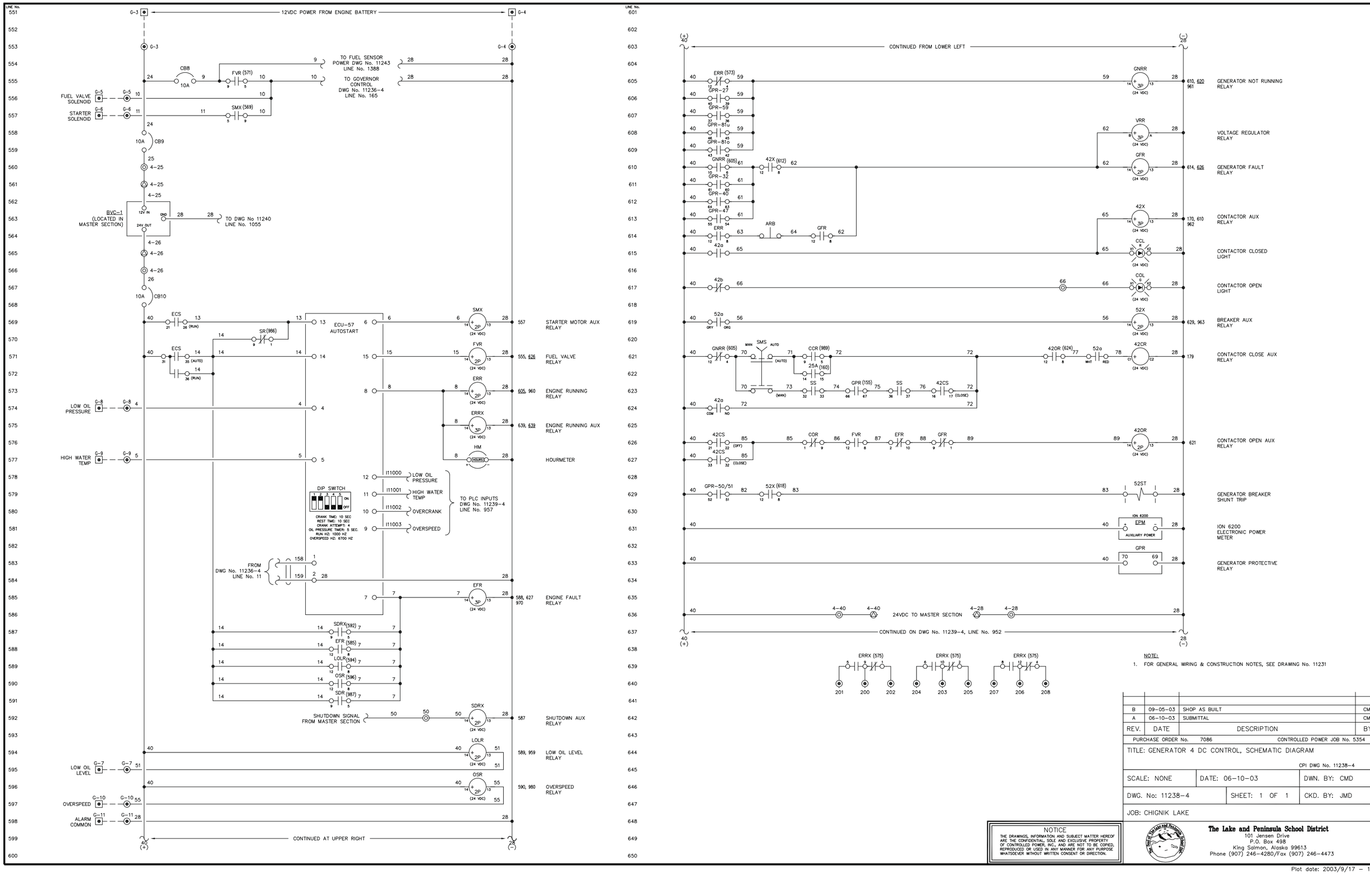
Phone (907) 246-4280/Fax (907) 246-4473

Plot date: 2003/9/17 – 10:15



NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: GENERATOR 4 DC CONTROL, SCHEMATIC DIAGRAM

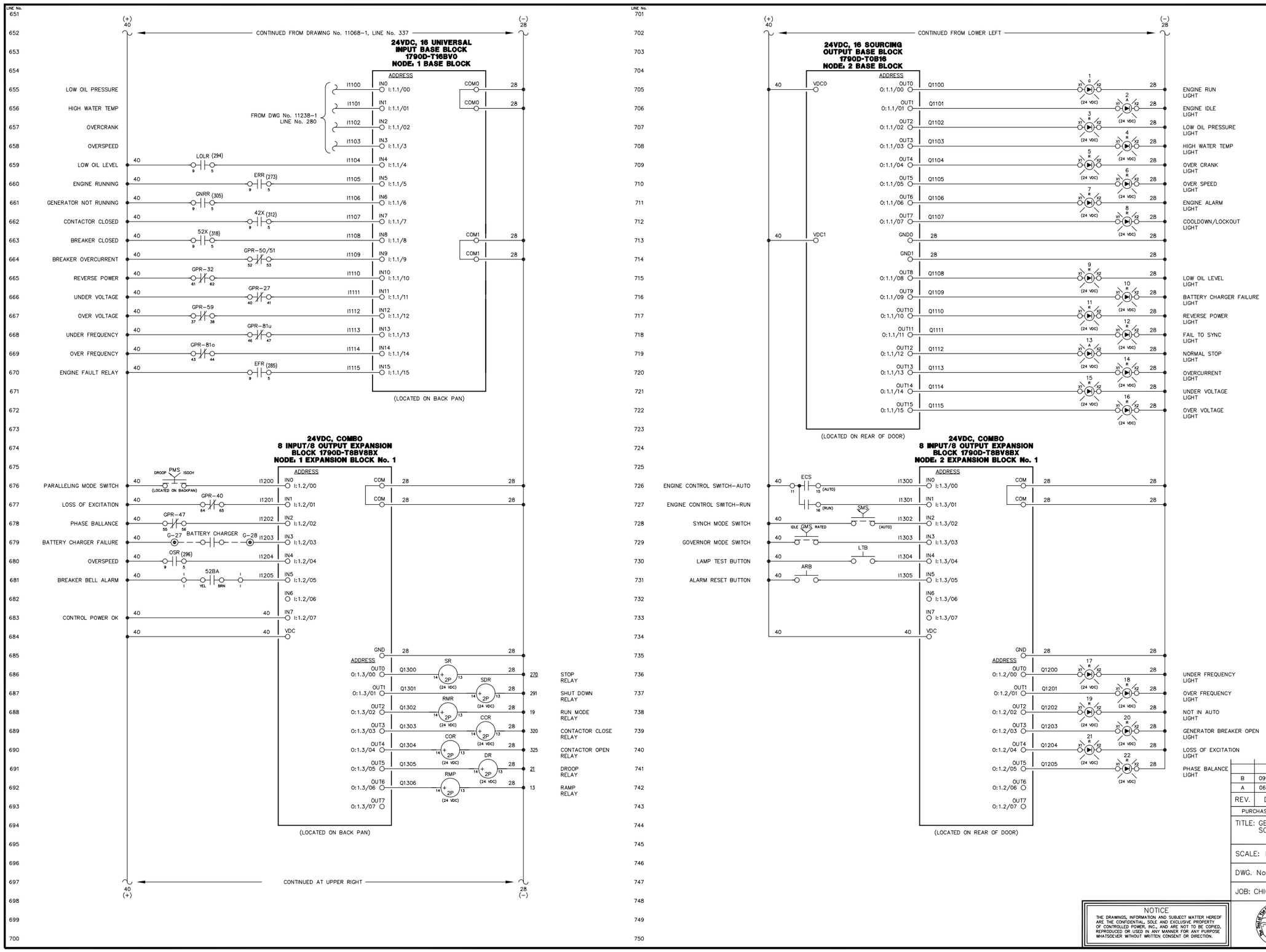
CPI DWG No. 11238-4

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11238-4	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

The Lake and Peninsula School District
101 Jensen Drive
P.O. Box 498
King Salmon, Alaska 99613
Phone (907) 246-4280/Fax (907) 246-4473

Plot date: 2003/9/17 – 10:04



NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: GENERATOR 1 PLC INPUTS & OUTPUTS, SCHEMATIC DIAGRAM

CPI DWG No. 11239-1

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11239-1	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

The Lake and Peninsula School District
101 Jensen Drive
P.O. Box 498
King Salmon, Alaska 99613
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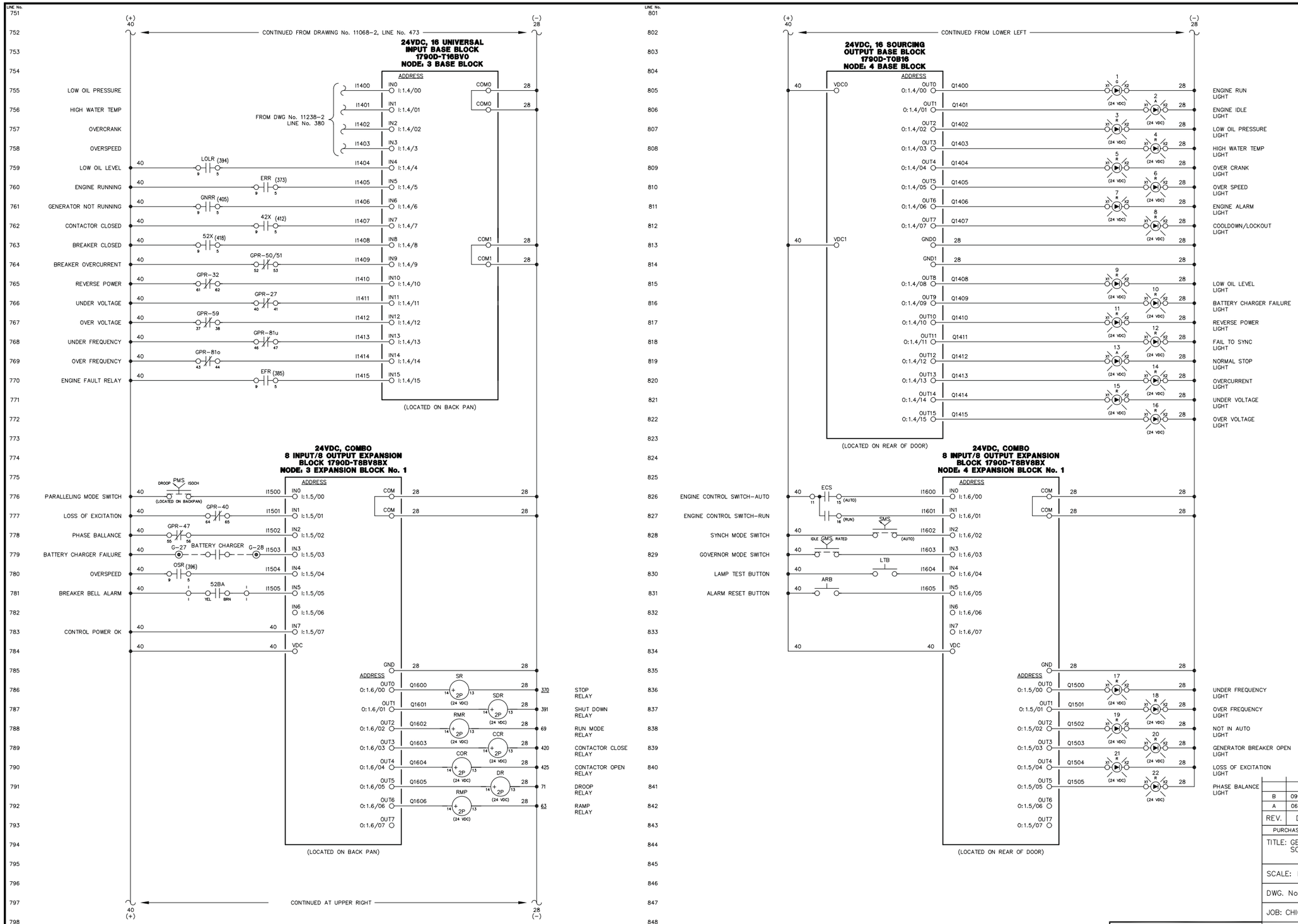
Plot date: 2003/9/17 - 10:03



NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: GENERATOR 2 PLC INPUTS & OUTPUTS, SCHEMATIC DIAGRAM

CPI DWG No. 11239-2

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11239-2	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

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101 Jensen Drive
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King Salmon, Alaska 99613
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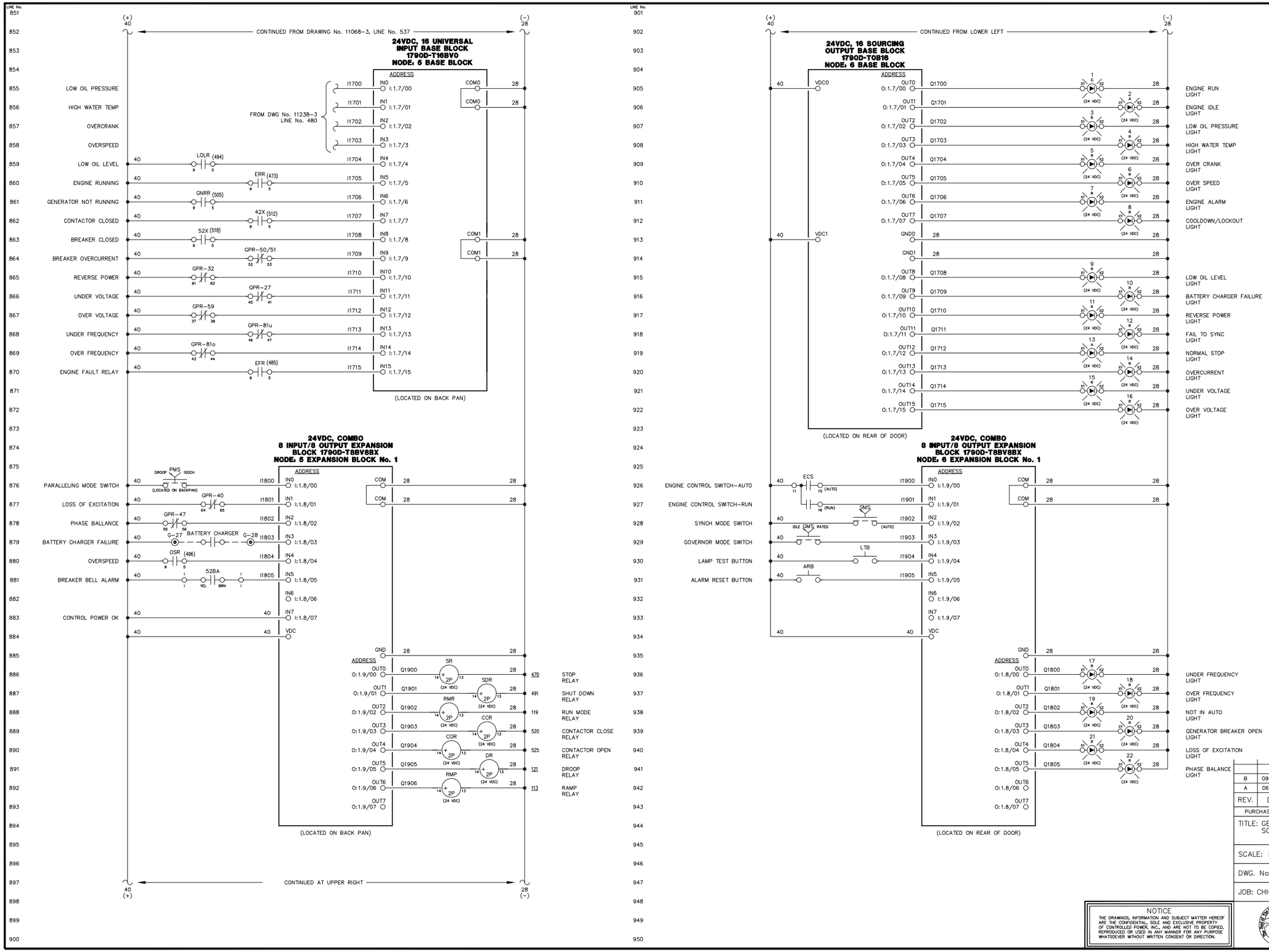
Plot date: 2003/9/17 - 10:17



NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: GENERATOR 3 PLC INPUTS & OUTPUTS, SCHEMATIC DIAGRAM

CPI DWG No. 11239-3

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11239-3	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

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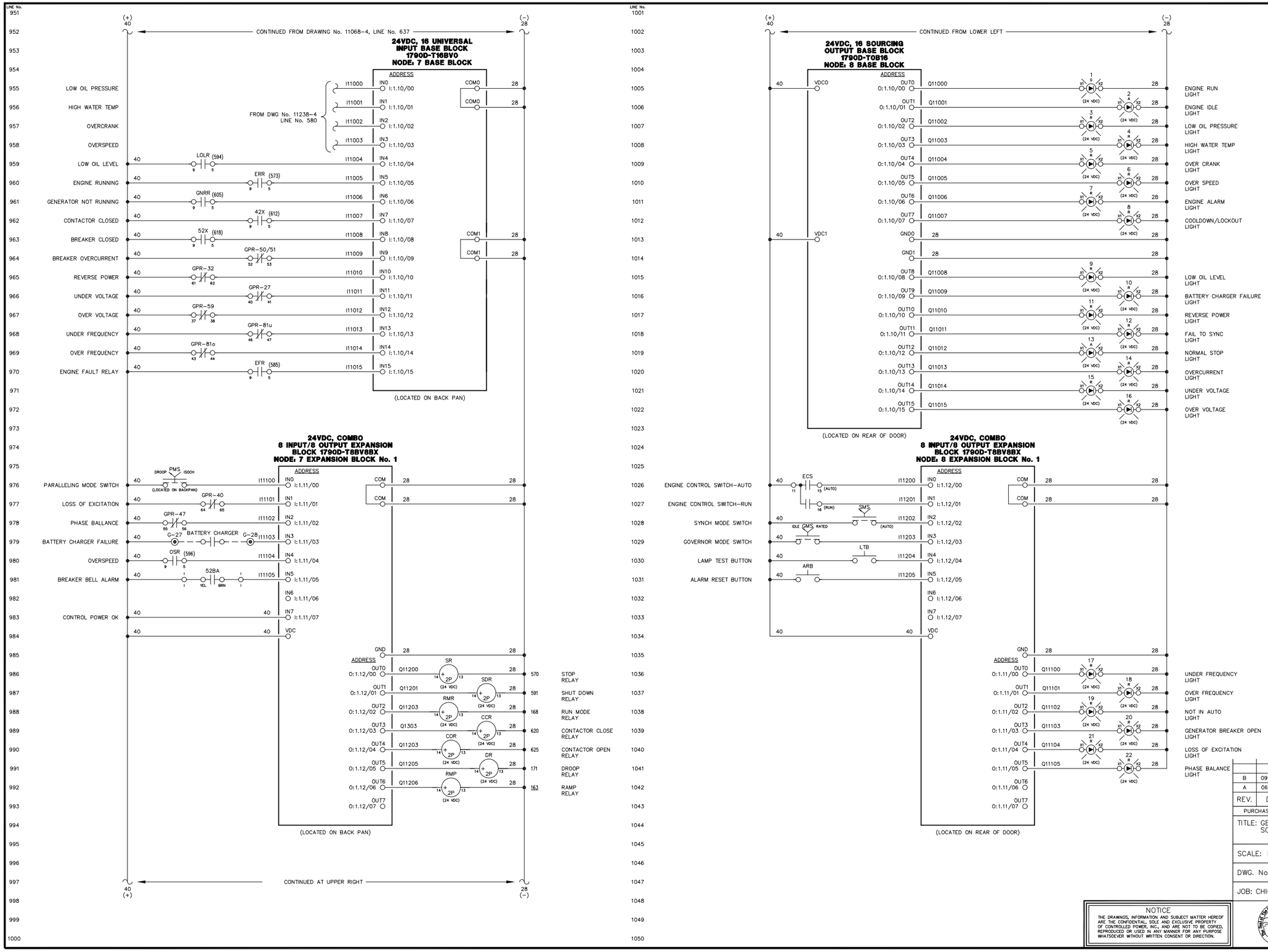
Plot date: 2003/9/17 - 10:19



NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 03-01 (5354) CONTROLLED POWER JOB No. 5354

TITLE: GENERATOR 4 PLC INPUTS & OUTPUTS, SCHEMATIC DIAGRAM

CPI DWG No. 11239-4

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11239-4	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

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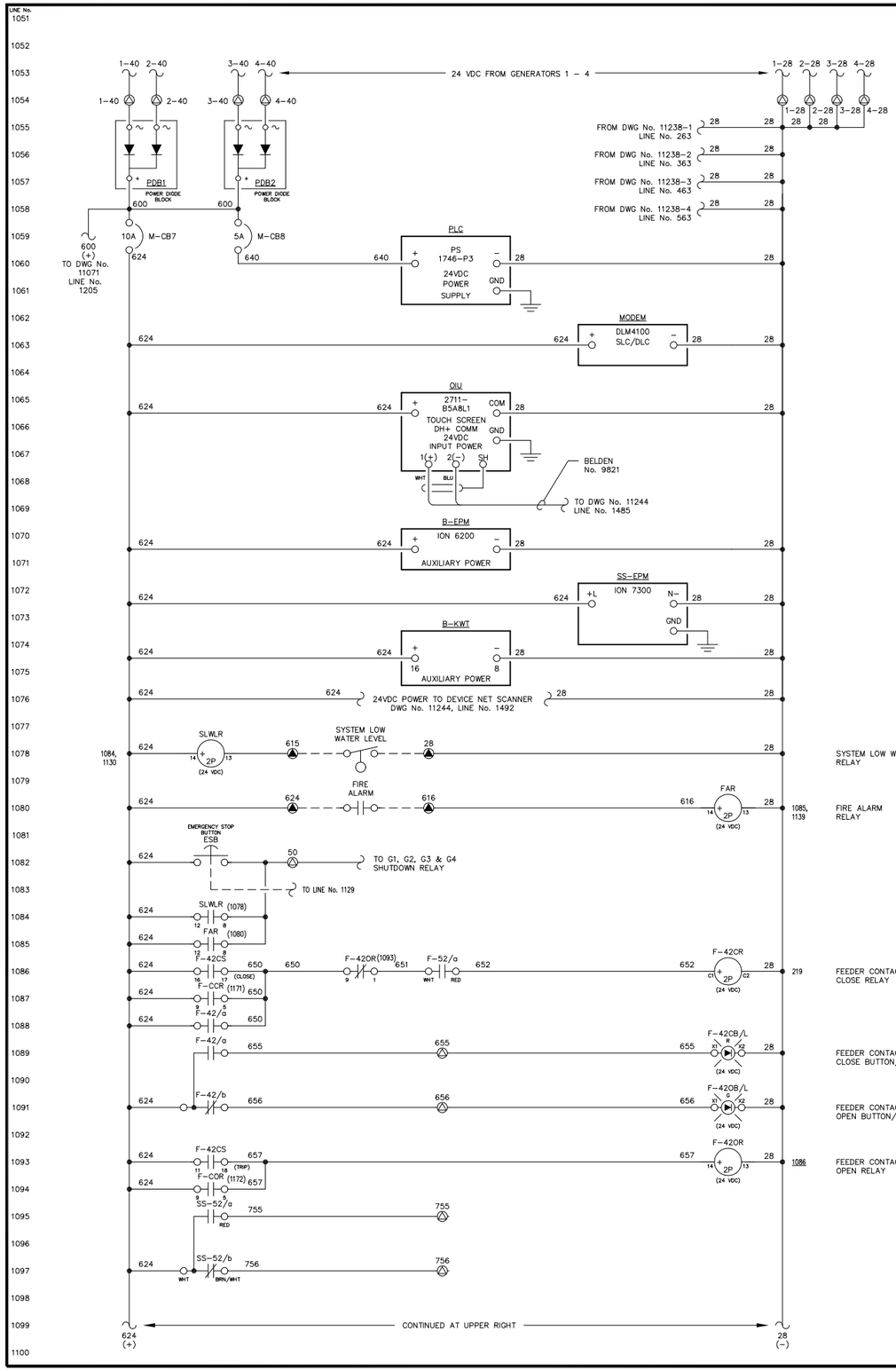
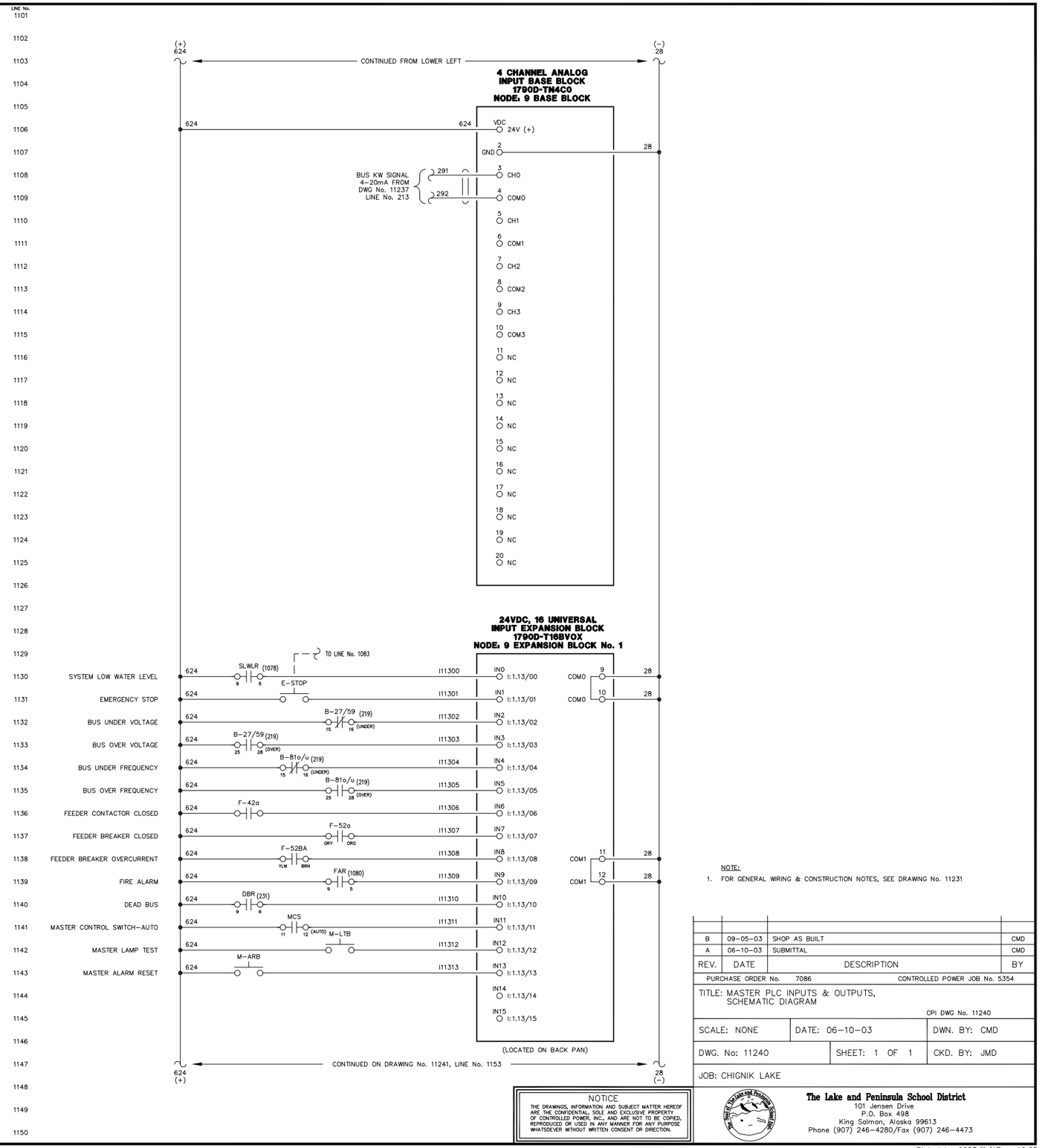
Plot date: 2003/9/17 - 10:26





NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 — CONTROLLED POWER JOB No. 5354

TITLE: MASTER PLC INPUTS & OUTPUTS, SCHEMATIC DIAGRAM

CPI DWG No. 11240

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11240	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

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King Salmon, Alaska 99613
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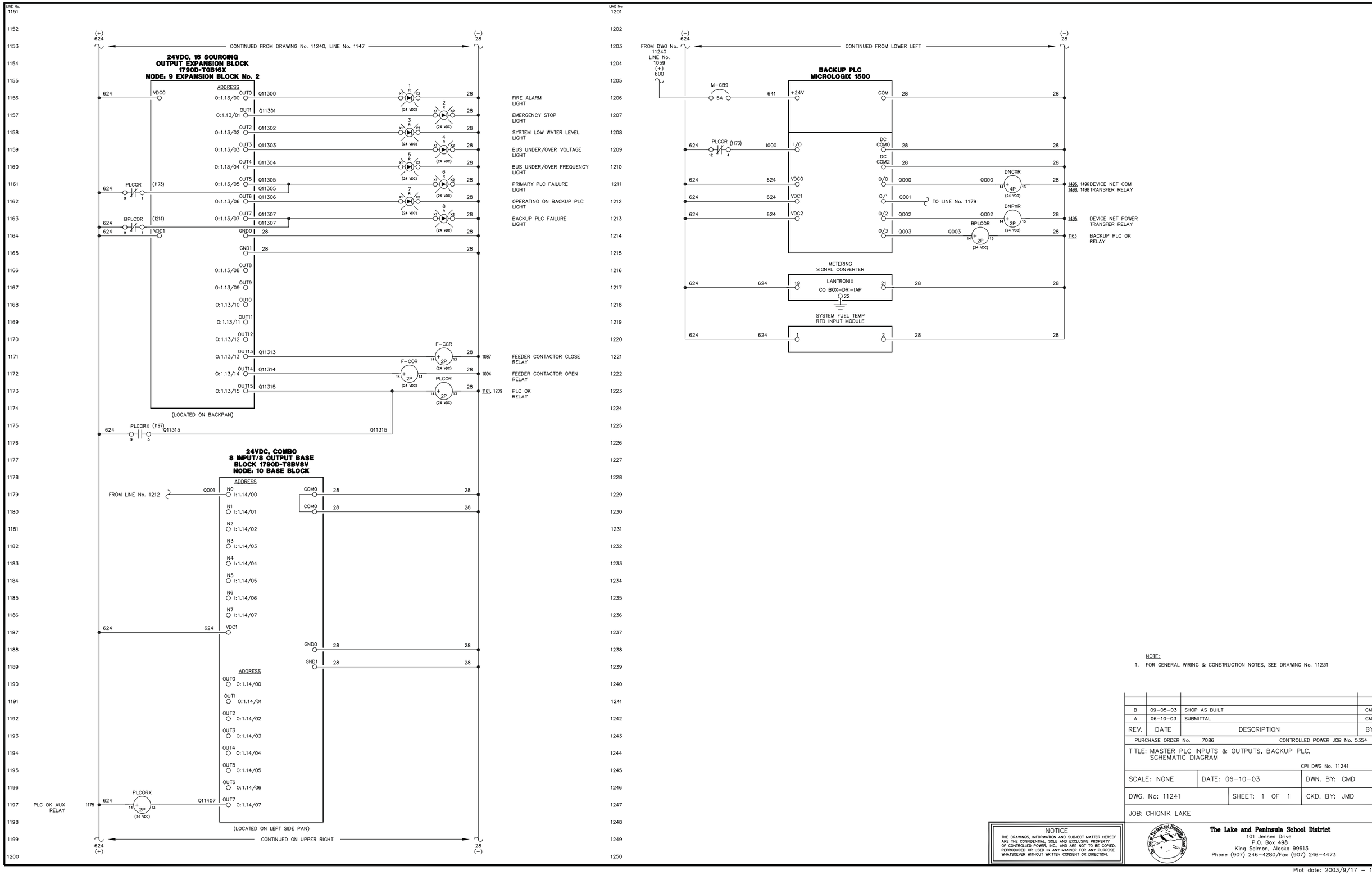
Plot date: 2003/9/17 - 10:25



NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: MASTER PLC INPUTS & OUTPUTS, BACKUP PLC, SCHEMATIC DIAGRAM

CPI DWG No. 11241

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11241	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CHIGNIK LAKE		

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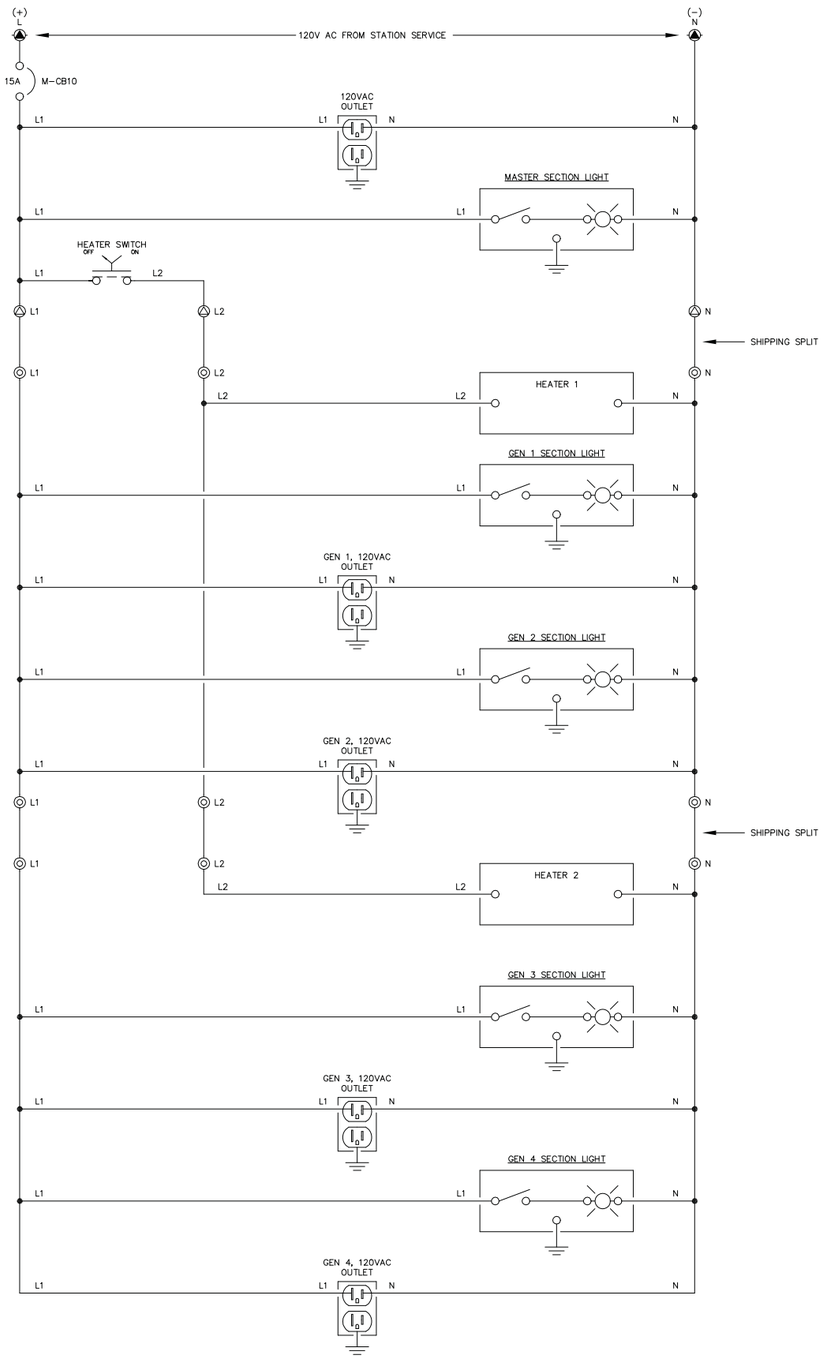
Plot date: 2003/9/17 - 10:25



NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09–05–03	SHOP AS BUILT	CMD
A	06–10–03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: HEATER & LIGHTING CONTROL, SCHEMATIC DIAGRAM

CPI DWG No. 11242

SCALE: NONE	DATE: 06–10–03	DWN. BY: CMD
DWG. No: 11242	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CHIGNIK LAKE		

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King Salmon, Alaska 99613
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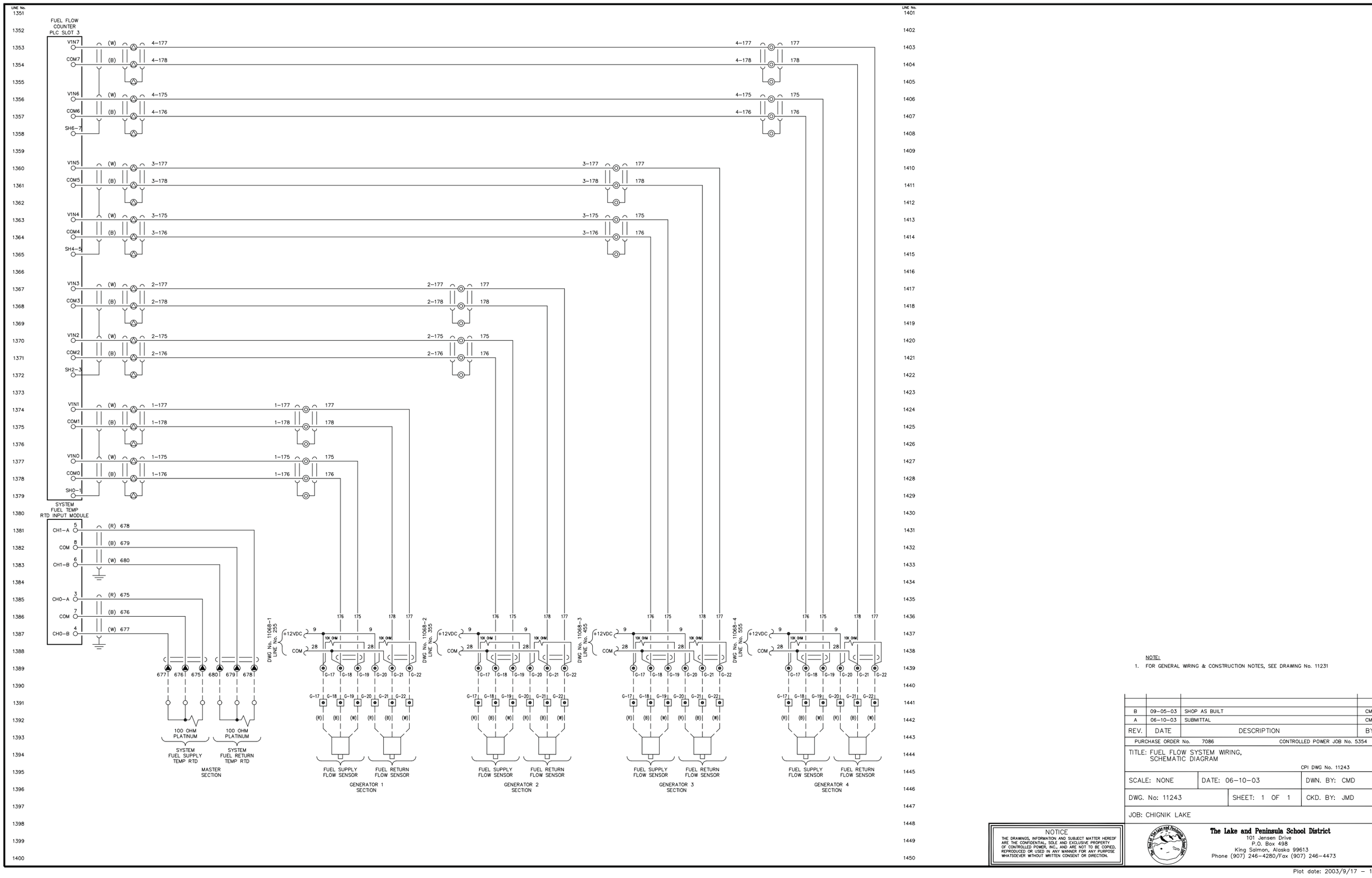
Plot date: 2003/9/17 – 10:24



NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: FUEL FLOW SYSTEM WIRING, SCHEMATIC DIAGRAM

CPI DWG No. 11243

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11243	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

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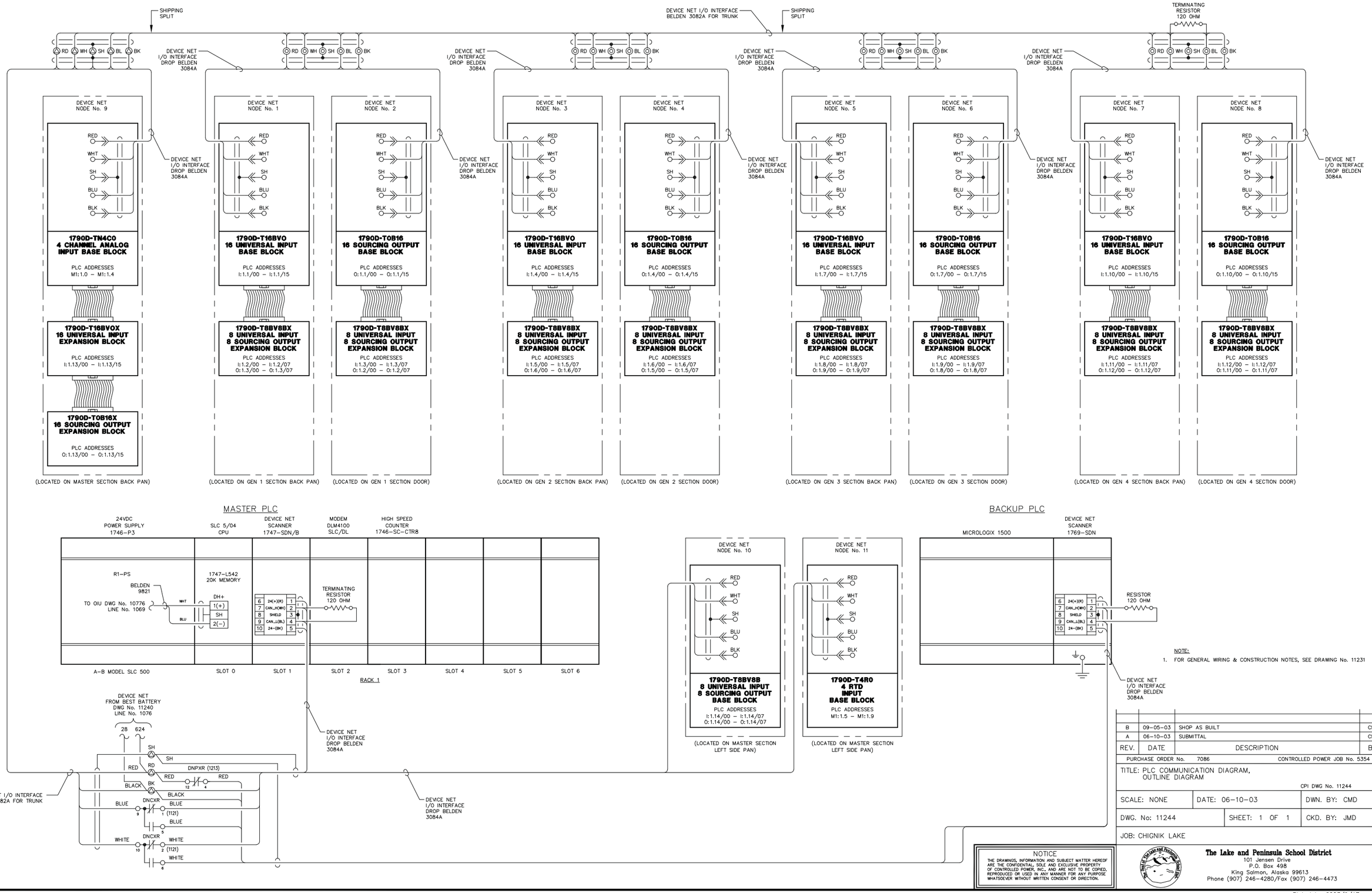
Plot date: 2003/9/17 - 10:24



REV.	DATE	DESCRIPTION	BY
B	09–05–03	SHOP AS BUILT	CMD
A	06–10–03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: PLC COMMUNICATION DIAGRAM, OUTLINE DIAGRAM

CPI DWG No. 11244

SCALE: NONE	DATE: 06–10–03	DWN. BY: CMD
DWG. No: 11244	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

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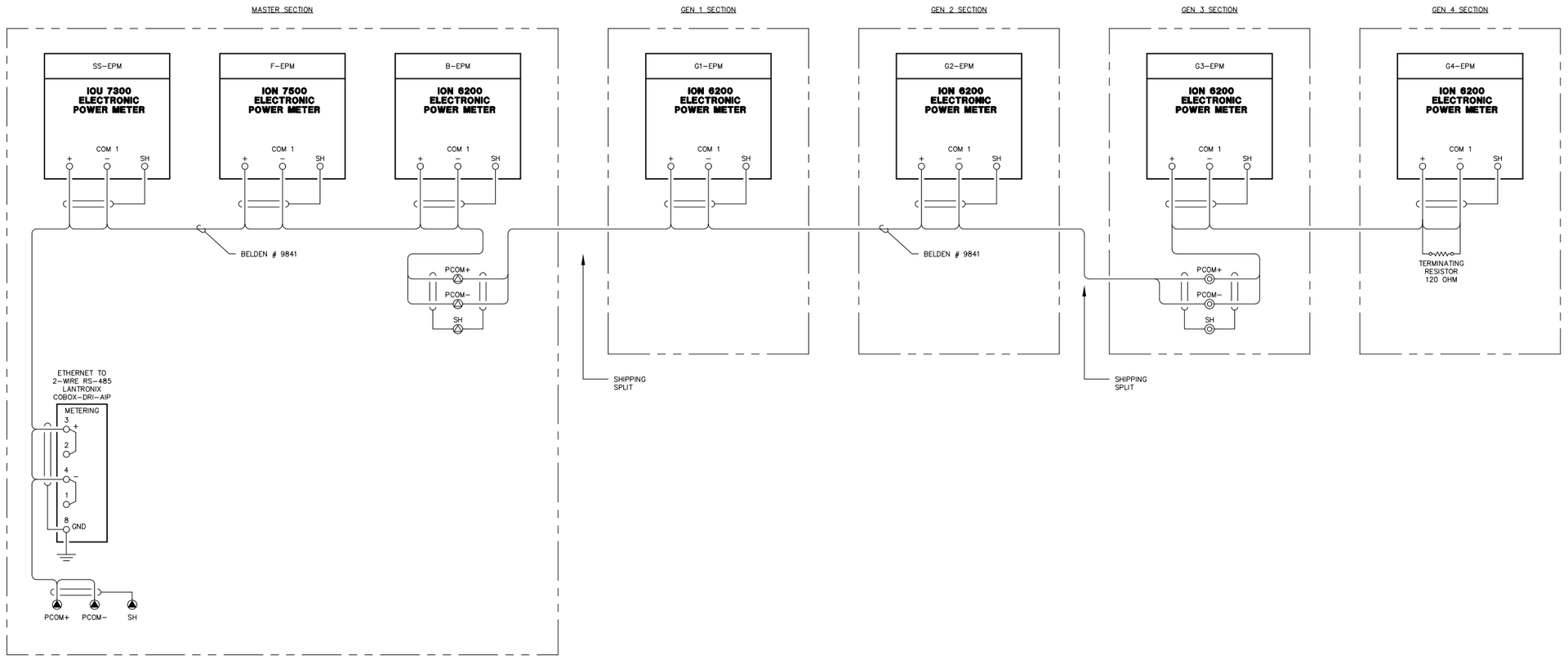
Plot date: 2003/9/17 – 10:23



NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09–05–03	SHOP AS BUILT	CMD
A	06–10–03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: EPM FUEL MONITORING, COMMUNICATION DIAGRAM

CPI DWG No. 11245

SCALE: NONE	DATE: 06–10–03	DWN. BY: CMD
DWG. No: 11245	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CHIGNIK LAKE		

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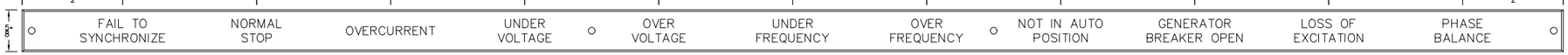
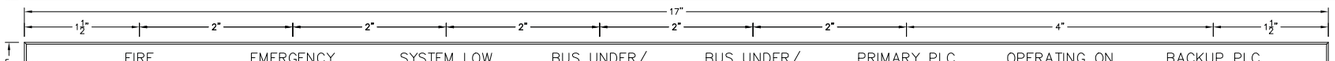
Plot date: 2003/9/17 – 10:23

NP. 1 TEXT 1/8" QUANTITY 4 SCALE 1/1

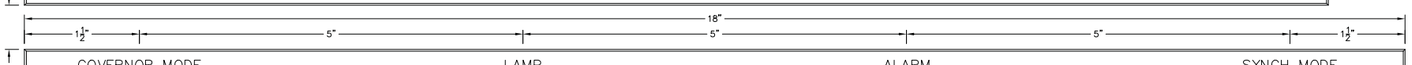
NP. 2 TEXT 1/8" QUANTITY 4 SCALE 1/1



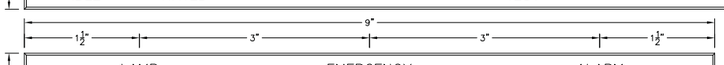
NP. 3 TEXT 1/8" QUANTITY 1 SCALE 1/1



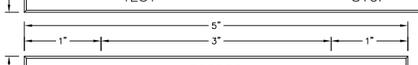
NP. 4 TEXT 1/8" QUANTITY 4 SCALE 1/1



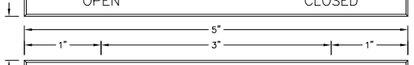
NP. 5 TEXT 1/8" QUANTITY 1 SCALE 1/1



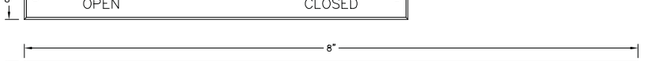
NP. 6 TEXT 1/8" QUANTITY 1 SCALE 1/1



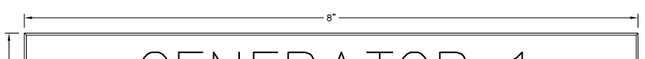
NP. 7 TEXT 1/8" QUANTITY 4 SCALE 1/1



NP. 8 TEXT 1/2" QUANTITY 1 SCALE 1/1



NP. 9 TEXT 1/2" QUANTITY 1 SCALE 1/1



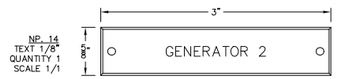
NP. 10 TEXT 1/2" QUANTITY 1 SCALE 1/1

NP. 11 TEXT 1/2" QUANTITY 1 SCALE 1/1

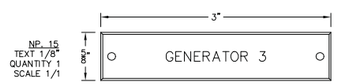
NP. 12 TEXT 1/2" QUANTITY 1 SCALE 1/1

NP. 13 TEXT 1/8" QUANTITY 1 SCALE 1/1

NP. 14 TEXT 1/8" QUANTITY 1 SCALE 1/1

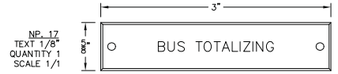


NP. 15 TEXT 1/8" QUANTITY 1 SCALE 1/1

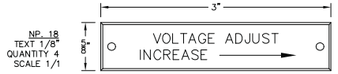


NP. 16 TEXT 1/8" QUANTITY 1 SCALE 1/1

NP. 17 TEXT 1/8" QUANTITY 1 SCALE 1/1

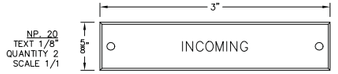


NP. 18 TEXT 1/8" QUANTITY 4 SCALE 1/1

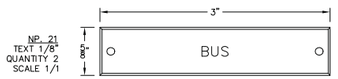


NP. 19 TEXT 1/8" QUANTITY 2 SCALE 1/1

NP. 20 TEXT 1/8" QUANTITY 2 SCALE 1/1



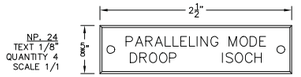
NP. 21 TEXT 1/8" QUANTITY 2 SCALE 1/1



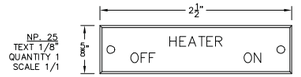
NP. 22 TEXT 1/8" QUANTITY 2 SCALE 1/1

NP. 23 TEXT 1/8" QUANTITY 4 SCALE 1/1

NP. 24 TEXT 1/8" QUANTITY 4 SCALE 1/1

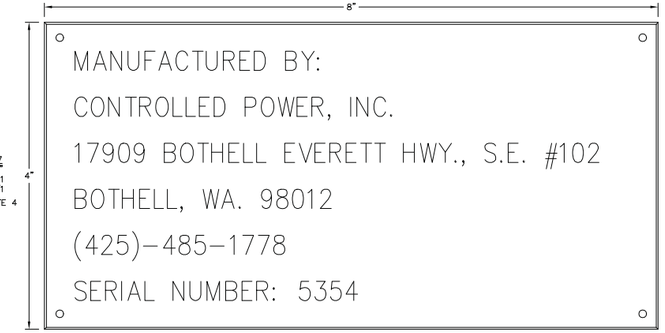


NP. 25 TEXT 1/8" QUANTITY 1 SCALE 1/1



NP. 26 TEXT 1/8" QUANTITY 4 SCALE 1/1

NP. 27 TEXT 1/4" QUANTITY 1 SCALE 1/1
⚠ SEE NOTE 4



NOTES:
1. ALL NAMEPLATES SHALL BE BLACK FACE WITH WHITE LETTERS EXCEPT AS NOTED.
2. ALL NAMEPLATES SHALL HAVE PRESSURE SENSITIVE ADHESIVE ON BACK, 100 % COVERAGE.
3. ALL NAMEPLATES SHALL HAVE MOUNTING HOLES DRILLED, (1) EACH END.
⚠ INDICATES THAT NAMEPLATE SHALL BE BRUSHED ALUMINUM WITH BLACK ENGRAVED LETTERS.

NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231.

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: NAMEPLATE ENGRAVING SCHEDULE
FABRICATION DIAGRAM

CPI DWG No. 11246

SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11246	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CHIGNIK LAKE		

1" 0" 1" 2"
SCALE: 1"= 1"

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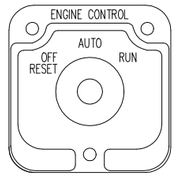
Plot date: 2003/9/17 - 10:22

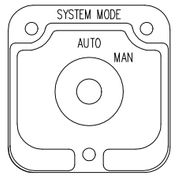
ENGINE CONTROL SWITCH – ECS



(ELECTROSWITCH 24304C–S)
ROUND KNURLED HANDLE
QTY 4

DECK	CONTACTS	POS. OFF	*	AUTO	*	RUN
1	11 – 14	X	X			
	15		X	X	X	
	16				X	X
2	21 – 24	X	X			
	25		X	X	X	
	26				X	X
3	31 – 34	X	X			
	35		X	X	X	
	36				X	X
4	41 – 44	X	X			
	45		X	X	X	
	46				X	X

MASTER CONTROL SWITCH – MCS



(ELECTROSWITCH 24201C)
KNURLED HANDLE
QTY 1

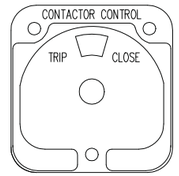
DECK	CONTACTS	POS. AUTO	MAN
1	12 – 11	X	
	13		X
	16 – 15	X	
	17		X

SYNCHRONIZING SWITCH – SS

(ELECTROSWITCH 2424E)
OVAL HANDLE
QTY 4

DECK	CONTACTS	POS. OFF	ON
1	12 – 13		X
	16 – 17		X
2	22 – 23		X
	26 – 27		X
3	32 – 33		X
	36 – 37		X

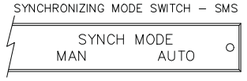
CONTACTOR CONTROL SWITCH – F–42CS

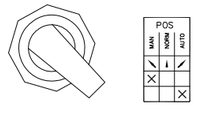


(ELECTROSWITCH 2438D)
PISTOL GRIP HANDLE
SPRING RETURN TO CENTER
QTY 1

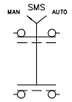
DECK	CONTACTS	POS. TRIP	NORM.	CLOSE
1	11 – 18	X		
	16 – 17			X

SYNCHRONIZING MODE SWITCH – SMS



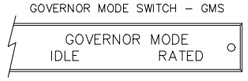


POS	MAN	NORM	AUTO
	/		/
	X		
			X



(MAINTAINED POSITION)

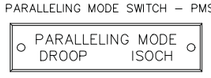
GOVERNOR MODE SWITCH – GMS



POS	IDLE	RATED
	/	/
	X	
		X

(MAINTAINED POSITION)

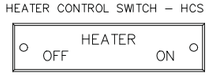
PARALLELING MODE SWITCH – PMS



POS	DROOP	ISOCH
	/	/
	X	
		X

(MAINTAINED POSITION)
LOCATED ON BACK PAN

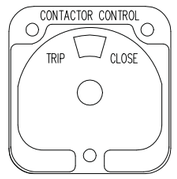
HEATER CONTROL SWITCH – HCS



POS	OFF	ON
	/	/
	X	
		X

(MAINTAINED POSITION)
LOCATED ON MASTER BACK PAN

CONTACTOR CONTROL SWITCH – G1, G2, G3 & G4–42CS



(ELECTROSWITCH 2444D)
PISTOL GRIP HANDLE
SPRING RETURN TO CENTER
QTY 4

DECK	CONTACTS	POS. TRIP	NAT.	NAC.	CLOSE
1	11 – 18	X			
	16 – 17				X
2	21 – 22		X	X	
	25 – 26		X	X	
3	32 – 33			X	X
	36 – 37			X	X

NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09–05–03	SHOP AS BUILT	CMD
A	06–10–03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

TITLE: CONTROL SWITCH TARGET DIAGRAM

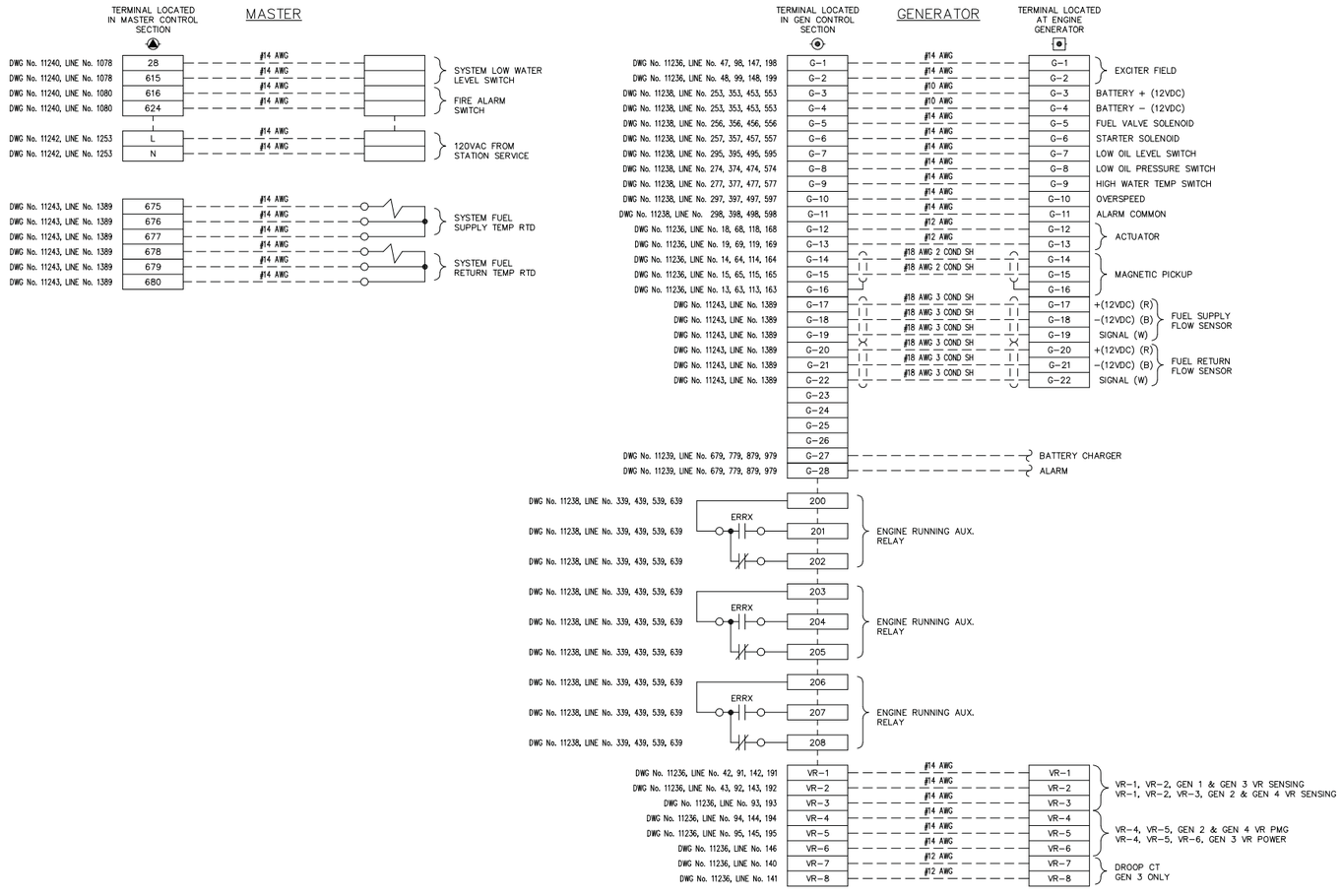
CPI DWG No. 11247

SCALE: NONE	DATE: 06–10–03	DWN. BY: CMD
DWG. No: 11247	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CHIGNIK LAKE

The Lake and Peninsula School District
101 Jensen Drive
P.O. Box 498
King Salmon, Alaska 99613
Phone (907) 246–4280/Fax (907) 246–4473

Plot date: 2003/9/17 – 10:20



NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 11231

REV.	DATE	DESCRIPTION	BY
B	09-05-03	SHOP AS BUILT	CMD
A	06-10-03	SUBMITTAL	CMD

PURCHASE ORDER No. 7086 CONTROLLED POWER JOB No. 5354

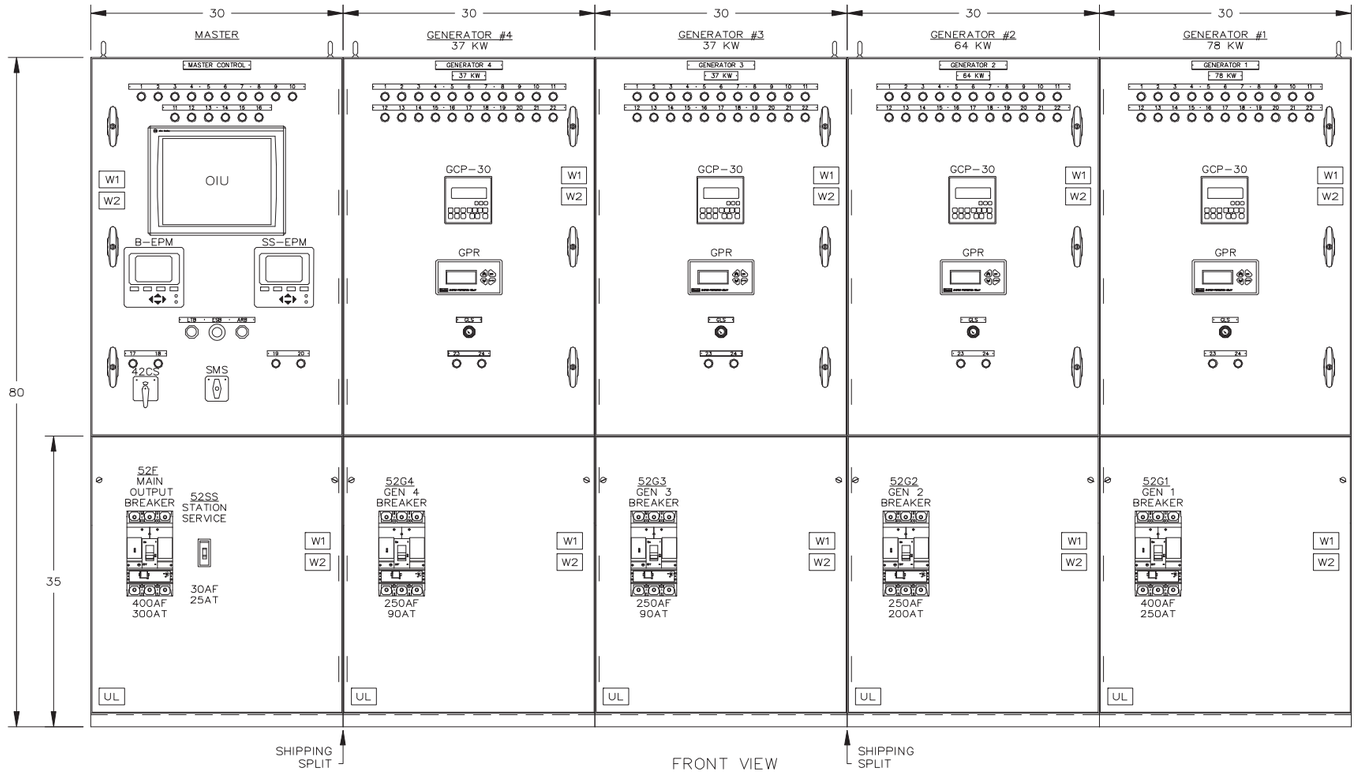
TITLE: FIELD CONNECTION DIAGRAM

CPI DWG No. 11248

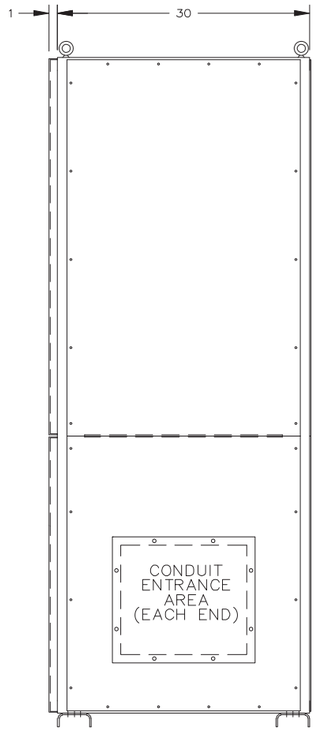
SCALE: NONE	DATE: 06-10-03	DWN. BY: CMD
DWG. No: 11248	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CHIGNIK LAKE		

The Lake and Peninsula School District
101 Jensen Drive
P.O. Box 498
King Salmon, Alaska 99613
Phone (907) 246-4280/Fax (907) 246-4473

Plot date: 2003/9/17 – 10:20



FRONT VIEW



SIDE VIEW

DEVICE LEGEND

ARB	ALARM RESET BUTTON
B-EPM	BUS ELECTRONIC POWER METER – 7650ION
ESB	EMERGENCY STOP BUTTON
GCP	GENERATOR CONTROL PACKAGE
GLS	GENERATOR LOCKOUT SWITCH
GPR	GENERATOR PROTECTIVE RELAY
OIU	OPERATOR INTERFACE UNIT
LTB	LAMP TEST BUTTON
SMS	MASTER CONTROL SWITCH (AUTO-MANUAL)
SS-EPM	STATION SERVICE POWER METER – 7550ION
42xx	CONTACTOR
42CS	CONTACTOR CONTROL SWITCH
52xx	CIRCUIT BREAKER

GENERATOR ANNUNCIATOR LEGEND:

1	ENGINE RUN	13	NOT IN AUTO POSITION
2	ENGINE IDLE	14	GENERATOR BREAKER OPEN
3	ENGINE ALARM	15	FAIL TO SYNCHRONIZE
4	LOW OIL PRESSURE	16	OVERCURRENT
5	LOW OIL LEVEL	17	UNDER VOLTAGE
6	HIGH OIL TEMPERATURE	18	OVER VOLTAGE
7	HIGH WATER TEMPERATURE	19	UNDER FREQUENCY
8	OVERSPEED	20	OVER FREQUENCY
9	OVERCRANK	21	LOSS OF EXCITATION
10	COOLDOWN/LOCKOUT	22	REVERSE POWER
11	BATTERY CHARGER FAILURE	23	CONTACTOR OPEN
12	NORMAL STOP	24	CONTACTOR CLOSED

MASTER ANNUNCIATOR LEGEND:

1	FIRE ALARM LIGHT	11	HEAT RECOVERY NO LOAD
2	EMERGENCY STOP LIGHT	12	HEAT RECOVERY LOSS OF PRESSURE
3	SYSTEM LOW WATER LEVEL LIGHT	13	HEAT RECOVERY LOSS OF FLOW
4	LOW FUEL LEVEL LIGHT	14	SPARE 1
5	BUS UNDER/OVER VOLTAGE LIGHT	15	SPARE 2
6	BUS UNDER/OVER FREQUENCY LIGHT	16	SPARE 3
7	FEEDER BREAKER OVERCURRENT LIGHT	17	FEEDER BREAKER OPEN
8	PRIMARY PLC FAILURE	18	FEEDER BREAKER CLOSED
9	OPERATING ON BACKUP PLC	19	STATION SERVICE BREAKER OPEN
10	BACKUP PLC FAILURE	20	STATION SERVICE BREAKER CLOSED

DRAWING LEGEND

1	PHYSICAL LAYOUT
2	SINGLE LINE DIAGRAM
3	BLANK
4A	GENERATOR 1 AC SCHEMATIC
4B	GENERATOR 2 AC SCHEMATIC
4C	GENERATOR 3 AC SCHEMATIC
4D	GENERATOR 4 AC SCHEMATIC
5	MASTER AC & DISTRIBUTION SCHEMATIC
6A	GENERATOR 1 DC CONTROL SCHEMATIC
6B	GENERATOR 2 DC CONTROL SCHEMATIC
6C	GENERATOR 3 DC CONTROL SCHEMATIC
6D	GENERATOR 4 DC CONTROL SCHEMATIC
7A	GENERATOR 1 DC CONTROL SCHEMATIC
7B	GENERATOR 2 DC CONTROL SCHEMATIC
7C	GENERATOR 3 DC CONTROL SCHEMATIC
7D	GENERATOR 4 DC CONTROL SCHEMATIC
8A	GENERATOR 1 DC CONTROL SCHEMATIC
8B	GENERATOR 2 DC CONTROL SCHEMATIC
8C	GENERATOR 3 DC CONTROL SCHEMATIC
8D	GENERATOR 4 DC CONTROL SCHEMATIC

DRAWING LEGEND

9	MASTER DC CONTROL SCHEMATIC
10	MASTER DC CONTROL SCHEMATIC
11	MASTER DC CONTROL SCHEMATIC
12	BLANK
13	BLANK
14	PLC COMMUNICATION DIAGRAM
15	COMMUNICATION NETWORK DIAGRAM
16	EPM MONITORING & SYSTEM COMMUNICATION DIAGRAM
17	HEATER & LIGHTING CONTROL SCHEMATIC
18	CONTROL SWITCH TARGET DIAGRAM
19	NAMEPLATE DETAILS
20	INTERCONNECTION DIAGRAM

NOTES

1	WIRE MARKERS: HEATSHRINK TYPE c/w INDELIBLE INK MARKINGS
2	WIRE TYPE: ALL CONNECTIONS TO BUS AND BREAKERS TO BE #14AWG SIS. WIRING THAT IS TO BE PROVIDED AS PART OF OR IS AN INTEGRAL PART OF SUPERVISORY CONTROL EQUIPMENT SHALL BE #18-14AWG SIS. CT WIRING TO BE #10AWG SIS MIN.
3	WIRING COLOR CODED: NO WIRE NUMBERS TO MATCH TERMINAL NUMBERS UNLESS NOTED
4	LOAD BUS TO BE 1000A 3PH 4W TIN PLATED COPPER BRACED AT 35KA.
5	ENCLOSURE TYPE NEMA 1 BUILT TO UL891.
6	PAINT ASA #61 GREY EXTERIOR, WHITE MOUNTING PAN
7	ENCLOSURE SUPPLIED IN THREE PIECES
8	FULL LENGTH COPPER GROUND BUS 0.25" X 2.5" C/W (6) #6-250MCM GROUND LUGS
9	POWER CABLES: UTILITY FROM BOTTOM; GEN & LOAD TOP. FRONT AND REAR ACCESS REQUIRED.
10	LAMICOIDS WHITE C/W BLACK LETTERS, MECHANICALLY ATTACHED
11	CABLE LUG SIZES: GEN 1, 2: (1) #8 – 600MCM Cu/AL PER PHASE GEN 3, 4: (1) #8 – 350MCM Cu/AL PER PHASE LOAD: (1) #8 – 600MCM Cu/AL PER PHASE SS: (1) #12 – 3/0 Cu/AL PER PHASE

GCP READOUT

* INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING LIST OF METERING, STATUS, AND ALARMS.

METERING LEGEND
1. VOLTS: Aø, Bø, Cø L-N, L-L
2. AMPS: Aø, Bø, Cø
3. KW
4. PF
5. KWH

ALARM LEGEND
1. LOW OIL PRESSURE ALARM
2. LOW OIL PRESSURE SHUTDOWN
3. HIGH WATER TEMPERATURE ALARM
4. HIGH WATER TEMPERATURE SHUTDOWN
5. OVERCRANK
6. OVERSPEED
7. LOW OIL LEVEL

ANALOG INPUT LEGEND
1. OIL PRESSURE (PSI)
2. WATER TEMP (F)

MISC. LEGEND
1. ENGINE HOURS
2. ENGINE START COUNTER
3. MAINTENANCE CALL

GPR FUNCTIONS
* INCLUDES, BUT NOT LIMITED TO:
27/59, 81 o/u, 32, 50/51, 40, 47

TAKOTNA SWITCHGEAR SHOP DRAWINGS, 32 SHEETS TOTAL. NOTE THAT THESE DRAWINGS SHOW THE SHOP AS BUILT FROM THE ORIGINAL INSALLATION IN 2003. THEY HAVE NOT BEEN VERIFIED FOR PRESENT AS BUILT CONDITIONS.

AS BUILT

#/ REFER TO SHEET #

☐ APPROVED FOR CONSTRUCTION
☐ MASTER COPY ☐ REFERENCE COPY ____ OF ____
☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

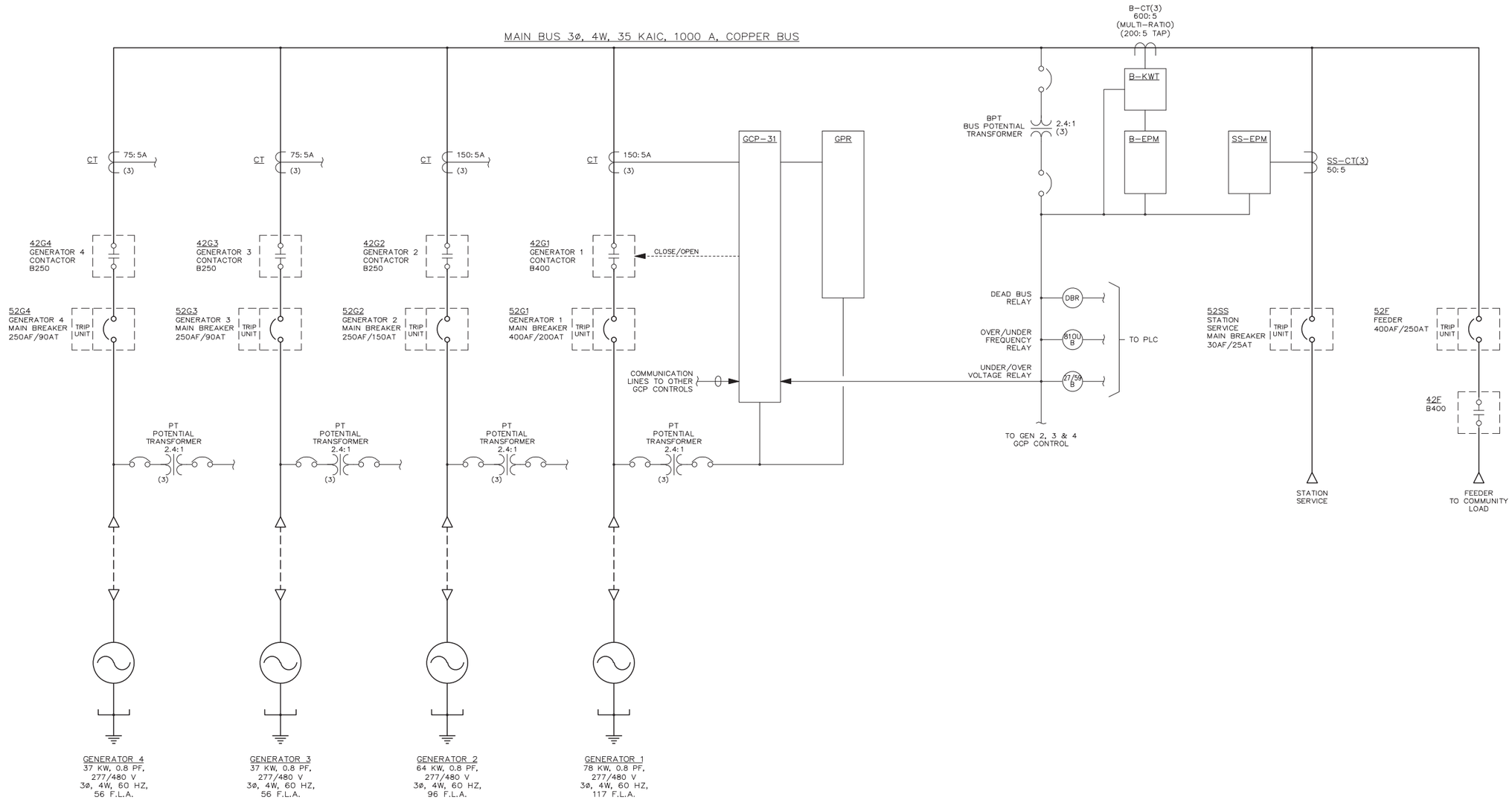
DRAWING No.	REFERENCE DRAWINGS

No.	REVISIONS	BY	AUTH	DATE
2	AS BUILT	BM	RH	05-05-06
1	APPROVAL MOD'S	BM	RH	05-03-16

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
PHYSICAL LAYOUT
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY		
CUSTOMER ORDER No.	C-022623	WORK ORDER No.	W-030032
DRAWN BY	LR	AUTH BY	RH
DATE	05-03-03	REV	2
DRAWING/FILE No.	W-030032-01	SHEET	1



NOTE:
GENERATORS 2 , 3 & 4 SIMILAR TO GENERATOR 1.

REFER TO SHEET #

AS BUILT

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☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

DRAWING No.	REFERENCE DRAWINGS

No.	REVISIONS	BY	AUTH	DATE
1	AS BUILT	BM	RH	05-05-06

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
SINGLE LINE DIAGRAM
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY		
CUSTOMER ORDER No.	C-022623	WORK ORDER No.	W-030032
DRAWN BY	LR	AUTH BY	RH
DATE	05-03-03	REV	1
DRAWING/FILE No.	W-030032-02	SHEET	2

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☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

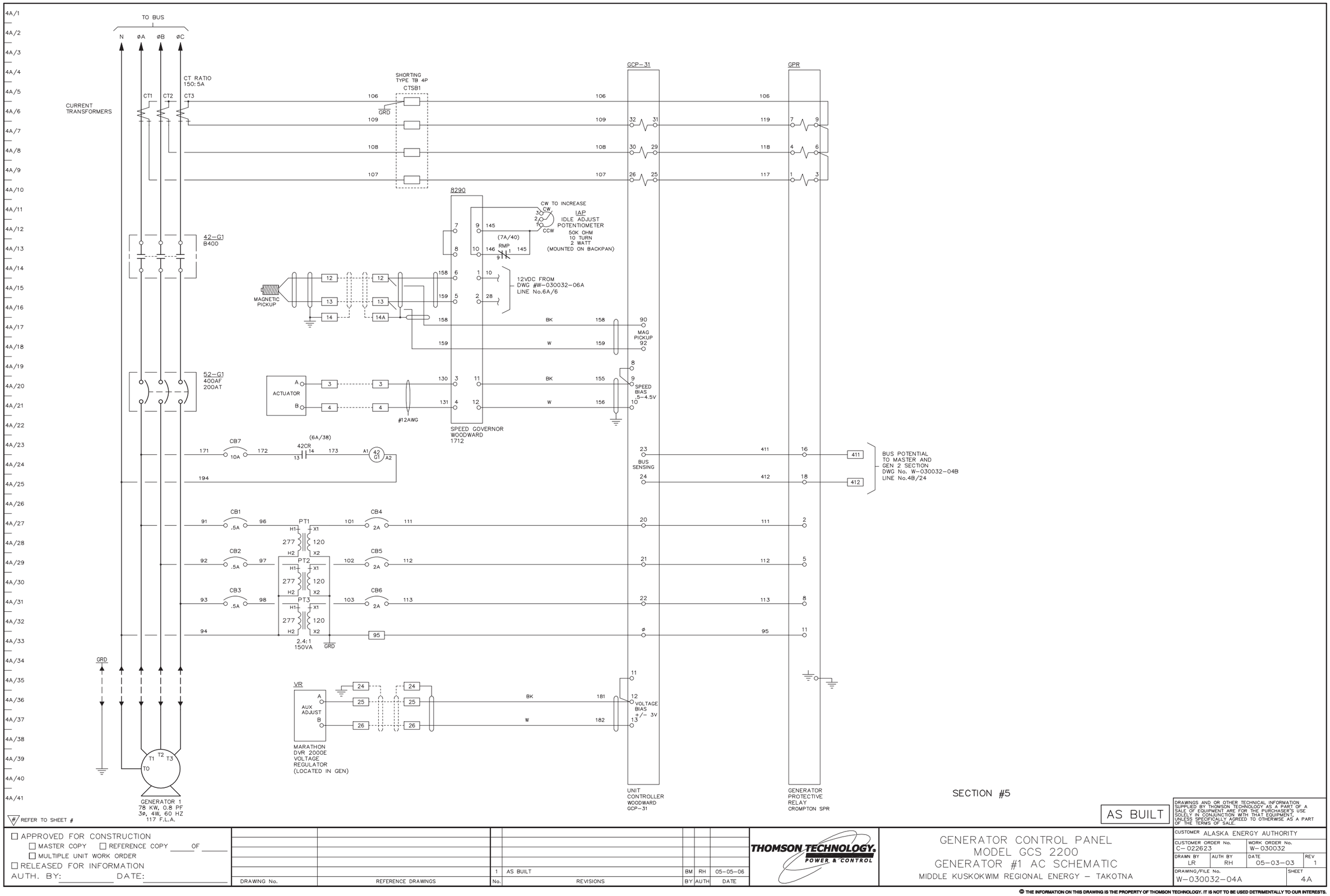
DRAWING No.	REFERENCE DRAWINGS

No.	REVISIONS	BY	AUTH	DATE
1	AS BUILT	BM	RH	05-05-06

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
BLANK SHEET
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY		
CUSTOMER ORDER No.	C-022623	WORK ORDER No.	W-030032
DRAWN BY	LR	AUTH BY	RH
DATE	05-03-03	REV	1
DRAWING/FILE No.	W-030032-03	SHEET	3



SECTION #5

AS BUILT

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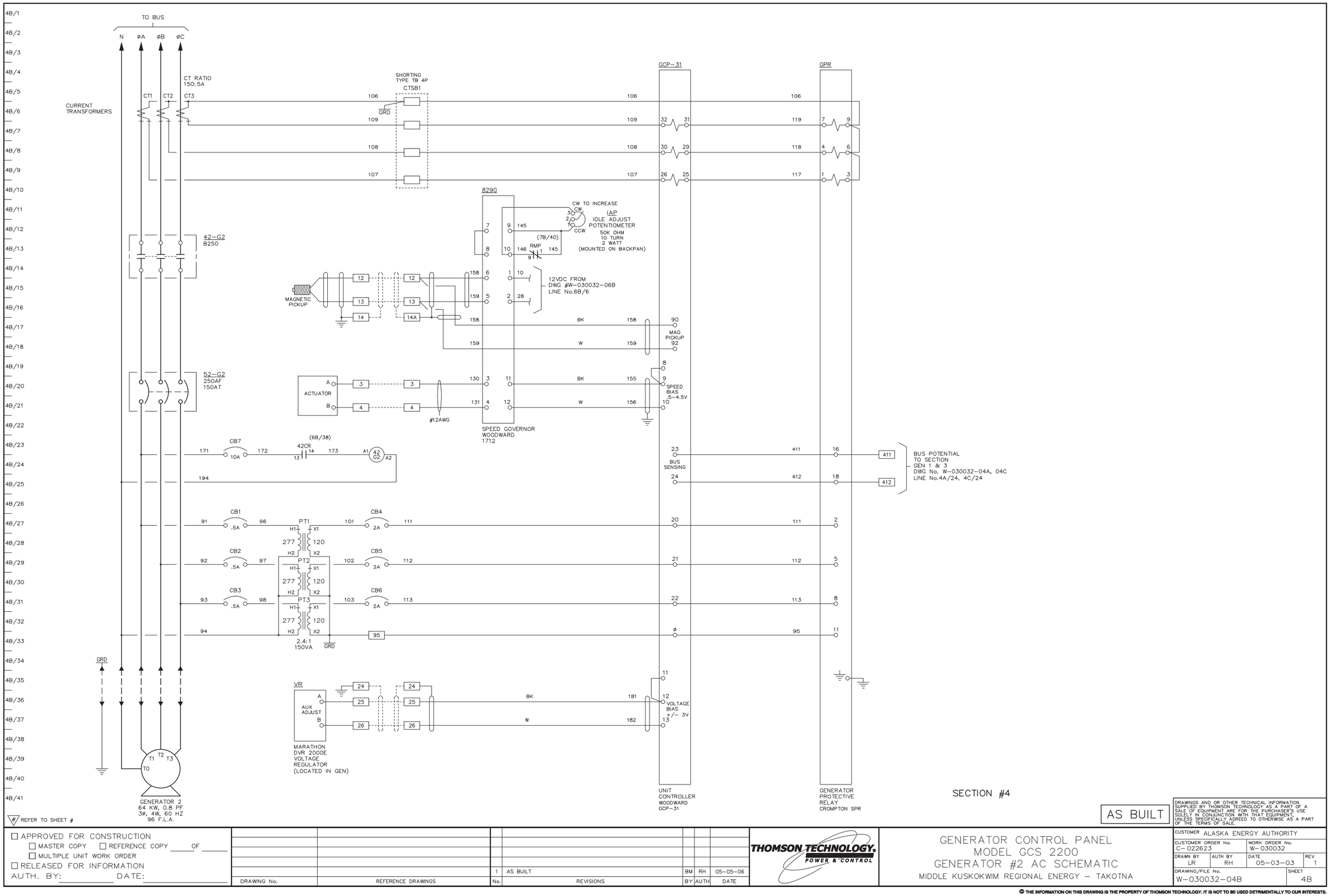
☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

DRAWING No.	REFERENCE DRAWINGS	No.	REVISIONS	BY	AUTH	DATE
		1	AS BUILT	BM	RH	05-05-06

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
GENERATOR #1 AC SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY		
CUSTOMER ORDER No.	C-022623	WORK ORDER No.	W-030032
DRAWN BY	LR	AUTH BY	RH
DATE	05-03-03	REV	1
DRAWING/FILE No.	W-030032-04A	SHEET	4A



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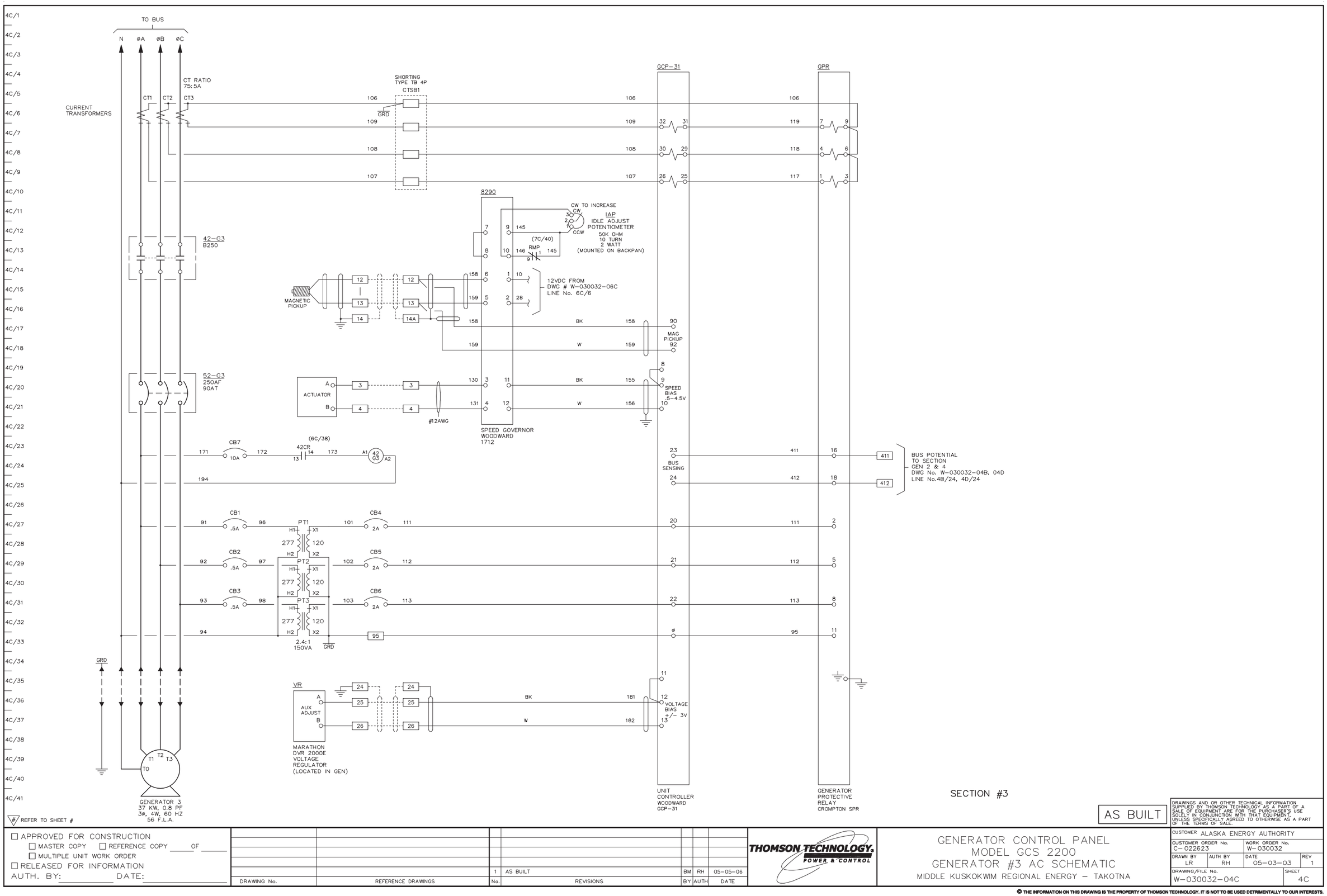
☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

DRAWING No.	REFERENCE DRAWINGS	No.	REVISIONS	BY	AUTH	DATE
		1	AS BUILT	BM	RH	05-05-06

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
GENERATOR #2 AC SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY
CUSTOMER ORDER No.	C-022623
WORK ORDER No.	W-030032
DRAWN BY	LR
AUTH BY	RH
DATE	05-03-03
REV	1
DRAWING/FILE No.	W-030032-04B
SHEET	4B



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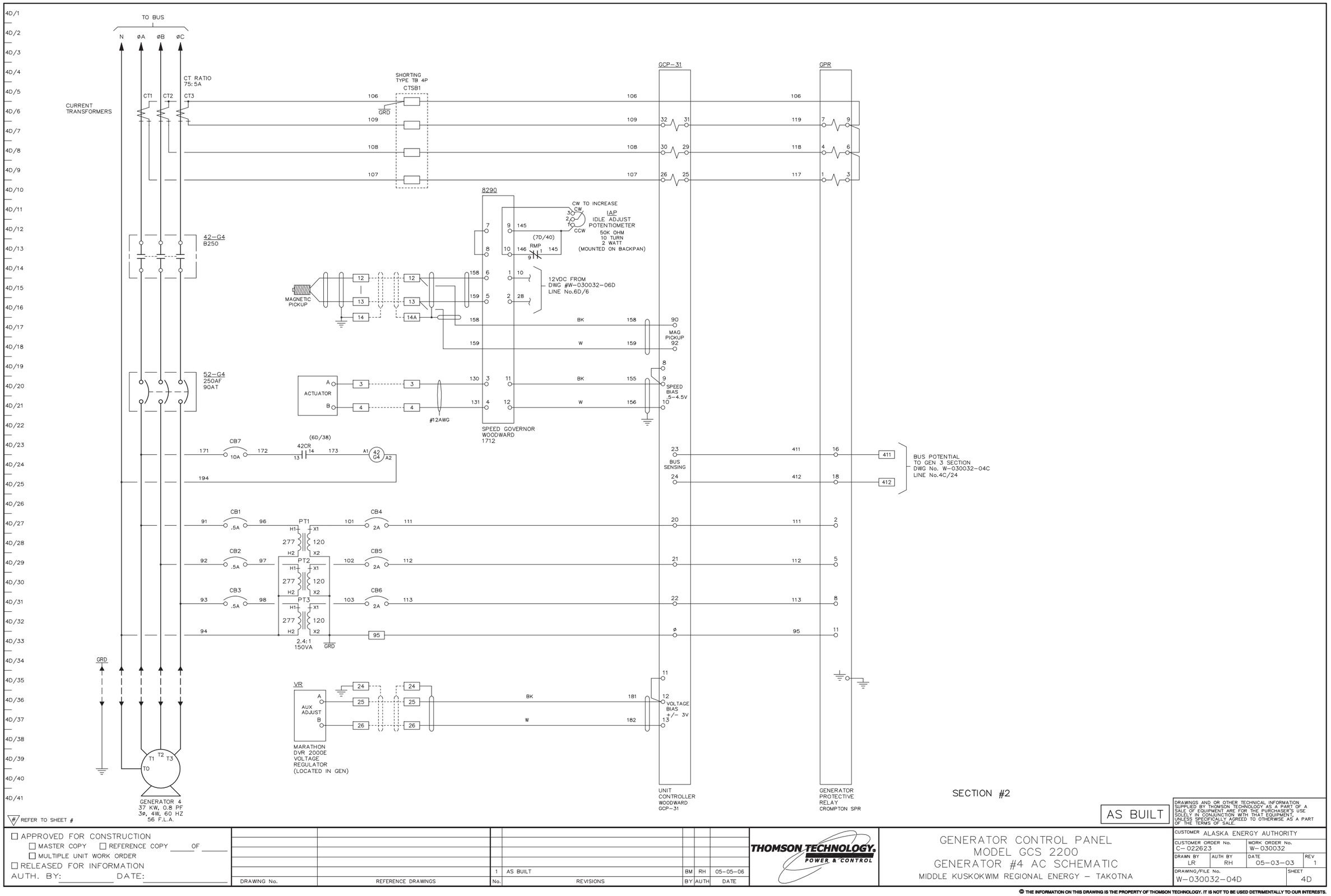
☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

DRAWING No.	REFERENCE DRAWINGS	No.	REVISIONS	BY	AUTH	DATE
		1	AS BUILT	BM	RH	05-05-06

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
GENERATOR #3 AC SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY
CUSTOMER ORDER No.	C-022623
WORK ORDER No.	W-030032
DRAWN BY	LR
AUTH BY	RH
DATE	05-03-03
REV	1
DRAWING/FILE No.	W-030032-04C
SHEET	4C



SECTION #2

AS BUILT

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☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

No.	REVISIONS	BY	AUTH	DATE
1	AS BUILT	BM	RH	05-05-06

DRAWING No. | REFERENCE DRAWINGS

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
GENERATOR #4 AC SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY
CUSTOMER ORDER No.	C-022623
WORK ORDER No.	W-030032
DRAWN BY	LR
AUTH BY	RH
DATE	05-03-03
REV	1
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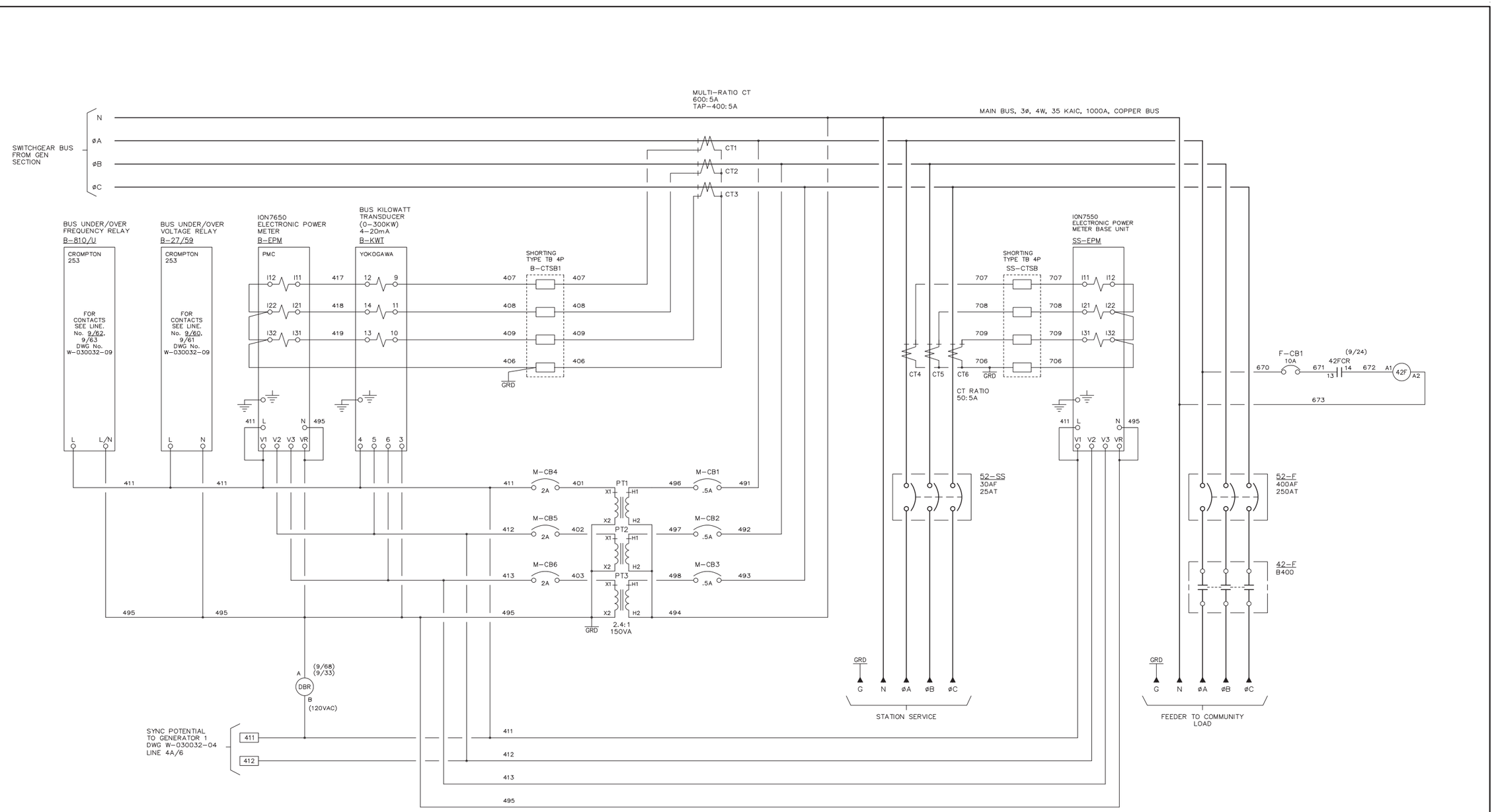

SECTION #1

AS BUILT

DRAWINGS AND OR OTHER TECHNICAL INFORMATION SUPPLIED BY THOMSON TECHNOLOGY AS A PART OF A SALE OF EQUIPMENT ARE FOR THE PURCHASER'S USE SOLELY IN CONJUNCTION WITH THAT EQUIPMENT, UNLESS SPECIFICALLY AGREED TO OTHERWISE AS A PART OF THE TERMS OF SALE.

REFER TO SHEET #

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☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

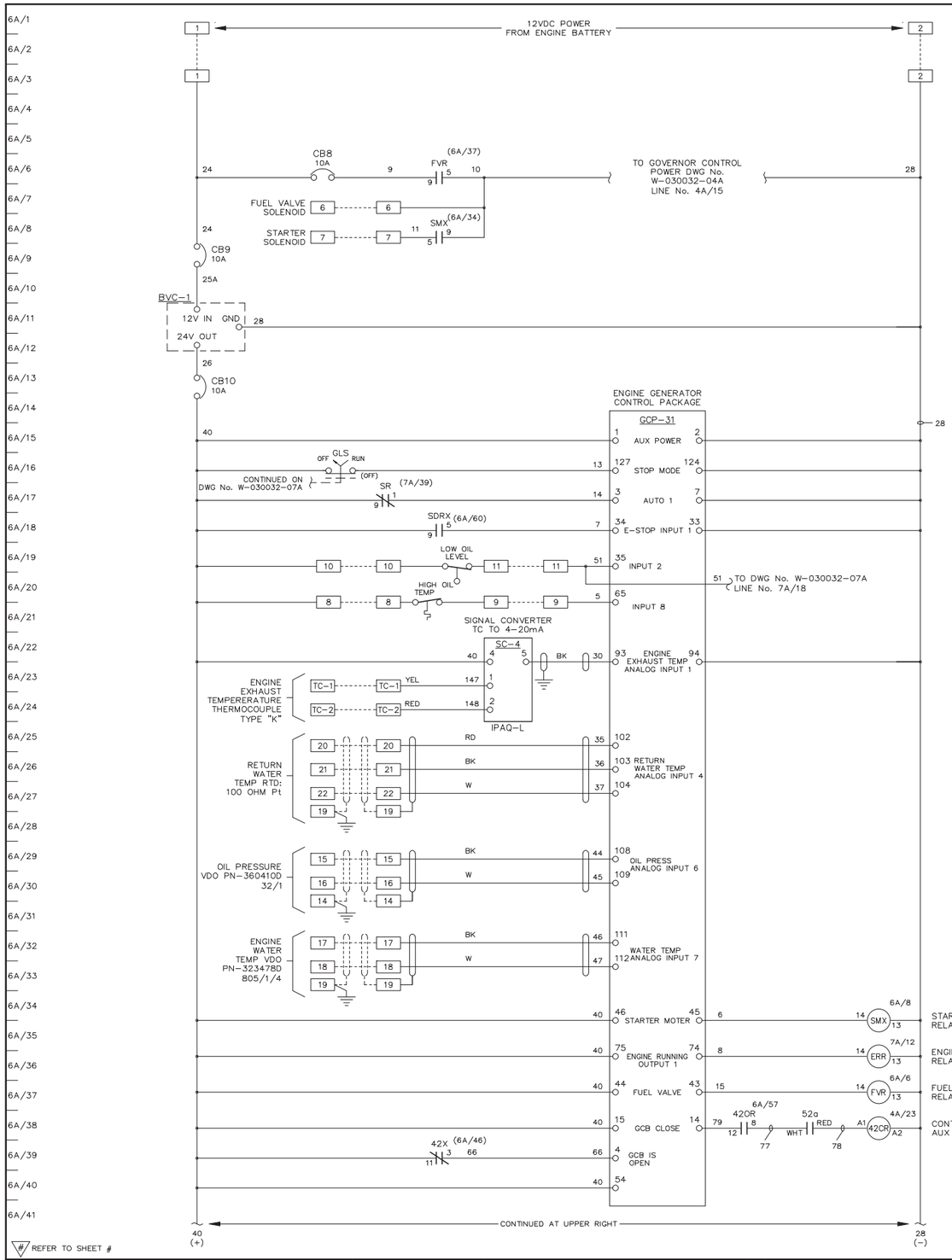
DRAWING No.	REFERENCE DRAWINGS

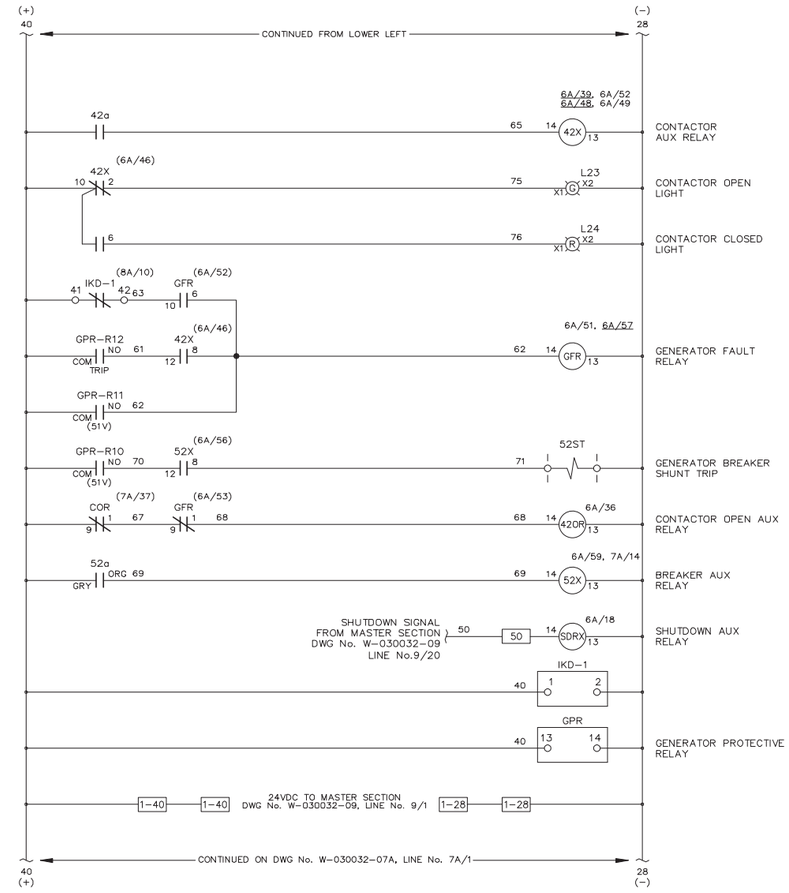
No.	REVISIONS	BY	AUTH	DATE
1	AS BUILT	BM	RH	05-05-06

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
MASTER AC & DISTRIBUTION SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY - TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY
CUSTOMER ORDER No.	C-022623
WORK ORDER No.	W-030032
DRAWN BY	LR
AUTH BY	RH
DATE	05-03-03
REV	1
DRAWING/FILE No.	W-030032-05
SHEET	5





SECTION #5

AS BUILT

☐ APPROVED FOR CONSTRUCTION
☐ MASTER COPY ☐ REFERENCE COPY ____ OF ____
☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

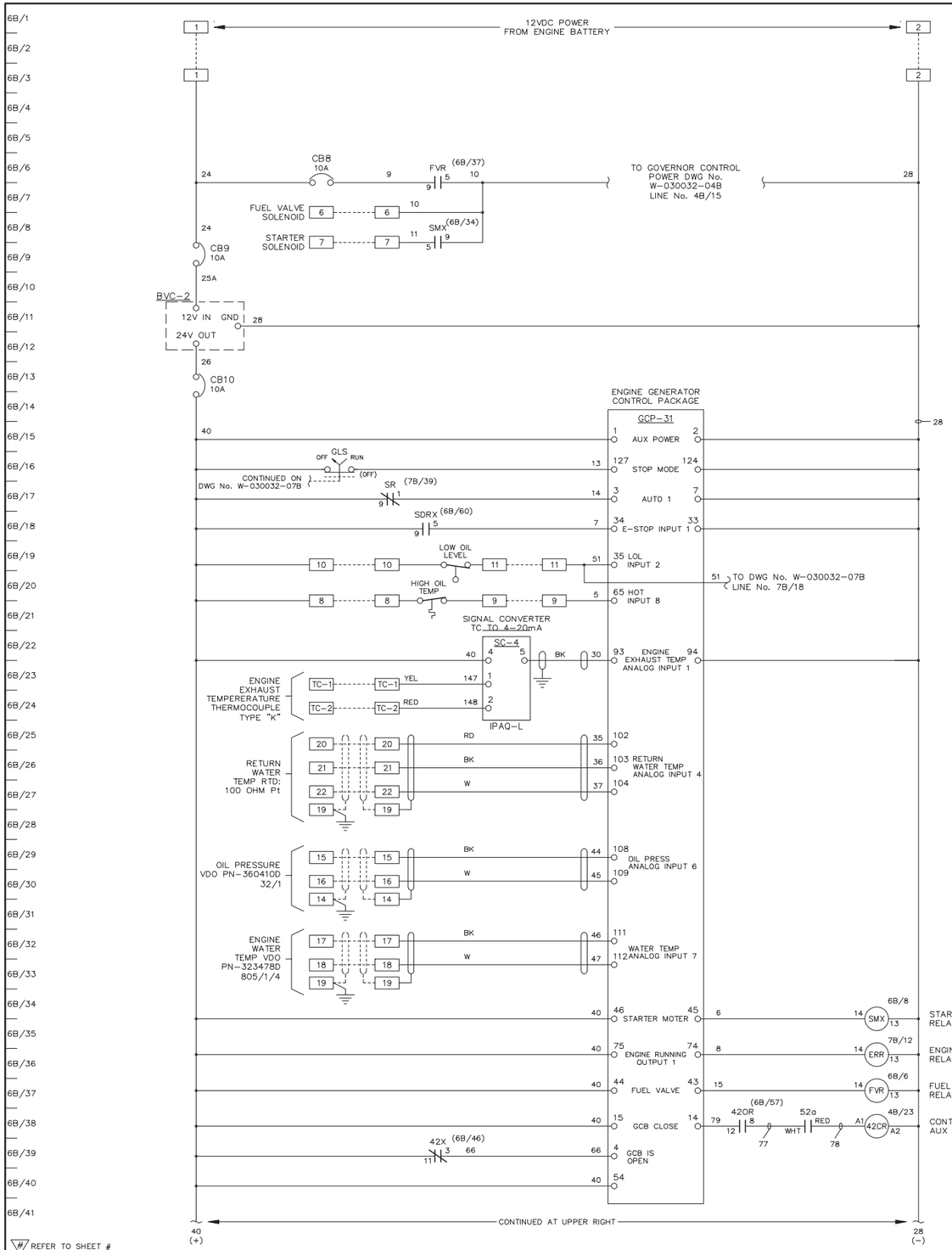
DRAWING No.	REFERENCE DRAWINGS

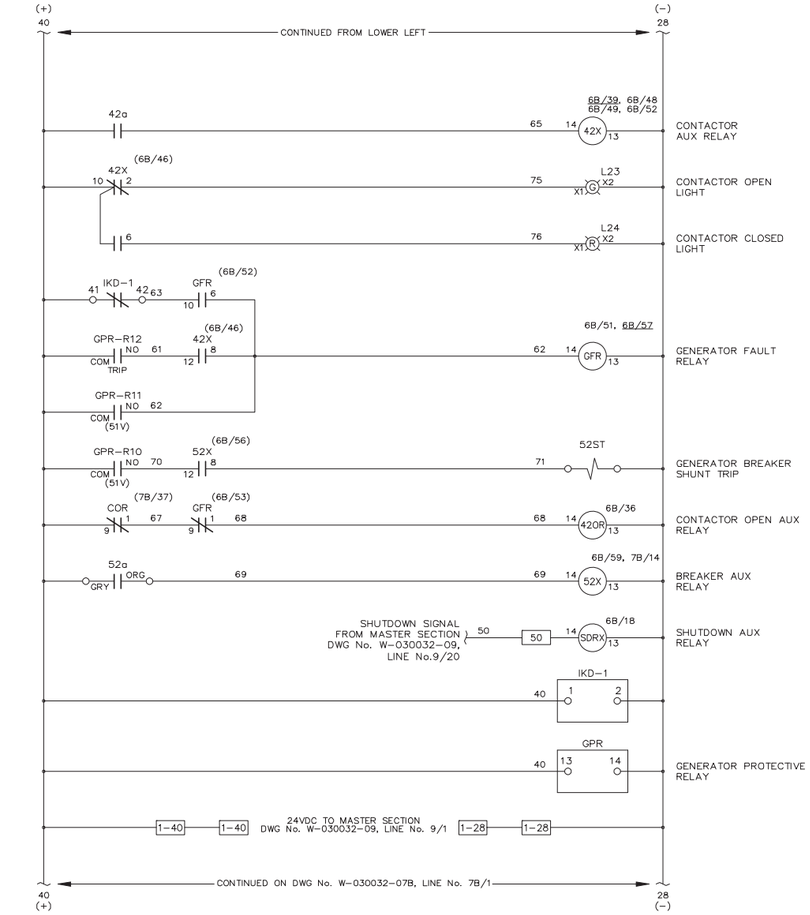
No.	REVISIONS	BY	AUTH	DATE
1	AS BUILT	BM	RH	05-05-06

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
GENERATOR 1 DC CONTROL SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY
CUSTOMER ORDER No.	C-022623
WORK ORDER No.	W-030032
DRAWN BY	LR
AUTH BY	RH
DATE	05-03-03
REV	1
DRAWING/FILE No.	W-030032-06A
SHEET	6A





SECTION #4

AS BUILT

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☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

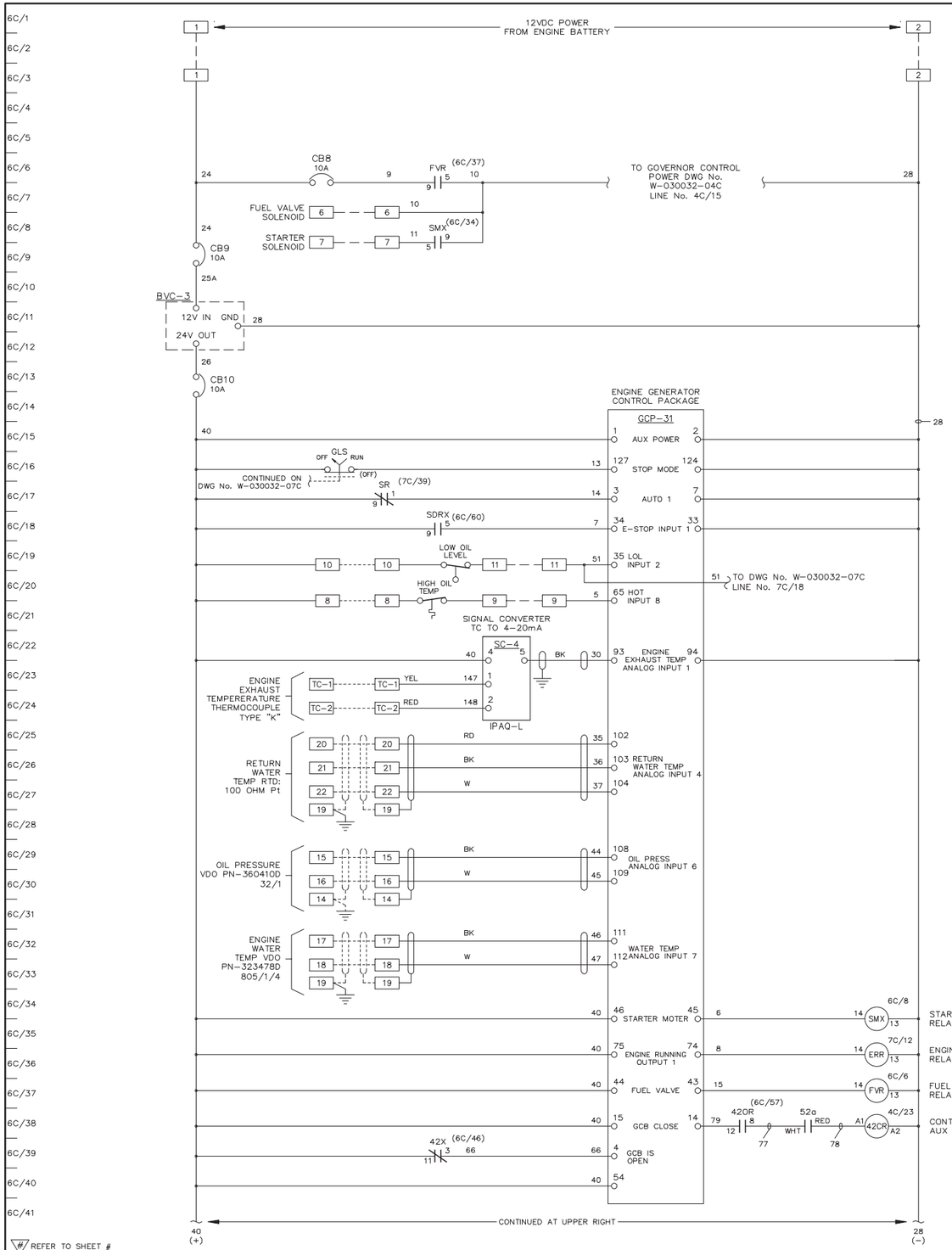
DRAWING No.	REFERENCE DRAWINGS

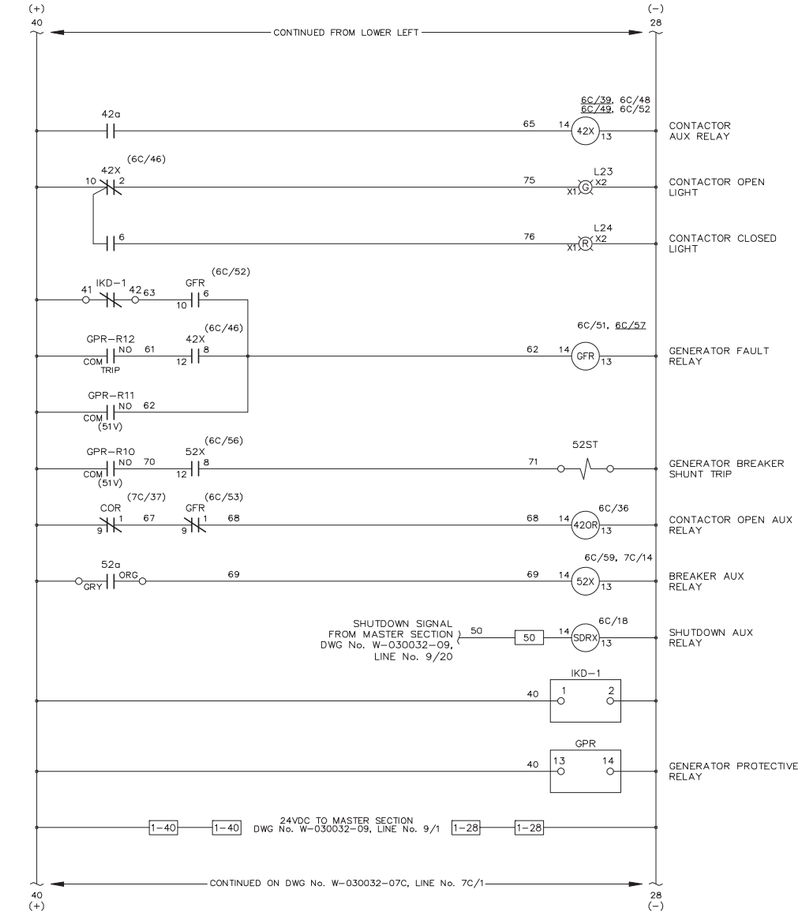
No.	REVISIONS	BY	AUTH	DATE
2	AS BUILT	BM	RH	05-05-06
1	APPROVAL MOD'S	BM	RH	05-03-16

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
GENERATOR 2 DC CONTROL SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY
CUSTOMER ORDER No.	C-022623
WORK ORDER No.	W-030032
DRAWN BY	LR
AUTH BY	RH
DATE	05-03-03
REV	2
DRAWING/FILE No.	W-030032-06B
SHEET	6B





SECTION #3

AS BUILT

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☐ MASTER COPY ☐ REFERENCE COPY ____ OF ____
☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

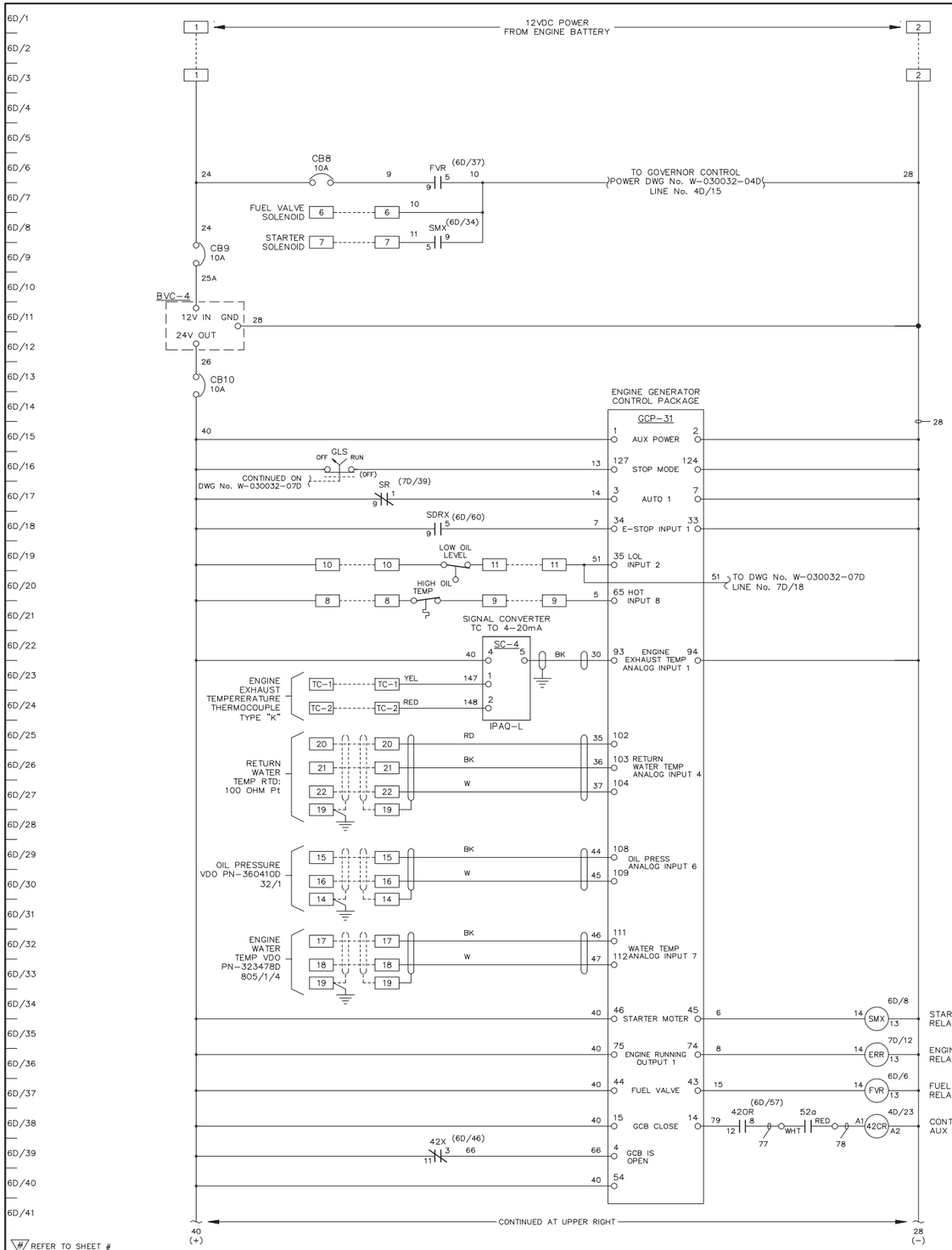
DRAWING No.	REFERENCE DRAWINGS

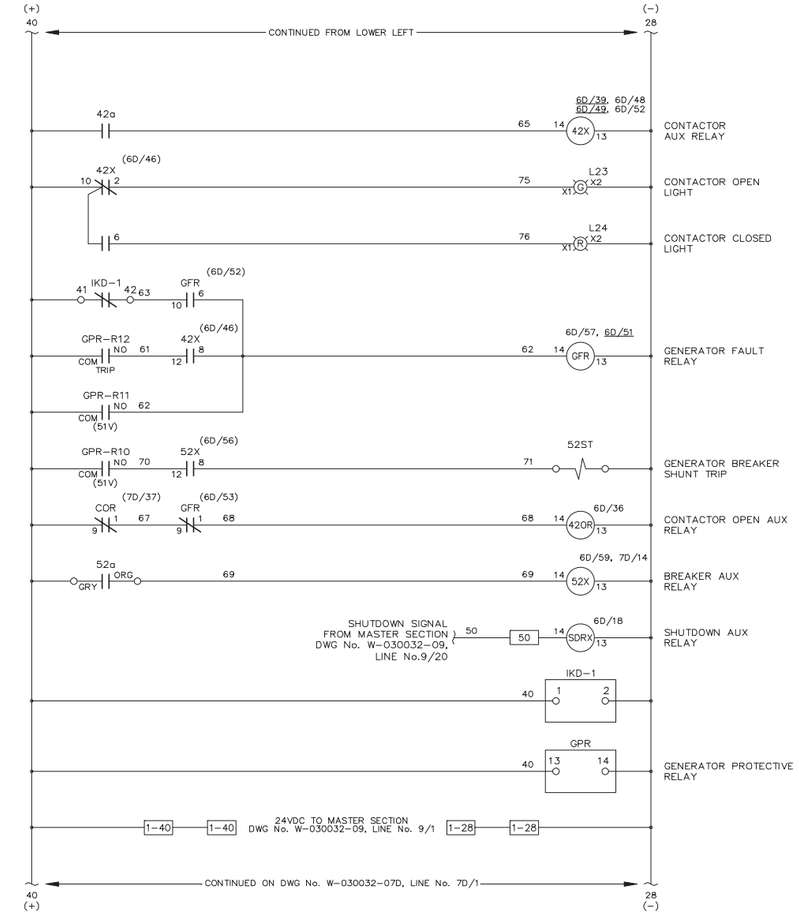
No.	REVISIONS	BY	AUTH	DATE
2	AS BUILT	BM	RH	05-05-06
1	APPROVAL MOD'S	BM	RH	05-03-16

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
GENERATOR 3 DC CONTROL SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY		
CUSTOMER ORDER No.	C-022623	WORK ORDER No.	W-030032
DRAWN BY	LR	AUTH BY	RH
DATE	05-03-03	REV	2
DRAWING/FILE No.	W-030032-06C	SHEET	6C





SECTION #2

AS BUILT

DRAWINGS AND OR OTHER TECHNICAL INFORMATION SUPPLIED BY THOMSON TECHNOLOGY AS A PART OF A SALE OF EQUIPMENT ARE FOR THE PURCHASER'S USE SOLELY IN CONJUNCTION WITH THAT EQUIPMENT, UNLESS SPECIFICALLY AGREED TO OTHERWISE AS A PART OF THE TERMS OF SALE.

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☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

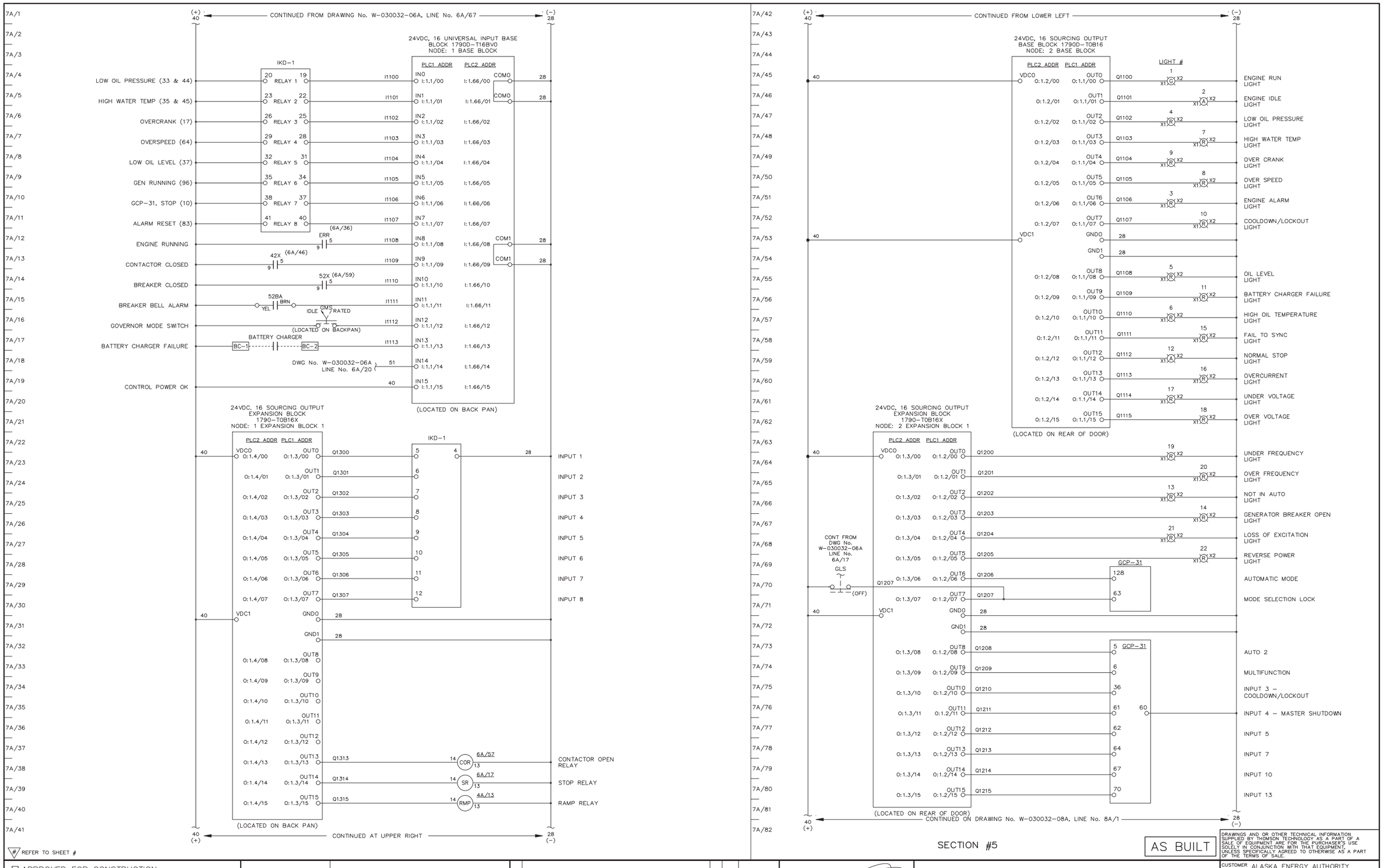
DRAWING No.	REFERENCE DRAWINGS

No.	REVISIONS	BY	AUTH	DATE
2	AS BUILT	BM	RH	05-05-06
1	APPROVAL MOD'S	BM	RH	05-03-16

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
GENERATOR 4 DC CONTROL SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER ALASKA ENERGY AUTHORITY
CUSTOMER ORDER No. C-022623
WORK ORDER No. W-030032
DRAWN BY LR | AUTH BY RH | DATE 05-03-03 | REV 2
DRAWING/FILE No. W-030032-06D
SHEET 6D



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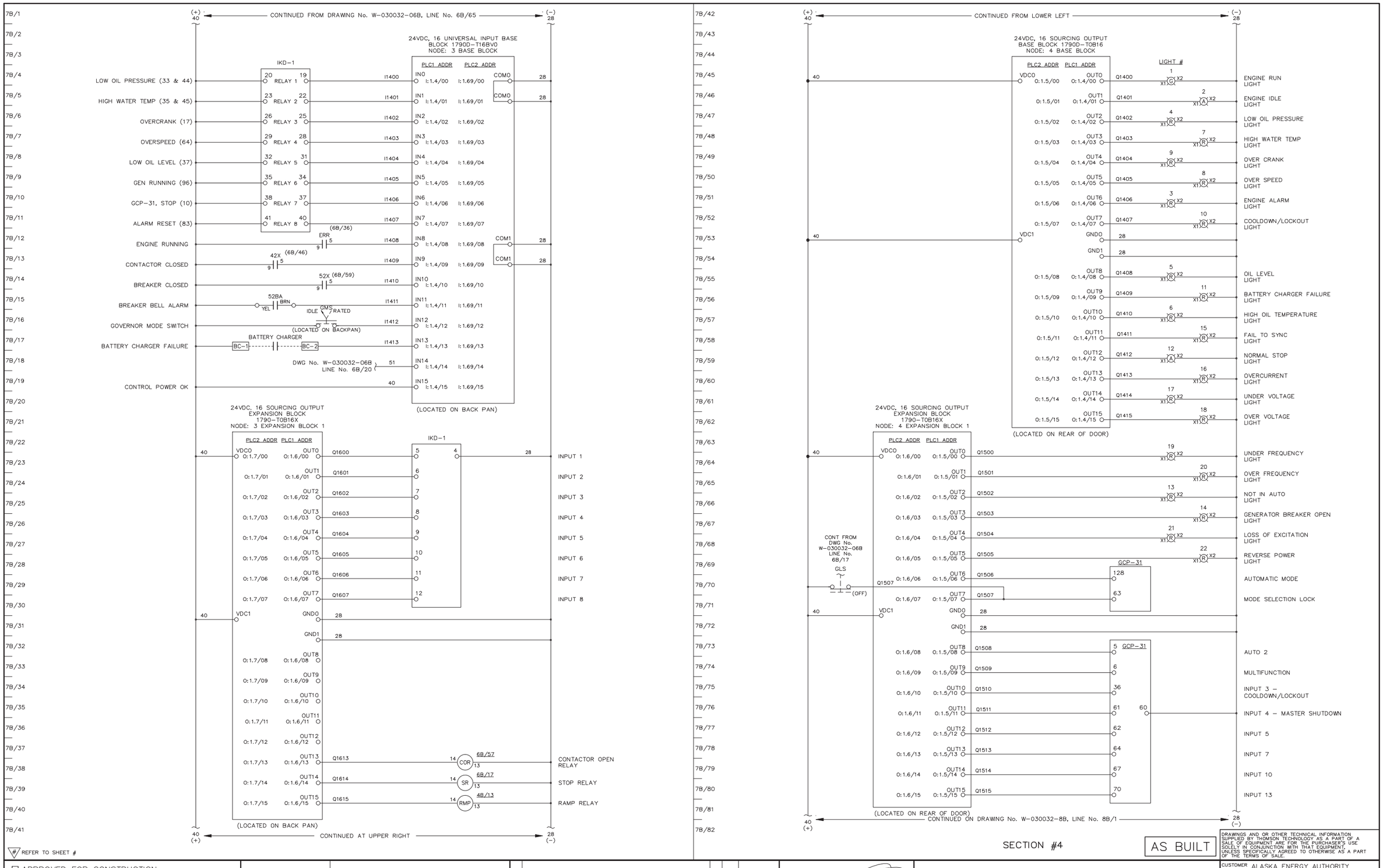
☐ APPROVED FOR CONSTRUCTION
☐ MASTER COPY ☐ REFERENCE COPY ____ OF ____
☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

DRAWING No.	REFERENCE DRAWINGS	No.	REVISIONS	BY	AUTH	DATE
		2	AS BUILT	BM	RH	05-05-06
		1	APPROVAL MOD'S	BM	RH	05-03-16

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
GENERATOR 1 DC CONTROL SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY		
CUSTOMER ORDER No.	C-022623	WORK ORDER No.	W-030032
DRAWN BY	LR	AUTH BY	RH
DATE	05-03-03	REV	2
DRAWING/FILE No.	W-030032-07A	SHEET	7A



SECTION #4

AS BUILT

DRAWINGS AND OR OTHER TECHNICAL INFORMATION SUPPLIED BY THOMSON TECHNOLOGY AS A PART OF A SALE OF EQUIPMENT ARE FOR THE PURCHASER'S USE SOLELY IN CONJUNCTION WITH THAT EQUIPMENT, UNLESS SPECIFICALLY AGREED TO OTHERWISE AS A PART OF THE TERMS OF SALE.

☐ APPROVED FOR CONSTRUCTION
☐ MASTER COPY ☐ REFERENCE COPY ____ OF ____
☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

DRAWING No.	REFERENCE DRAWINGS	No.	REVISIONS	BY	AUTH	DATE
		2	AS BUILT	BM	RH	05-05-06
		1	APPROVAL MOD'S	BM	RH	05-03-16

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
GENERATOR 2 DC CONTROL SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY
CUSTOMER ORDER No.	C-022623
WORK ORDER No.	W-030032
DRAWN BY	LR
AUTH BY	RH
DATE	05-03-03
REV	2
DRAWING/FILE No.	W-030032-07B
SHEET	7B

CONTINUED FROM DRAWING No. W-030032-06C, LINE No. 6C/65

24VDC, 16 UNIVERSAL INPUT BASE BLOCK 1790D-T16BV0 NODE: 5 BASE BLOCK

IKD-1

		PLC1 ADDR	PLC2 ADDR	
LOW OIL PRESSURE (33 & 44)	I1700	IN0	I:1.7/00	I:1.72/00
HIGH WATER TEMP (35 & 45)	I1701	IN1	I:1.7/01	I:1.72/01
OVERCRANK (17)	I1702	IN2	I:1.7/02	I:1.72/02
OVERSPEED (64)	I1703	IN3	I:1.7/03	I:1.72/03
LOW OIL LEVEL (37)	I1704	IN4	I:1.7/04	I:1.72/04
GEN RUNNING (96)	I1705	IN5	I:1.7/05	I:1.72/05
GCP-31, STOP (10)	I1706	IN6	I:1.7/06	I:1.72/06
ALARM RESET (83)	I1707	IN7	I:1.7/07	I:1.72/07
ENGINE RUNNING	I1708	IN8	I:1.7/08	I:1.72/08
CONTACTOR CLOSED	I1709	IN9	I:1.7/09	I:1.72/09
BREAKER CLOSED	I1710	IN10	I:1.7/10	I:1.72/10
BREAKER BELL ALARM	I1711	IN11	I:1.7/11	I:1.72/11
GOVERNOR MODE SWITCH	I1712	IN12	I:1.7/12	I:1.72/12
BATTERY CHARGER FAILURE	I1713	IN13	I:1.7/13	I:1.72/13
		IN14	I:1.7/14	I:1.72/14
CONTROL POWER OK		IN15	I:1.7/15	I:1.72/15

IKD-1 RELAY 1 (20/19) RELAY 2 (23/22) RELAY 3 (26/25) RELAY 4 (29/28) RELAY 5 (32/31) RELAY 6 (35/34) RELAY 7 (38/37) RELAY 8 (41/40)

(6C/36) ERR 5/9 (6C/46) 42X 5/9 (6C/59) 52X 5/9

52BA YEL BRN

IDLE GMS RATED (LOCATED ON BACKPAN)

BATTERY CHARGER BC-1 BC-2

DWG No. W-030032-06C LINE No. 6C/20 — 51

40

COM0 28 COM0 28 COM1 28 COM1 28

(LOCATED ON BACK PAN)

24VDC, 16 SOURCING OUTPUT EXPANSION BLOCK 1790-T0B16X NODE: 5 EXPANSION BLOCK 1

	PLC2 ADDR	PLC1 ADDR		
40 VDC0	O:1.10/00	O:1.9/00	Q1900	INPUT 1
	O:1.10/01	O:1.9/01	Q1901	INPUT 2
	O:1.10/02	O:1.9/02	Q1902	INPUT 3
	O:1.10/03	O:1.9/03	Q1903	INPUT 4
	O:1.10/04	O:1.9/04	Q1904	INPUT 5
	O:1.10/05	O:1.9/05	Q1905	INPUT 6
	O:1.10/06	O:1.9/06	Q1906	INPUT 7
	O:1.10/07	O:1.9/07	Q1907	INPUT 8
40 VDC1		GND0	28	
		GND1	28	
	O:1.10/08	O:1.9/08		
	O:1.10/09	O:1.9/09		
	O:1.10/10	O:1.9/10		
	O:1.10/11	O:1.9/11		
	O:1.10/12	O:1.9/12		
	O:1.10/13	O:1.9/13	Q1913	CONTACTOR OPEN RELAY
	O:1.10/14	O:1.9/14	Q1914	STOP RELAY
	O:1.10/15	O:1.9/15	Q1915	RAMP RELAY

IKD-1 5 4 6 7 8 9 10 11 12

14 COR 13 (6C/57) 14 SR 13 (6C/17) 14 RMP 13 (4C/13)

(LOCATED ON BACK PAN)

40 (+) CONTINUED AT UPPER RIGHT 28 (-)

REFER TO SHEET #

CONTINUED FROM LOWER LEFT

24VDC, 16 SOURCING OUTPUT BASE BLOCK 1790D-T0B16 NODE: 6 BASE BLOCK

	PLC2 ADDR	PLC1 ADDR		LIGHT #	
40 VDC0	O:1.8/00	O:1.7/00	Q1700	1 X1 X2	ENGINE RUN LIGHT
	O:1.8/01	O:1.7/01	Q1701	2 X1 X2	ENGINE IDLE LIGHT
	O:1.8/02	O:1.7/02	Q1702	4 X1 X2	LOW OIL PRESSURE LIGHT
	O:1.8/03	O:1.7/03	Q1703	7 X1 X2	HIGH WATER TEMP LIGHT
	O:1.8/04	O:1.7/04	Q1704	9 X1 X2	OVER CRANK LIGHT
	O:1.8/05	O:1.7/05	Q1705	8 X1 X2	OVER SPEED LIGHT
	O:1.8/06	O:1.7/06	Q1706	3 X1 X2	ENGINE ALARM LIGHT
	O:1.8/07	O:1.7/07	Q1707	10 X1 X2	COOLDOWN/LOCKOUT LIGHT
40 VDC1		GND0	28		
		GND1	28		
	O:1.8/08	O:1.7/08	Q1708	5 X1 X2	OIL LEVEL LIGHT
	O:1.8/09	O:1.7/09	Q1709	11 X1 X2	BATTERY CHARGER FAILURE LIGHT
	O:1.8/10	O:1.7/10	Q1710	6 X1 X2	HIGH OIL TEMPERATURE LIGHT
	O:1.8/11	O:1.7/11	Q1711	15 X1 X2	FAIL TO SYNC LIGHT
	O:1.8/12	O:1.7/12	Q1712	12 X1 X2	NORMAL STOP LIGHT
	O:1.8/13	O:1.7/13	Q1713	16 X1 X2	OVERCURRENT LIGHT
	O:1.8/14	O:1.7/14	Q1714	17 X1 X2	UNDER VOLTAGE LIGHT
	O:1.8/15	O:1.7/15	Q1715	18 X1 X2	OVER VOLTAGE LIGHT

(LOCATED ON REAR OF DOOR)

24VDC, 16 SOURCING OUTPUT EXPANSION BLOCK 1790-T0B16X NODE: 6 EXPANSION BLOCK 1

	PLC2 ADDR	PLC1 ADDR			
40 VDC0	O:1.9/00	O:1.8/00	Q1800	19 X1 X2	UNDER FREQUENCY LIGHT
	O:1.9/01	O:1.8/01	Q1801	20 X1 X2	OVER FREQUENCY LIGHT
	O:1.9/02	O:1.8/02	Q1802	13 X1 X2	NOT IN AUTO LIGHT
	O:1.9/03	O:1.8/03	Q1803	14 X1 X2	GENERATOR BREAKER OPEN LIGHT
	O:1.9/04	O:1.8/04	Q1804	21 X1 X2	LOSS OF EXCITATION LIGHT
	O:1.9/05	O:1.8/05	Q1805	22 X1 X2	REVERSE POWER LIGHT
CONT FROM DWG No. W-030032-06C LINE No. 6C/17 GLS (OFF) Q1807	O:1.9/06	O:1.8/06	Q1806	GCP-31 128	AUTOMATIC MODE
	O:1.9/07	O:1.8/07	Q1807	63	MODE SELECTION LOCK
40 VDC1		GND0	28		
		GND1	28		
	O:1.9/08	O:1.8/08	Q1808	5 GCP-31	AUTO 2
	O:1.9/09	O:1.8/09	Q1809	6	MULTIFUNCTION
	O:1.9/10	O:1.8/10	Q1810	36	INPUT 3 – COOLDOWN/LOCKOUT
	O:1.9/11	O:1.8/11	Q1811	61 60	INPUT 4 – MASTER SHUTDOWN
	O:1.9/12	O:1.8/12	Q1812	62	INPUT 5
	O:1.9/13	O:1.8/13	Q1813	64	INPUT 7
	O:1.9/14	O:1.8/14	Q1814	67	INPUT 10
	O:1.9/15	O:1.8/15	Q1815	70	INPUT 13

(LOCATED ON REAR OF DOOR)

40 (+) CONTINUED ON DRAWING No. W-030032-08C, LINE No. 8C/1 28 (-)

SECTION #3

AS BUILT

DRAWINGS AND OR OTHER TECHNICAL INFORMATION SUPPLIED BY THOMSON TECHNOLOGY AS A PART OF A SALE OF EQUIPMENT ARE FOR THE PURCHASER'S USE SOLELY IN CONJUNCTION WITH THAT EQUIPMENT, UNLESS SPECIFICALLY AGREED TO OTHERWISE AS A PART OF THE TERMS OF SALE.

☐ APPROVED FOR CONSTRUCTION
☐ MASTER COPY ☐ REFERENCE COPY ____ OF ____
☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

DRAWING No.	REFERENCE DRAWINGS

No.	REVISIONS	BY	AUTH	DATE
2	AS BUILT	BM	RH	05-05-06
1	APPROVAL MOD'S	BM	RH	05-03-16

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
GENERATOR 3 DC CONTROL SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER ALASKA ENERGY AUTHORITY			
CUSTOMER ORDER No. C-022623	WORK ORDER No. W-030032		
DRAWN BY LR	AUTH BY RH	DATE 05-03-03	REV 2
DRAWING/FILE No. W-030032-07C		SHEET 7C	

CONTINUED FROM DRAWING No. W-030032-06D, LINE No. 6D/65

24VDC, 16 UNIVERSAL INPUT BASE BLOCK 1790D-T16BV0 NODE: 7 BASE BLOCK

IKD-1

LOW OIL PRESSURE (33 & 44)	20 RELAY 1 19	I11000	IN0	I:1.10/00	I:1.75/00
HIGH WATER TEMP (35 & 45)	23 RELAY 2 22	I11001	IN1	I:1.10/01	I:1.75/01
OVERCRANK (17)	26 RELAY 3 25	I11002	IN2	I:1.10/02	I:1.75/02
OVERSPEED (64)	29 RELAY 4 28	I11003	IN3	I:1.10/03	I:1.75/03
LOW OIL LEVEL (37)	32 RELAY 5 31	I11004	IN4	I:1.10/04	I:1.75/04
GEN RUNNING (96)	35 RELAY 6 34	I11005	IN5	I:1.10/05	I:1.75/05
GCP-31, STOP (10)	38 RELAY 7 37	I11006	IN6	I:1.10/06	I:1.75/06
ALARM RESET (83)	41 RELAY 8 40	I11007	IN7	I:1.10/07	I:1.75/07
ENGINE RUNNING	(6D/36) ERR 5 / 9	I11008	IN8	I:1.10/08	I:1.75/08
CONTACTOR CLOSED	42X (6D/46) 5 / 9	I11009	IN9	I:1.10/09	I:1.75/09
BREAKER CLOSED	52X (6D/59) 5 / 9	I11010	IN10	I:1.10/10	I:1.75/10
BREAKER BELL ALARM	52BA YEL BRN	I11011	IN11	I:1.10/11	I:1.75/11
GOVERNOR MODE SWITCH	IDLE GMS RATED (LOCATED ON BACKPAN)	I11012	IN12	I:1.10/12	I:1.75/12
BATTERY CHARGER FAILURE	BATTERY CHARGER BC-1 BC-2	I11013	IN13	I:1.10/13	I:1.75/13
	DWG No. W-030032-06D LINE No. 6D/20 51		IN14	I:1.10/14	I:1.75/14
CONTROL POWER OK	40		IN15	I:1.10/15	I:1.75/15

COM0 28 28 — COM1 28 28

(LOCATED ON BACK PAN)

24VDC, 16 SOURCING OUTPUT EXPANSION BLOCK 1790-T0B16X NODE: 7 EXPANSION BLOCK 1

PLC2 ADDR	PLC1 ADDR			
VDC0	OUT0	Q11200	IKD-1 5	INPUT 1
O:1.13/00	O:1.12/00			
	OUT1	Q11201	6	INPUT 2
O:1.13/01	O:1.12/01			
	OUT2	Q11202	7	INPUT 3
O:1.13/02	O:1.12/02			
	OUT3	Q11203	8	INPUT 4
O:1.13/03	O:1.12/03			
	OUT4	Q11204	9	INPUT 5
O:1.13/04	O:1.12/04			
	OUT5	Q11205	10	INPUT 6
O:1.13/05	O:1.12/05			
	OUT6	Q11206	11	INPUT 7
O:1.13/06	O:1.12/06			
	OUT7	Q11207	12	INPUT 8
O:1.13/07	O:1.12/07			
VDC1	GND0		28	
	GND1		28	
	OUT8			
O:1.13/08	O:1.12/08			
	OUT9			
O:1.13/09	O:1.12/09			
	OUT10			
O:1.13/10	O:1.12/10			
	OUT11			
O:1.13/11	O:1.12/11			
	OUT12			
O:1.13/12	O:1.12/12			
	OUT13	Q11213	14 COR 13 (6D/57)	CONTACTOR OPEN RELAY
O:1.13/13	O:1.12/13			
	OUT14	Q11214	14 SR 13 (6D/17)	STOP RELAY
O:1.13/14	O:1.12/14			
	OUT15	Q11215	14 RMP 13 (4D/13)	RAMP RELAY
O:1.13/15	O:1.12/15			

40 (+) — 28 (-)

(LOCATED ON BACK PAN)

CONTINUED AT UPPER RIGHT

CONTINUED FROM LOWER LEFT

24VDC, 16 SOURCING OUTPUT BASE BLOCK 1790D-T0B16 NODE: 8 BASE BLOCK

PLC2 ADDR	PLC1 ADDR		LIGHT #	
40 VDC0	OUT0	Q11000	1 X1 X2	ENGINE RUN LIGHT
O:1.11/00	O:1.10/00			
	OUT1	Q11001	2 X1 X2	ENGINE IDLE LIGHT
O:1.11/01	O:1.10/01			
	OUT2	Q11002	4 X1 X2	LOW OIL PRESSURE LIGHT
O:1.11/02	O:1.10/02			
	OUT3	Q11003	7 X1 X2	HIGH WATER TEMP LIGHT
O:1.11/03	O:1.10/03			
	OUT4	Q11004	9 X1 X2	OVER CRANK LIGHT
O:1.11/04	O:1.10/04			
	OUT5	Q11005	8 X1 X2	OVER SPEED LIGHT
O:1.11/05	O:1.10/05			
	OUT6	Q11006	3 X1 X2	ENGINE ALARM LIGHT
O:1.11/06	O:1.10/06			
	OUT7	Q11007	10 X1 X2	COOLDOWN/LOCKOUT LIGHT
O:1.11/07	O:1.10/07			
40 VDC1	GND0		28	
	GND1		28	
	OUT8	Q11008	5 X1 X2	OIL LEVEL LIGHT
O:1.11/08	O:1.10/08			
	OUT9	Q11009	11 X1 X2	BATTERY CHARGER FAILURE LIGHT
O:1.11/09	O:1.10/09			
	OUT10	Q11010	6 X1 X2	HIGH OIL TEMPERATURE LIGHT
O:1.11/10	O:1.10/10			
	OUT11	Q11011	15 X1 X2	FAIL TO SYNC LIGHT
O:1.11/11	O:1.10/11			
	OUT12	Q11012	12 X1 X2	NORMAL STOP LIGHT
O:1.11/12	O:1.10/12			
	OUT13	Q11013	16 X1 X2	OVERCURRENT LIGHT
O:1.11/13	O:1.10/13			
	OUT14	Q11014	17 X1 X2	UNDER VOLTAGE LIGHT
O:1.11/14	O:1.10/14			
	OUT15	Q11015	18 X1 X2	OVER VOLTAGE LIGHT
O:1.11/15	O:1.10/15			

(LOCATED ON REAR OF DOOR)

24VDC, 16 SOURCING OUTPUT EXPANSION BLOCK 1790-T0B16X NODE: 8 EXPANSION BLOCK 1

PLC2 ADDR	PLC1 ADDR			
40 VDC0	OUT0	Q11100	19 X1 X2	UNDER FREQUENCY LIGHT
O:1.12/00	O:1.11/00			
	OUT1	Q11101	20 X1 X2	OVER FREQUENCY LIGHT
O:1.12/01	O:1.11/01			
	OUT2	Q11102	13 X1 X2	NOT IN AUTO LIGHT
O:1.12/02	O:1.11/02			
	OUT3	Q11103	14 X1 X2	GENERATOR BREAKER OPEN LIGHT
O:1.12/03	O:1.11/03			
	OUT4	Q11104	21 X1 X2	LOSS OF EXCITATION LIGHT
O:1.12/04	O:1.11/04			
	OUT5	Q11105	22 X1 X2	REVERSE POWER LIGHT
O:1.12/05	O:1.11/05			
CONT FROM DWG No. W-030032-06D LINE No. 6D/17 GLS	OUT6	Q11106	GCP-31 128	AUTOMATIC MODE
O:1.12/06	O:1.11/06			
Q11107 (OFF)	OUT7	Q11107	63	MODE SELECTION LOCK
O:1.12/07	O:1.11/07			
40 VDC1	GND0		28	
	GND1		28	
	OUT8	Q11108	5 GCP-31	AUTO 2
O:1.12/08	O:1.11/08			
	OUT9	Q11109	6	MULTIFUNCTION
O:1.12/09	O:1.11/09			
	OUT10	Q11110	36	INPUT 3 — COOLDOWN/LOCKOUT
O:1.12/10	O:1.11/10			
	OUT11	Q11111	61 60	INPUT 4 — MASTER SHUTDOWN
O:1.12/11	O:1.11/11			
	OUT12	Q11112	62	INPUT 5
O:1.12/12	O:1.11/12			
	OUT13	Q11113	64	INPUT 7
O:1.12/13	O:1.11/13			
	OUT14	Q11114	67	INPUT 10
O:1.12/14	O:1.11/14			
	OUT15	Q11115	70	INPUT 13
O:1.12/15	O:1.11/15			

(LOCATED ON REAR OF DOOR)

CONTINUED ON DRAWING No. W-030032-08D, LINE No. 8D/1

40 (+) — 28 (-)

SECTION #2

AS BUILT

REFER TO SHEET #

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☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

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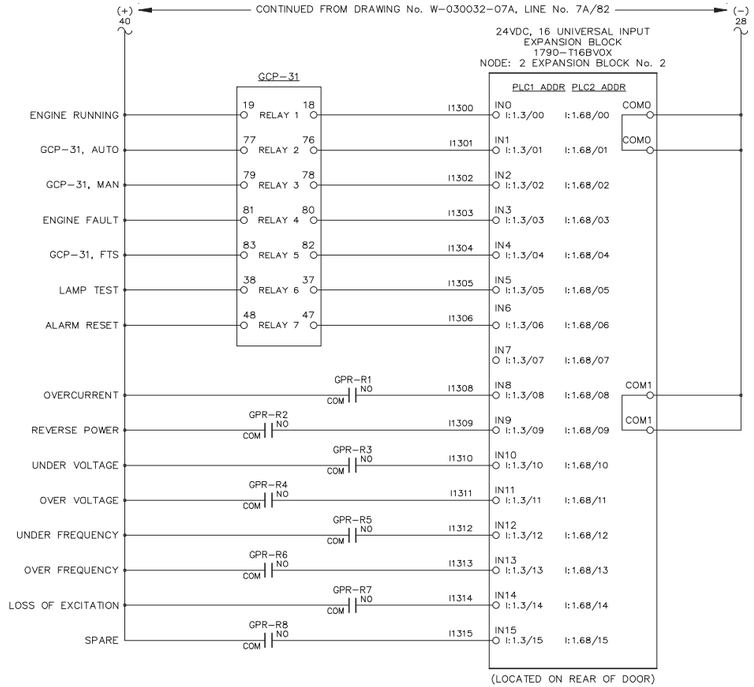
		2	AS BUILT	BM	RH	05-05-06
		1	APPROVAL MOD'S	BM	RH	05-03-16

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
GENERATOR 4 DC CONTROL SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER ALASKA ENERGY AUTHORITY			
CUSTOMER ORDER No. C-022623		WORK ORDER No. W-030032	
DRAWN BY LR	AUTH BY RH	DATE 05-03-03	REV 2
DRAWING/FILE No. W-030032-07D			SHEET 7D



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8A/41

SECTION #5

#/ REFER TO SHEET #

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AUTH. BY: _____ DATE: _____

DRAWING No.	REFERENCE DRAWINGS

No.	REVISIONS	BY	AUTH	DATE
1	AS BUILT	BM	RH	05-05-06

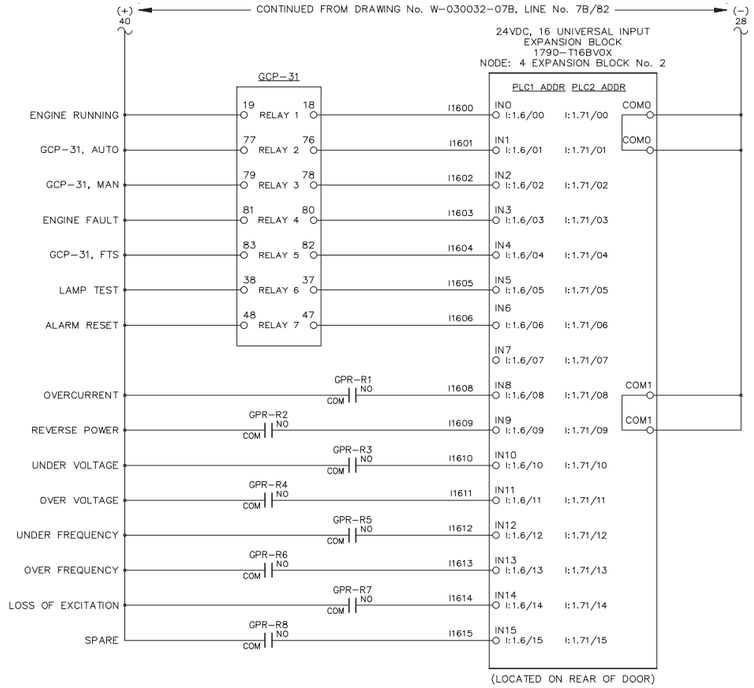
THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
GENERATOR 1 DC CONTROL SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER ALASKA ENERGY AUTHORITY

CUSTOMER ORDER No.	WORK ORDER No.		
C-022623	W-030032		
DRAWN BY	AUTH BY	DATE	REV
LR	RH	05-03-03	1
DRAWING/FILE No.		SHEET	
W-030032-08A		8A	

CONTINUED FROM DRAWING No. W-030032-07B, LINE No. 7B/82



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8B/41

SECTION #4

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DRAWING No.	REFERENCE DRAWINGS

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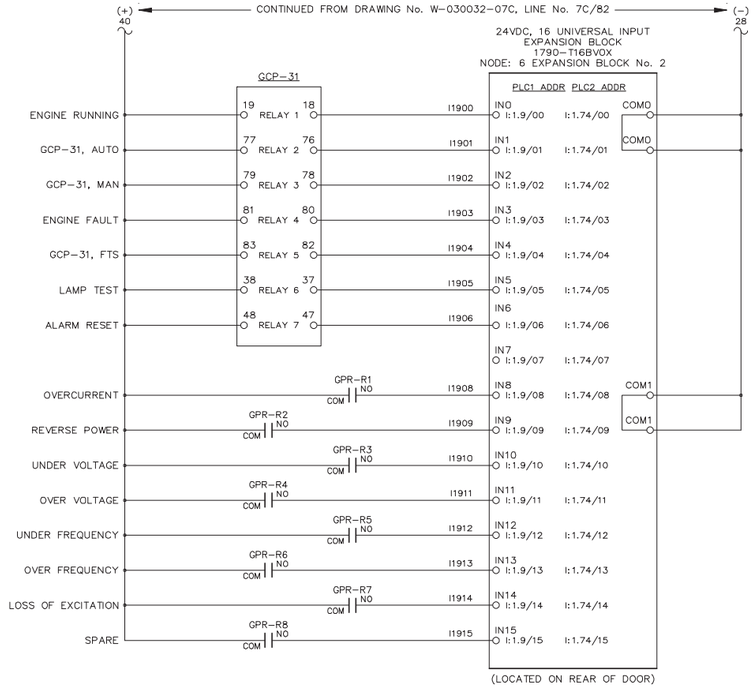
THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
GENERATOR 2 DC CONTROL SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER ALASKA ENERGY AUTHORITY

CUSTOMER ORDER No.	WORK ORDER No.		
C-022623	W-030032		
DRAWN BY	AUTH BY	DATE	REV
LR	RH	05-03-03	1
DRAWING/FILE No.		SHEET	
W-030032-08B		8B	

8C/1 8C/2 8C/3 8C/4 8C/5 8C/6 8C/7 8C/8 8C/9 8C/10 8C/11 8C/12 8C/13 8C/14 8C/15 8C/16 8C/17 8C/18 8C/19 8C/20 8C/21 8C/22 8C/23 8C/24 8C/25 8C/26 8C/27 8C/28 8C/29 8C/30 8C/31 8C/32 8C/33 8C/34 8C/35 8C/36 8C/37 8C/38 8C/39 8C/40 8C/41



SECTION #3

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AUTH. BY: _____ DATE: _____

DRAWING No.	REFERENCE DRAWINGS

No.	REVISIONS	BY	AUTH	DATE
1	AS BUILT	BM	RH	05-05-06

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
GENERATOR 3 DC CONTROL SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY		
CUSTOMER ORDER No.	C-022623	WORK ORDER No.	W-030032
DRAWN BY	LR	AUTH BY	RH
DATE	05-03-03	REV	1
DRAWING/FILE No.	W-030032-08C	SHEET	8C

CONTINUED FROM DRAWING No. W-030032-07D, LINE No. 7D/82

(+) 40 ~ (-) 28

24VDC, 16 UNIVERSAL INPUT
EXPANSION BLOCK
1790-T16BVOX
NODE: 6 EXPANSION BLOCK No. 2

GCP-31

				PLC1 ADDR	PLC2 ADDR	
ENGINE RUNNING	19 RELAY 1 18	I11200	IN0	I:1.12/00	I:1.77/00	COM0
GCP-31, AUTO	77 RELAY 2 76	I11201	IN1	I:1.12/01	I:1.77/01	COM0
GCP-31, MAN	79 RELAY 3 78	I11202	IN2	I:1.12/02	I:1.77/02	
ENGINE FAULT	81 RELAY 4 80	I11203	IN3	I:1.12/03	I:1.77/03	
GCP-31, FTS	83 RELAY 5 82	I11204	IN4	I:1.12/04	I:1.77/04	
LAMP TEST	38 RELAY 6 37	I11205	IN5	I:1.12/05	I:1.77/05	
ALARM RESET	48 RELAY 7 47	I11206	IN6	I:1.12/06	I:1.77/06	
			IN7	I:1.12/07	I:1.77/07	
OVERCURRENT	GPR-R1 NO COM	I11208	IN8	I:1.12/08	I:1.77/08	COM1
REVERSE POWER	GPR-R2 NO COM	I11209	IN9	I:1.12/09	I:1.77/09	COM1
UNDER VOLTAGE	GPR-R3 NO COM	I11210	IN10	I:1.12/10	I:1.77/10	
OVER VOLTAGE	GPR-R4 NO COM	I11211	IN11	I:1.12/11	I:1.77/11	
UNDER FREQUENCY	GPR-R5 NO COM	I11212	IN12	I:1.12/12	I:1.77/12	
OVER FREQUENCY	GPR-R6 NO COM	I11213	IN13	I:1.12/13	I:1.77/13	
LOSS OF EXCITATION	GPR-R7 NO COM	I11214	IN14	I:1.12/14	I:1.77/14	
SPARE	GPR-R8 NO COM	I11215	IN15	I:1.12/15	I:1.77/15	

(LOCATED ON REAR OF DOOR)

8D/1 8D/2 8D/3 8D/4 8D/5 8D/6 8D/7 8D/8 8D/9 8D/10 8D/11 8D/12 8D/13 8D/14 8D/15 8D/16 8D/17 8D/18 8D/19 8D/20 8D/21 8D/22 8D/23 8D/24 8D/25 8D/26 8D/27 8D/28 8D/29 8D/30 8D/31 8D/32 8D/33 8D/34 8D/35 8D/36 8D/37 8D/38 8D/39 8D/40 8D/41

SECTION #2

AS BUILT

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DRAWING No.	REFERENCE DRAWINGS

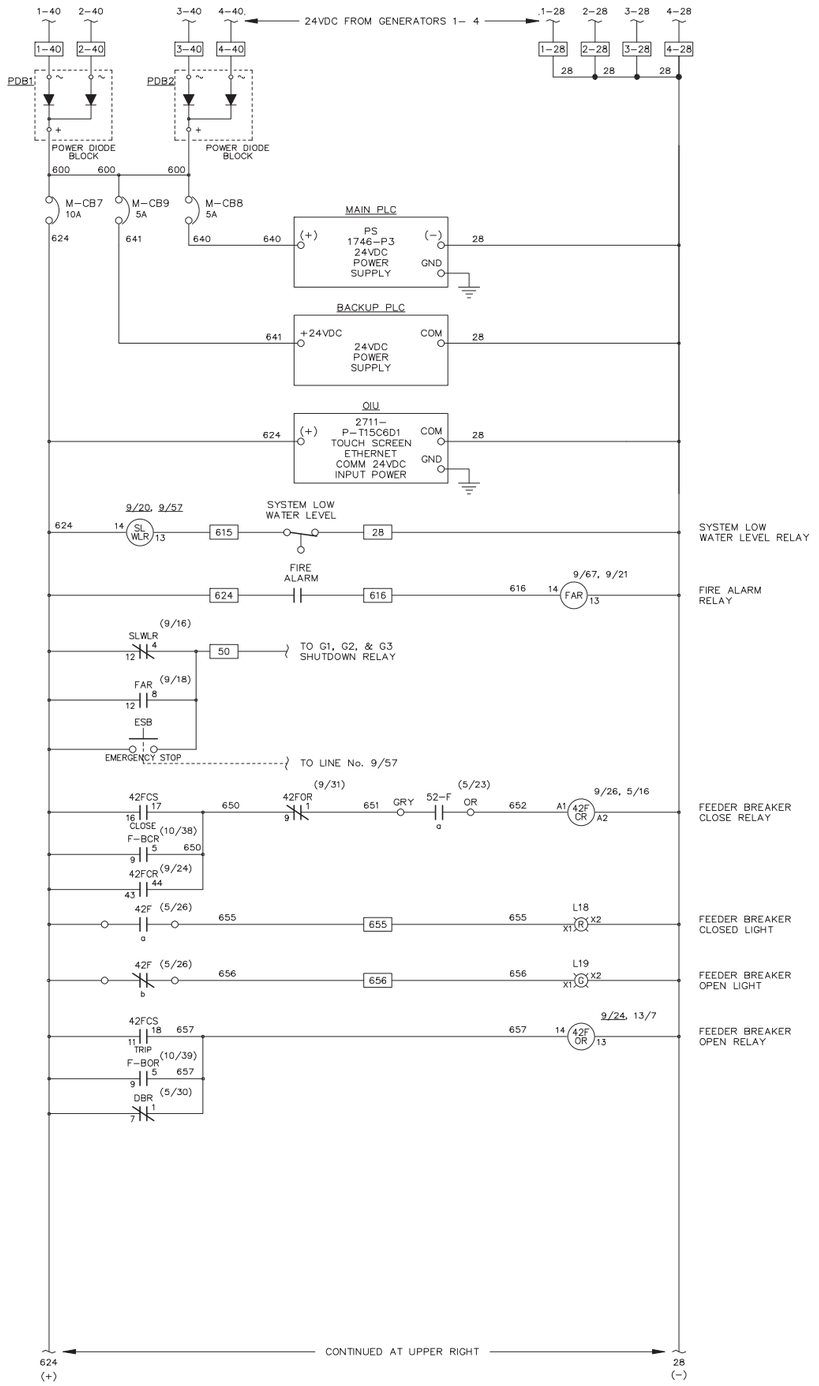
No.	REVISIONS	BY	AUTH	DATE
1	AS BUILT	BM	RH	05-05-06

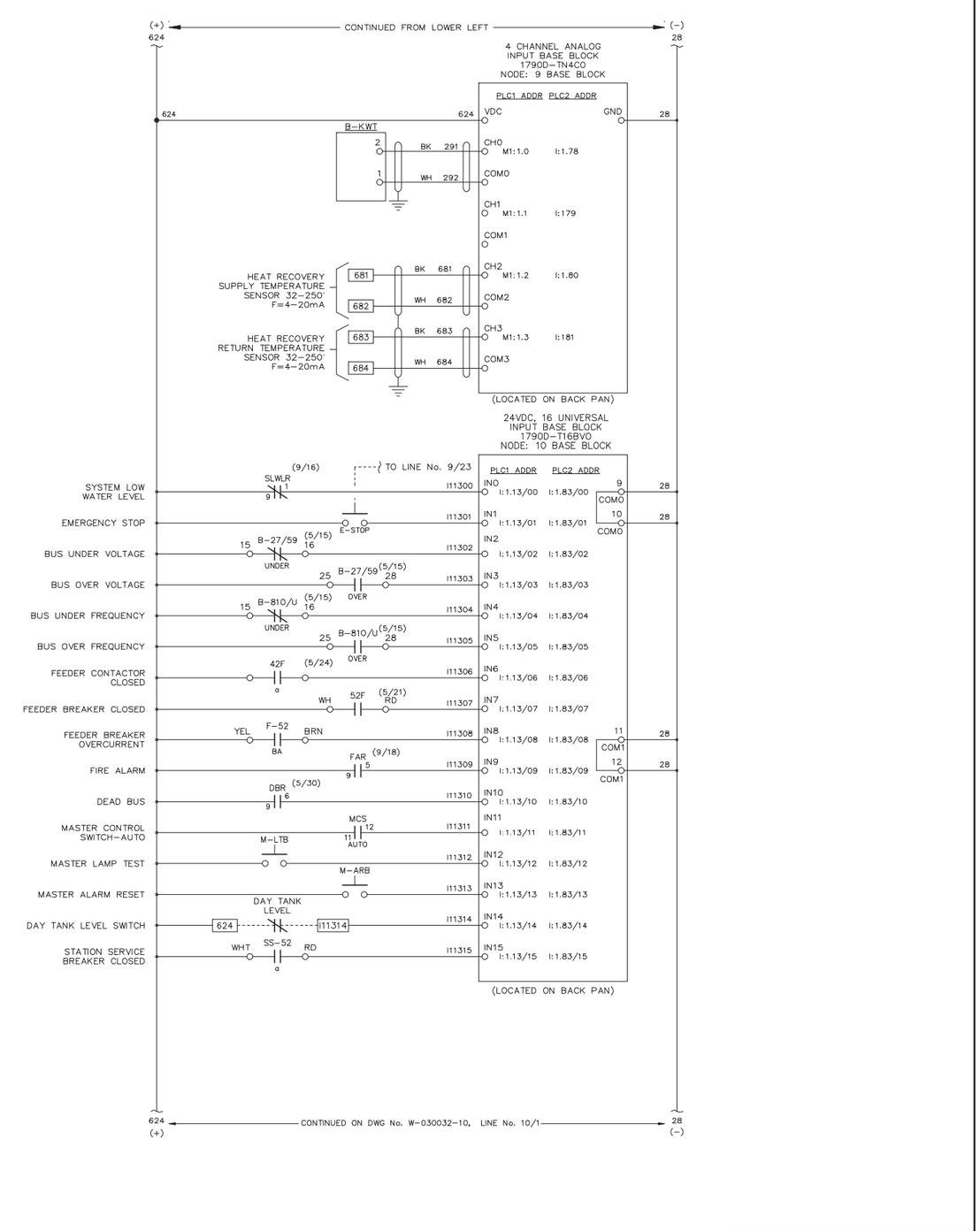
THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
GENERATOR 4 DC CONTROL SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER ALASKA ENERGY AUTHORITY

CUSTOMER ORDER No.	WORK ORDER No.		
C-022623	W-030032		
DRAWN BY	AUTH BY	DATE	REV
LR	RH	05-03-03	1
DRAWING/FILE No.		SHEET	
W-030032-08D		8D	





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1	APPROVAL MOD'S	BM	RH	05-03-16

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
MASTER DC CONTROL SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY
CUSTOMER ORDER No.	C-022623
WORK ORDER No.	W-030032
DRAWN BY	LR
AUTH BY	RH
DATE	05-03-03
REV	2
DRAWING/FILE No.	W-030032-09
SHEET	9

CONTINUED FROM DWG No. W-030032-09, LINE No. 9/78

(+) 624 — (−) 28

24VDC, 16 SOURCING OUTPUT EXPANSION BLOCK 1790-T0B16X
NODE: 10 EXPANSION BLOCK No. 1

PLC2 ADDR	PLC1 ADDR			
VDC0	OUT0 0:1.13/00	Q11300	1 X1 X2	FIRE ALARM LIGHT
OUT1 0:1.14/01	0:1.13/01	Q11301	2 X1 X2	EMERGENCY STOP LIGHT
OUT2 0:1.14/02	0:1.13/02	Q11302	3 X1 X2	SYSTEM LOW WATER LEVEL LIGHT
OUT3 0:1.14/03	0:1.13/03	Q11303	4 X1 X2	LOW FUEL LEVEL LIGHT
OUT4 0:1.14/04	0:1.13/04	Q11304	5 X1 X2	BUS UNDER/OVER VOLTAGE LIGHT
OUT5 0:1.14/05	0:1.13/05	Q11305	6 X1 X2	BUS UNDER/OVER FREQUENCY LIGHT
OUT6 0:1.14/06	0:1.13/06	Q11306	7 X1 X2	FEEDER BREAKER OVERCURRENT LIGHT
OUT7 0:1.14/07	0:1.13/07	Q11307	8 X1 X2	PRIMARY PLC FAILURE LIGHT
	GND0	28		
VDC1				
	GND1	28		
OUT8 0:1.14/08	0:1.13/08	Q11308	9 X1 X2	OPERATING ON BACKUP PLC LIGHT
OUT9 0:1.14/09	0:1.13/09	Q11309	10 X1 X2	BACKUP PLC FAILURE LIGHT
OU10 0:1.14/10	0:1.13/10	Q11310	11 X1 A X2	HEAT RECOVERY NO LOAD LIGHT
OUT11 0:1.14/11	0:1.13/11	Q11311	12 X1 X2	HEAT RECOVERY LOSS OF PRESSURE LIGHT
OUT12 0:1.14/12	0:1.13/12	Q11312	13 X1 X2	HEAT RECOVERY LOSS OF FLOW LIGHT
OUT13 0:1.14/13	0:1.13/13	Q11313	14 X1 A X2	(SPARE 1) LIGHT
OUT14 0:1.14/14	0:1.13/14	Q11314	15 X1 X2	(SPARE 2) LIGHT
OUT15 0:1.14/15	0:1.13/15	Q11315	16 X1 X2	(SPARE 3) LIGHT

(10/40) PLCOR 9 Q11307

(11/11) BPLCOR 9 Q11309

(LOCATED ON BACKPAN)

24VDC, COMBO 8 INPUT/8 OUTPUT EXPANSION BLOCK 1790-T8BV8BX
NODE: 10 EXPANSION BLOCK No. 2

PLC1 ADDR	PLC2 ADDR		
IN0 I:1.14/00	I:1.84/00	COM	28
IN1 I:1.14/01	I:1.84/01	COM	28
IN2 I:1.14/02	I:1.84/02		
IN3 I:1.14/03	I:1.84/03		
IN4 I:1.14/04	I:1.84/04		HEAT RECOVERY LOSS OF PRESSURE — 624 — PS — 11404
IN5 I:1.14/05	I:1.84/05		HEAT RECOVERY LOSS OF FLOW — 624 — FS — 11405
IN6 I:1.14/06	I:1.84/06		TOTAL FUEL PULSER — 624 — FUEL — 11406
IN7 I:1.14/07	I:1.84/07		TOTAL HEAT DELIVERED PULSER — 624 — HEAT — 11407
VDC		GND	28
624			

PLC2 ADDR	PLC1 ADDR			
OUT0 0:1.15/00	0:1.14/00			
OUT1 0:1.15/01	0:1.14/01			
OUT2 0:1.15/02	0:1.14/02			
OUT3 0:1.15/03	0:1.14/03			
OUT4 0:1.15/04	0:1.14/04	Q11404	11/34, 11/34 14 RAR 13	REMOTE ALARM RELAY
OUT5 0:1.15/05	0:1.14/05	Q11405	9/26 14 F-BCR 13	FEEDER CONTACTOR CLOSE RELAY
OUT6 0:1.15/06	0:1.14/06	Q11406	9/32 14 F-BOR 13	FEEDER CONTACTOR OPEN RELAY
OUT7 0:1.15/07	0:1.14/07	Q11407	10/11, 11/6 14 PLC OR 13	PLC OK RELAY

(10/60) PLCORX 5 Q11407

(LOCATED ON BACK PAN)

CONTINUED AT UPPER RIGHT

624 (+) — 28 (−)

REFER TO SHEET #

CONTINUED FROM LOWER LEFT

(+) 624 — (−) 28

24VDC, COMBO 8 INPUT/8 OUTPUT BASE BLOCK 1790-T8BV8B
NODE: 11 BASE BLOCK

CONTINUED FROM DWG No. W-030032-11 LINE No. 11/9 — Q001

PLC1 ADDR		
IN0 I:1.15/00	COM	28
IN1 I:1.15/01	COM	28
IN2 I:1.15/02		
IN3 I:1.15/03		
IN4 I:1.15/04		
IN5 I:1.15/05		
IN6 I:1.15/06		
IN7 I:1.15/07	GND	28
VDC	PLC1 ADDR	
	OUT0 0:1.15/00	
	OUT1 0:1.15/01	
	OUT2 0:1.15/02	
	OUT3 0:1.15/03	
	OUT4 0:1.15/04	
	OUT5 0:1.15/05	
	OUT6 0:1.15/06	
	OUT7 0:1.15/07	Q11507 — 10/39 14 PLC ORX 13 — PLC OK AUX RELAY

(LOCATED ON BACK PAN)

RTD INPUT MODULE 1790D-T4R0
NODE: 12 BASE BLOCK

PLC1 ADDR PLC2 ADDR		
+24V	GND	
624	624	
CH0_A		
OUTSIDE AIR TEMP RTD, 100 OHM: 675 RD 675; 676 WH 676; 677 BK 677		
COM M1:1.5	I:1.85	
CH0_B		
CH1_A		
INSIDE AIR TEMP RTD, 100 OHM: 678 RD 678; 679 WH 679; 680 BK 680		
COM M1:1.6	I:186	
CH1_B		
CH2_A		
COM M1:1.7	I:187	
CH2_B		
CH3_A		
COM M1:1.8	I:188	
CH3_B		

(LOCATED ON BACK PAN)

CONTINUED ON DWG No. W-030032-11, LINE No. 11/1

624 (+) — 28 (−)

SECTION #1

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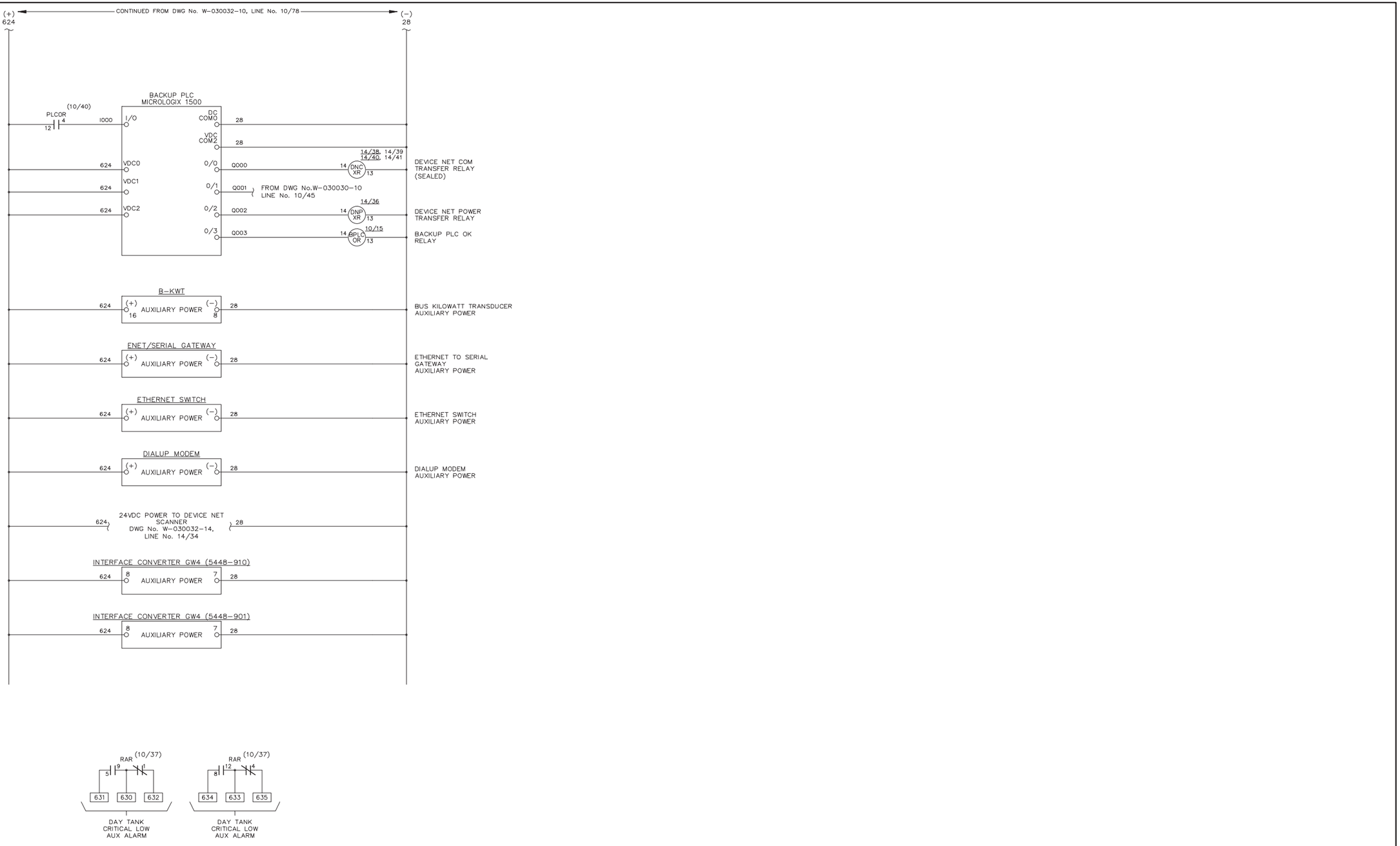
No.	REVISIONS	BY	AUTH	DATE
2	AS BUILT	BM	RH	05-05-06
1	APPROVAL MOD'S	BM	RH	05-03-16

DRAWING No. | REFERENCE DRAWINGS

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
MASTER DC CONTROL SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER ALASKA ENERGY AUTHORITY
CUSTOMER ORDER No. C-022623 | WORK ORDER No. W-030032
DRAWN BY LR | AUTH BY RH | DATE 05-03-03 | REV 2
DRAWING/FILE No. W-030032-10 | SHEET 10



SECTION #1

AS BUILT

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DRAWING No.	REFERENCE DRAWINGS

No.	REVISIONS	BY	AUTH	DATE
1	AS BUILT	BM	RH	05-05-06

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
MASTER DC CONTROL SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY		
CUSTOMER ORDER No.	C-022623	WORK ORDER No.	W-030032
DRAWN BY	LR	AUTH BY	RH
DATE	05-003-03	REV	1
DRAWING/FILE No.	W-030032-11	SHEET	11

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☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

DRAWING No.	REFERENCE DRAWINGS

No.	REVISIONS	BY	AUTH	DATE
1	AS BUILT	BM	RH	05-05-06

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
BLANK SHEET
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER: ALASKA ENERGY AUTHORITY

CUSTOMER ORDER No.	WORK ORDER No.		
C-022623	W-030032		
DRAWN BY	AUTH BY	DATE	REV
LR	RH	05-03-03	1
DRAWING/FILE No.			SHEET
W-030032-12			12

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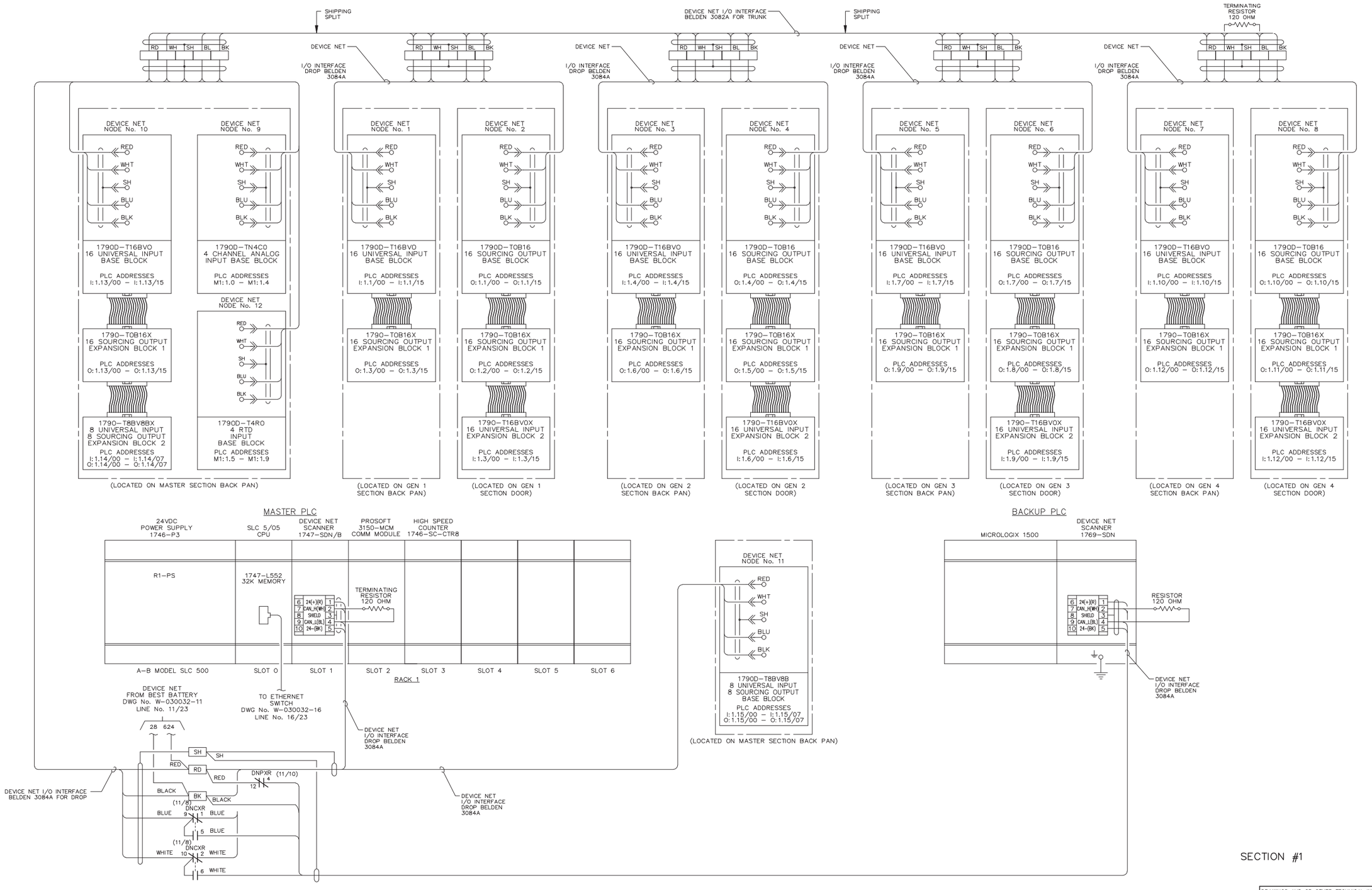
No.	REVISIONS	BY	AUTH	DATE
1	AS BUILT	BM	RH	05-05-06

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
BLANK SHEET
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY		
CUSTOMER ORDER No.	WORK ORDER No.		
C-022623	W-030032		
DRAWN BY	AUTH BY	DATE	REV
LR	RH	05-03-03	1
DRAWING/FILE No.		SHEET	
W-030032-13		13	



SECTION #1

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☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

DRAWING No.	REFERENCE DRAWINGS

No.	REVISIONS	BY	AUTH	DATE
1	AS BUILT	BM	RH	05-05-06

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
PLC COMMUNICATION DIAGRAM
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY
CUSTOMER ORDER No.	C-022623
WORK ORDER No.	W-030032
DRAWN BY	LR
AUTH BY	RH
DATE	05-03-03
REV	1
DRAWING/FILE No.	W-030032-14
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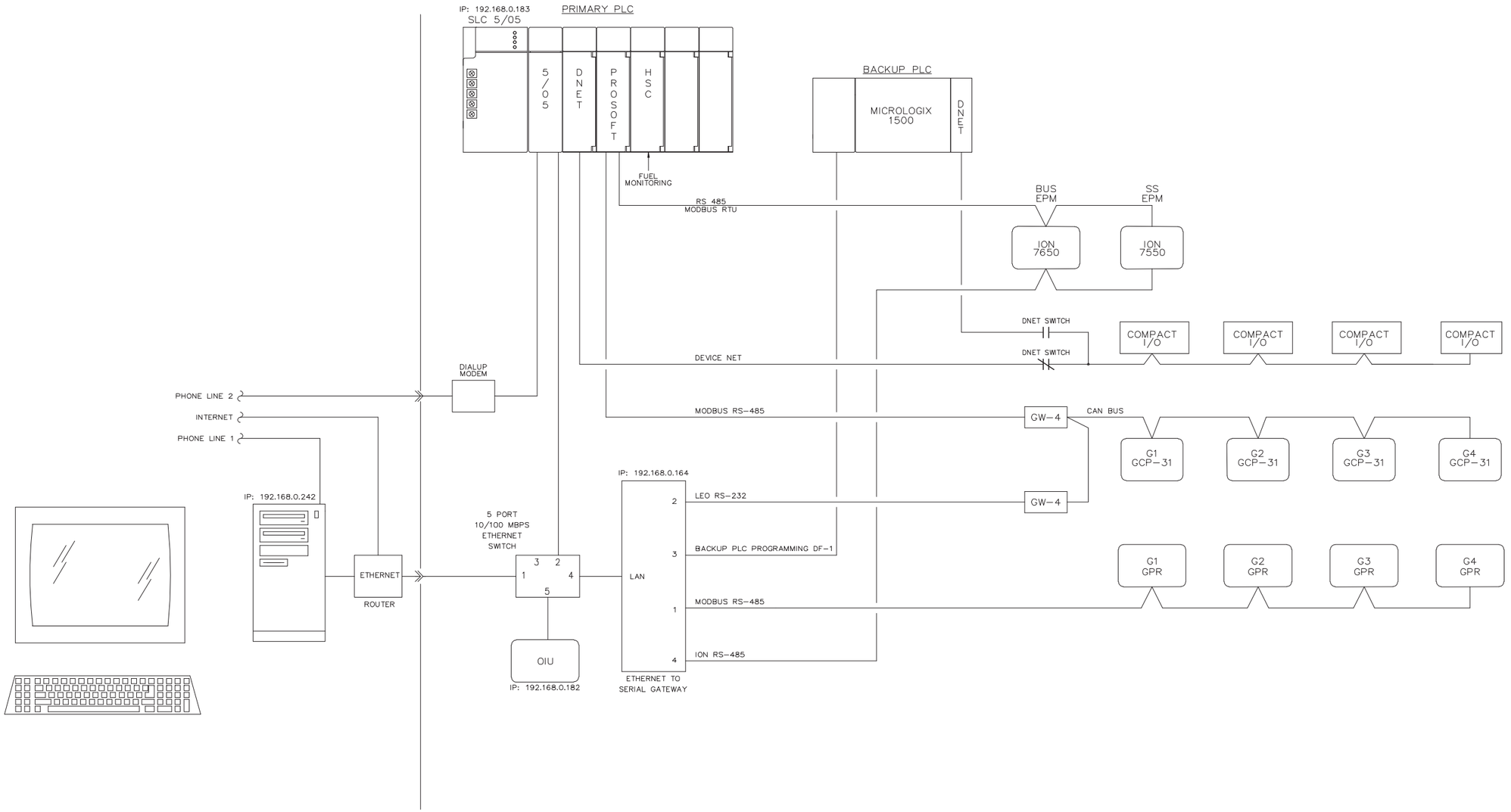

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☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

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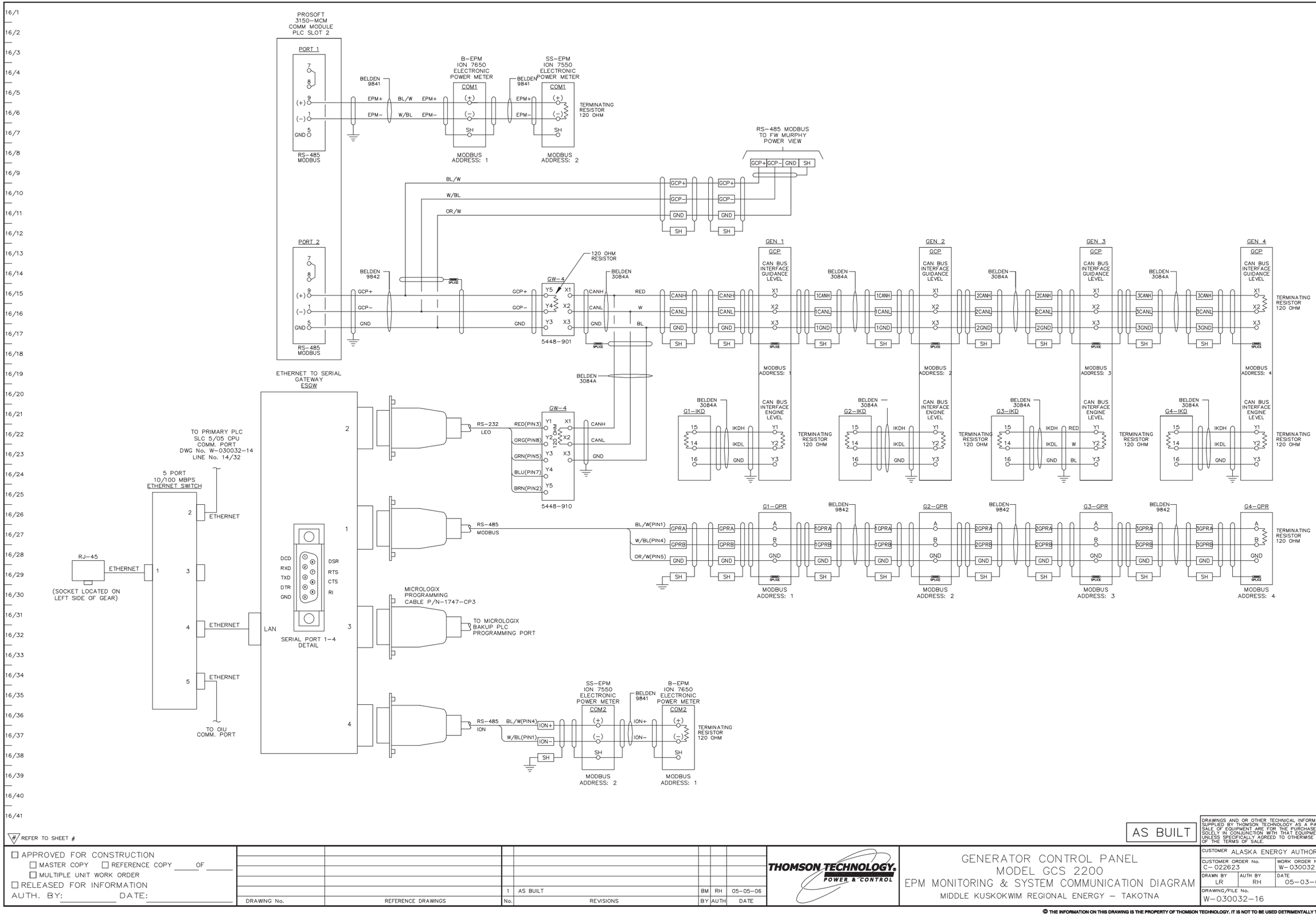
No.	REVISIONS	BY	AUTH	DATE
1	AS BUILT	BM	RH	05-05-06

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
COMMUNICATION NETWORK DIAGRAM
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY		
CUSTOMER ORDER No.	C–022623	WORK ORDER No.	W–030032
DRAWN BY	LR	AUTH BY	RH
DATE	05–03–03	REV	1
DRAWING/FILE No.	W–030032–15	SHEET	15



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☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

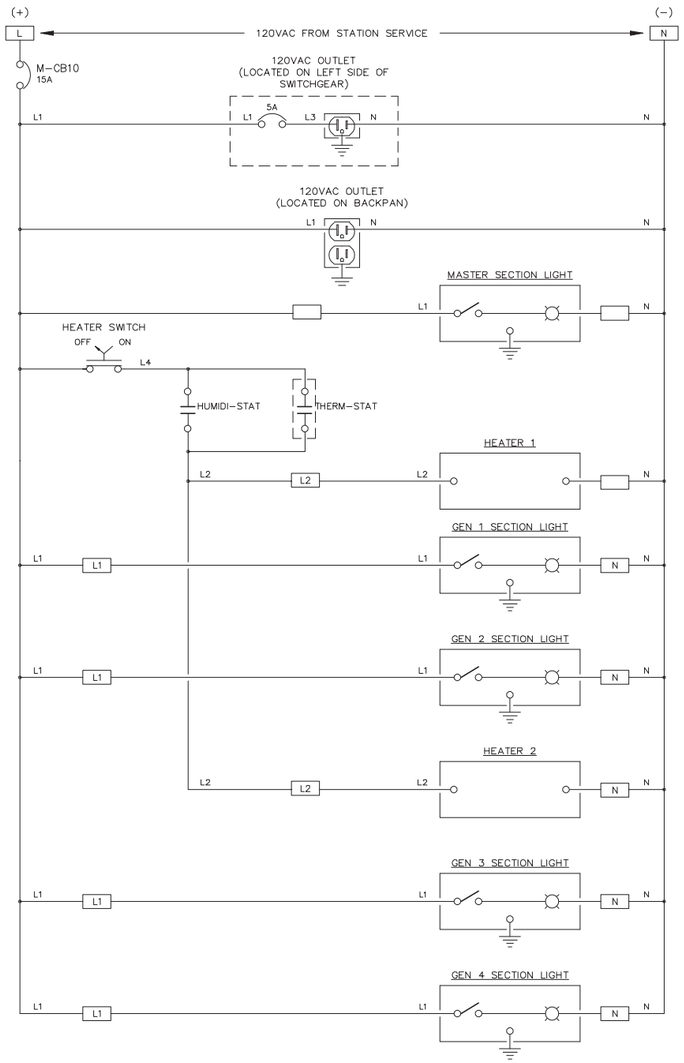
DRAWING No.	REFERENCE DRAWINGS

No.	REVISIONS	BY	AUTH	DATE
1	AS BUILT	BM	RH	05-05-06

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
EPM MONITORING & SYSTEM COMMUNICATION DIAGRAM
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY
CUSTOMER ORDER No.	C-022623
WORK ORDER No.	W-030032
DRAWN BY	LR
AUTH BY	RH
DATE	05-03-03
REV	1
DRAWING/FILE No.	W-030032-16
SHEET	16



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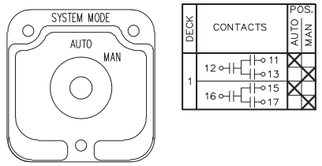
No.	REVISIONS	BY	AUTH	DATE
1	AS BUILT	BM	RH	05−05−06

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
HEATER & LIGHTING CONTROL SCHEMATIC
MIDDLE KUSKOKWIM REGIONAL ENERGY − TAKOTNA

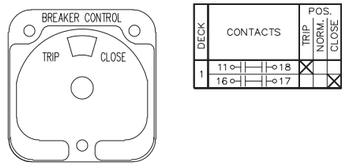
CUSTOMER	ALASKA ENERGY AUTHORITY		
CUSTOMER ORDER No.	C− 022623	WORK ORDER No.	W− 030032
DRAWN BY	LR	AUTH BY	RH
DATE	05−03−03	REV	1
DRAWING/FILE No.	W−030032−17	SHEET	17

SYSTEM MODE SWITCH – SMS



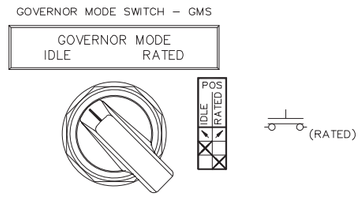
(ELECTROSWITCH 24201C)
KNURLED HANDLE
QTY 1

MAIN CONTACTOR CONTROL SWITCH – 42CS



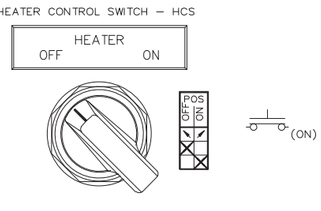
(ELECTROSWITCH 2438D)
PISTOL GRIP HANDLE
SPRING RETURN TO CENTER
QTY 1

GOVERNOR MODE SWITCH – GMS



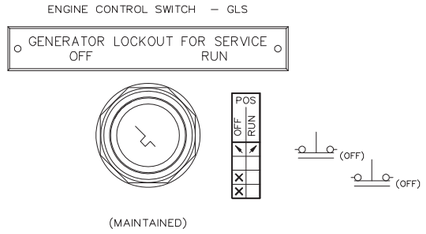
(MAINTAINED)
LOCATED ON BACK PAN

HEATER CONTROL SWITCH – HCS



(MAINTAINED)
LOCATED ON MASTER BACK PAN

ENGINE CONTROL SWITCH – GLS



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2	AS BUILT	BM	RH	05–05–06
1	APPROVAL MOD'S	BM	RH	05–03–16

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
CONTROL SWITCH TARGET DIAGRAM
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY		
CUSTOMER ORDER No.	C– 022623	WORK ORDER No.	W– 030032
DRAWN BY	LR	AUTH BY	RH
DATE	05–03–03	REV	2
DRAWING/FILE No.	W–030032–18	SHEET	18

NP. 1 TEXT 1/8 QUANTITY 4 SCALE 1/1 — 0.625

ENGINE RUNNING	ENGINE IDLE	ENGINE ALARM	LOW OIL PRESSURE	LOW OIL LEVEL	HIGH OIL TEMPERATURE	HIGH WATER TEMPERATURE	OVERSPEED	OVERCRANK	COOLDOWN/ LOCKOUT	BATTERY CHARGER FAILURE
1	2	2	2	2	2	2	2	2	2	1

22

NP. 2 TEXT 1/8 QUANTITY 4 SCALE 1/1 — 0.625

NORMAL STOP	NOT IN AUTO POSITION	GENERATOR BREAKER OPEN	FAIL TO SYNCHRONIZE	OVERCURRENT	UNDER VOLTAGE	OVER VOLTAGE	UNDER FREQUENCY	OVER FREQUENCY	LOSS OF EXCITATION	REVERSE POWER
1	2	2	2	2	2	2	2	2	2	1

22

NP. 3 TEXT 1/8 QUANTITY 1 SCALE 1/1 — 0.625

FIRE ALARM	EMERGENCY STOP	SYSTEM LOW WATER LEVEL	LOW FUEL LEVEL	BUS UNDER/ OVER VOLTAGE	BUS UNDER/ OVER FREQUENCY	FEEDER BREAKER OVERCURRENT	PRIMARY PLC FAILURE	OPERATING ON BACKUP PLC	BACKUP PLC FAILURE
1	2	2	2	2	2	2	2	2	1

20

NP. 4 TEXT 1/8 QUANTITY 1 SCALE 1/1 — 0.625

HEAT RECOVERY NO LOAD	HEAT RECOVERY LOSS OF PRESSURE	HEAT RECOVERY LOSS OF FLOW
1	2	2	7

12

NP. 5 TEXT 1/8 QUANTITY 1 SCALE 1/1 — 0.625

LAMP TEST	EMERGENCY STOP	ALARM RESET
1.5	3	3	1.5

9

NP. 6 TEXT 1/8 QUANTITY 1 SCALE 1/1 — 0.625

STATION SERVICE BREAKER — OPEN / CLOSED

1 | 3 | 1 — 5

NP. 7 TEXT 1/8 QUANTITY 1 SCALE 1/1 — 0.625

COMMUNITY CONTACTOR — OPEN / CLOSED

1 | 3 | 1 — 5

NP. 8 TEXT 1/8 QUANTITY 3 SCALE 1/1 — 0.625

CONTACTOR — OPEN / CLOSED

1 | 3 | 1 — 5

NP. 9 TEXT 1/2 QUANTITY 1 SCALE 1/1 — 1

MASTER CONTROL — 8

NP. 10 TEXT 1/2 QUANTITY 1 SCALE 1/1 — 1

GENERATOR 1 — 8

NP. 11 TEXT 1/2 QUANTITY 1 SCALE 1/1 — 1

GENERATOR 2 — 8

NP. 12 TEXT 1/2 QUANTITY 1 SCALE 1/1 — 1

GENERATOR 3 — 8

NP. 13 TEXT 1/2 QUANTITY 1 SCALE 1/1 — 1

GENERATOR 4 — 8

NP. 14 TEXT 1/8 QUANTITY 1 SCALE 1/1 — 0.625

GENERATOR 1 — 3

NP. 15 TEXT 1/8 QUANTITY 1 SCALE 1/1 — 0.625

GENERATOR 2 — 3

NP. 16 TEXT 1/8 QUANTITY 1 SCALE 1/1 — 0.625

GENERATOR 3 — 3

NP. 17 TEXT 1/8 QUANTITY 1 SCALE 1/1 — 0.625

GENERATOR 4 — 3

NP. 18 TEXT 1/8 QUANTITY 1 SCALE 1/1 — 0.625

BUS TOTALIZING — 3

NP. 19 TEXT 1/8 QUANTITY 2 SCALE 1/1 — 0.625

STATION SERVICE — 3

NP. 20 TEXT 1/8 QUANTITY 1 SCALE 1/1 — 0.625

COMMUNITY FEEDER — 3

NP. 22 TEXT 1/8 QUANTITY 4 SCALE 1/1 — 0.5

GOVERNOR MODE — IDLE / RATED — 2.5

NP. 23 TEXT 1/8 QUANTITY 1 SCALE 1/1 — 0.5

HEATER — OFF / ON — 2.5

NP. 24 TEXT 1/8 QUANTITY 4 SCALE 1/1 — 0.5

IDLE ADJUST INCREASE → — 2.5

NP. 25 TEXT 1/2 QUANTITY 1 SCALE 1/1 — 1

78 KW — 4

NP. 26 TEXT 1/2 QUANTITY 1 SCALE 1/1 — 1

64 KW — 4

NP. 27 TEXT 1/2 QUANTITY 2 SCALE 1/1 — 1

37 KW — 4

NP. 28 TEXT 1/8 QUANTITY 4 SCALE 1/1 — 0.625

GENERATOR LOCKOUT FOR SERVICE — OFF / RUN — 1 | 2 | 1 — 4

NOTES:
1. ALL NAMEPLATES SHALL BE WHITE FACE WITH BLACK LETTERS EXCEPT AS NOTED.
2. ALL NAMEPLATES SHALL HAVE PRESSURE SENSITIVE ADHESIVE ON BACK
3. ALL NAMEPLATES MECHANICALLY ATTACHED

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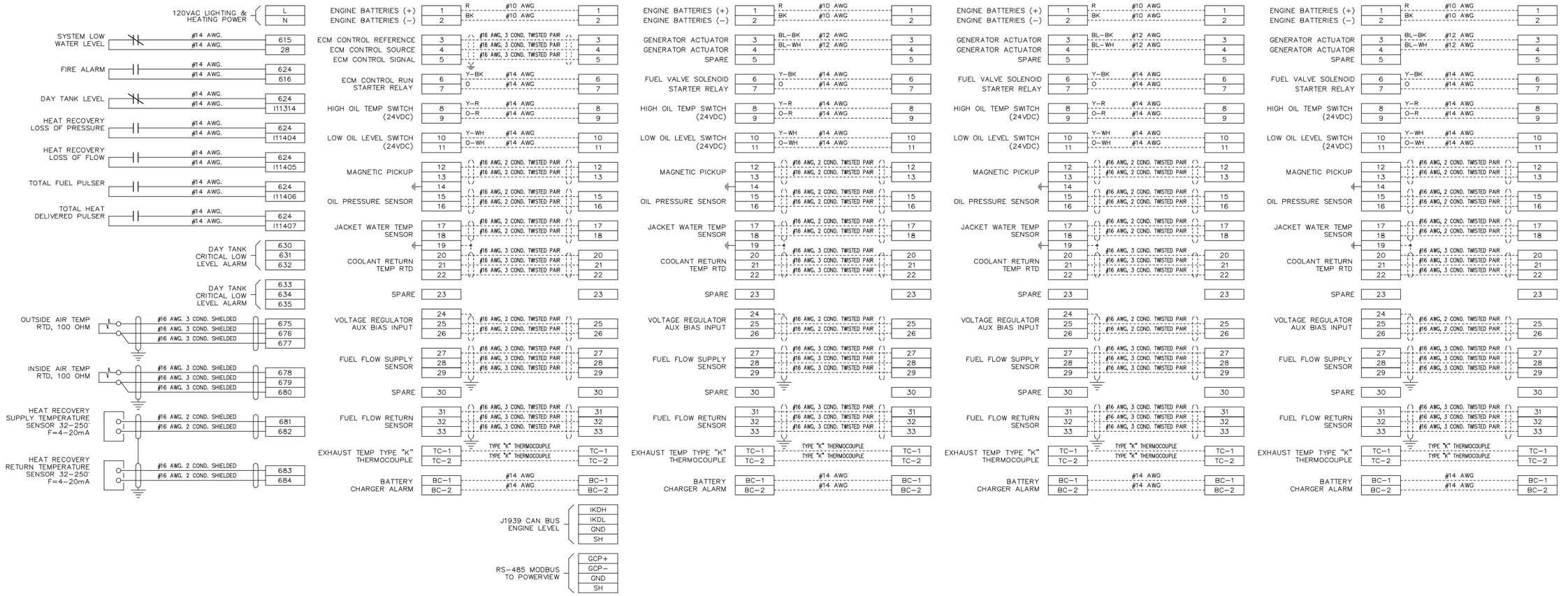
1	APPROVAL MOD'S	BM	RH	05-03-16

THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
NAMEPLATE ENGRAVING SCHEDULE, FABRICATION DETAIL
MIDDLE KUSKOKWIM REGIONAL ENERGY – TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY
CUSTOMER ORDER No.	C-022623
WORK ORDER No.	W-030032
DRAWN BY	LR
AUTH BY	RH
DATE	05-03-03
REV	2
DRAWING/FILE No.	W-030032-19
SHEET	19



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AUTH. BY: _____ DATE: _____

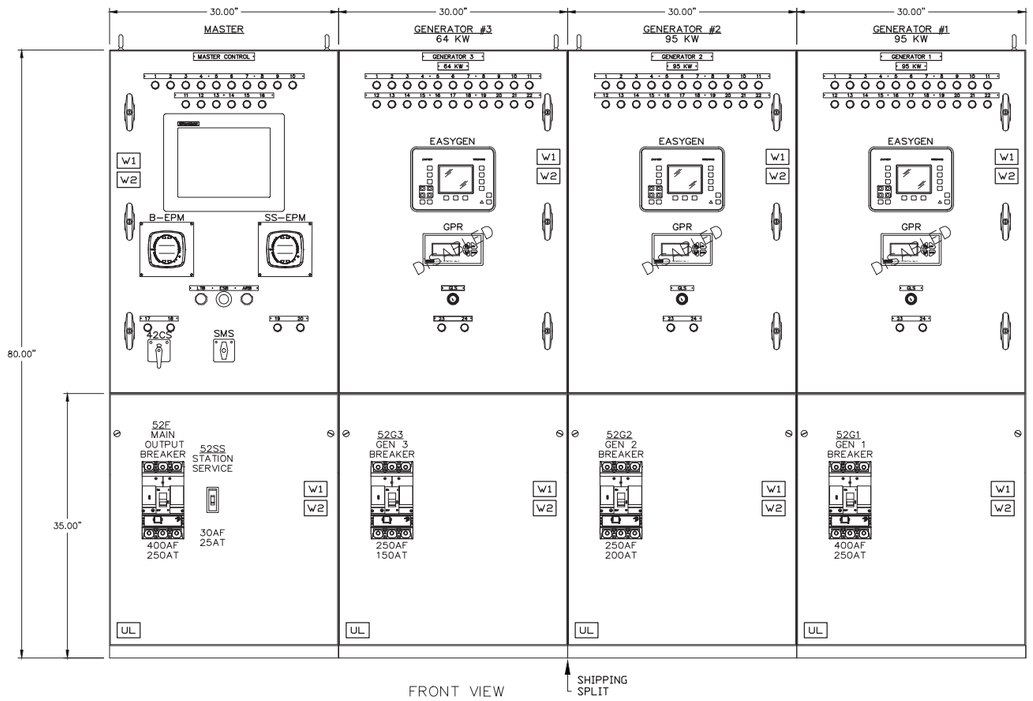
DRAWING No.	REFERENCE DRAWINGS

No.	REVISIONS	BY	AUTH	DATE
1	AS BUILT	BM	RH	05-05-06

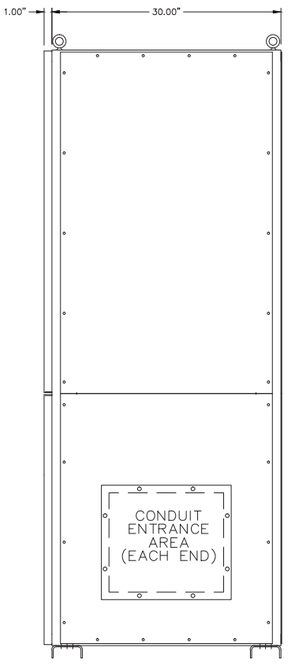
THOMSON TECHNOLOGY. POWER & CONTROL

GENERATOR CONTROL PANEL
MODEL GCS 2200
INTERCONNECTION DIAGRAM
MIDDLE KUSKOKWIM REGIONAL ENERGY - TAKOTNA

CUSTOMER	ALASKA ENERGY AUTHORITY
CUSTOMER ORDER No.	C-022623
WORK ORDER No.	W-030032
DRAWN BY	LR
AUTH BY	RH
DATE	05-03-03
REV	1
DRAWING/FILE No.	W-030032-20
SHEET	20



FRONT VIEW



SIDE VIEW

DEVICE LEGEND

ARB	ALARM RESET BUTTON
B-EPM	BUS ELECTRONIC POWER METER - SHARK
ESB	EMERGENCY STOP BUTTON
EZGEN	GENERATOR CONTROL PACKAGE
GLS	GENERATOR LOCKOUT SWITCH
GPR	GENERATOR PROTECTIVE RELAY (DISABLED)
OIU	OPERATOR INTERFACE UNIT
LTB	LAMP TEST BUTTON
SMS	MASTER CONTROL SWITCH (AUTO-MANUAL)
SS-EPM	STATION SERVICE POWER METER - SHARK
42xx	CONTACTOR
42CS	CONTACTOR CONTROL SWITCH
52xx	CIRCUIT BREAKER

GENERATOR ANNUNCIATOR LEGEND:

1	ENGINE RUN	13	NOT IN AUTO POSITION
2	ENGINE IDLE	14	GENERATOR BREAKER OPEN
3	ENGINE ALARM	15	FAIL TO SYNCHRONIZE
4	LOW OIL PRESSURE	16	OVERCURRENT
5	LOW OIL LEVEL	17	UNDER VOLTAGE
6	HIGH OIL TEMPERATURE	18	OVER VOLTAGE
7	HIGH WATER TEMPERATURE	19	UNDER FREQUENCY
8	OVERSPEED	20	OVER FREQUENCY
9	OVERCRANK	21	LOSS OF EXCITATION
10	COOLDOWN/LOCKOUT	22	REVERSE POWER
11	BATTERY CHARGER FAILURE	23	CONTACTOR OPEN
12	NORMAL STOP	24	CONTACTOR CLOSED

MASTER ANNUNCIATOR LEGEND:

1	FIRE ALARM LIGHT	11	HEAT RECOVERY NO LOAD
2	EMERGENCY STOP LIGHT	12	HEAT RECOVERY LOSS OF PRESSURE
3	SYSTEM LOW WATER LEVEL LIGHT	13	HEAT RECOVERY LOSS OF FLOW
4	LOW FUEL LEVEL LIGHT	14	SPARE 1
5	BUS UNDER/OVER VOLTAGE LIGHT	15	SPARE 2
6	BUS UNDER/OVER FREQUENCY LIGHT	16	SPARE 3
7	FEEDER BREAKER OVERCURRENT LIGHT	17	FEEDER BREAKER OPEN
8	PRIMARY PLC FAILURE	18	FEEDER BREAKER CLOSED
9	OPERATING ON BACKUP PLC	19	STATION SERVICE BREAKER OPEN
10	BACKUP PLC FAILURE	20	STATION SERVICE BREAKER CLOSED

DRAWING LEGEND

1	PHYSICAL LAYOUT
2	SINGLE LINE DIAGRAM
3	BLANK
4A	GENERATOR 1 AC SCHEMATIC
4B	GENERATOR 2 AC SCHEMATIC
4C	GENERATOR 3 AC SCHEMATIC
4D	GENERATOR 4 AC SCHEMATIC
5	MASTER AC & DISTRIBUTION SCHEMATIC
6A	GENERATOR 1 DC CONTROL SCHEMATIC
6B	GENERATOR 2 DC CONTROL SCHEMATIC
6C	GENERATOR 3 DC CONTROL SCHEMATIC
6D	GENERATOR 4 DC CONTROL SCHEMATIC
7A	GENERATOR 1 DC CONTROL SCHEMATIC
7B	GENERATOR 2 DC CONTROL SCHEMATIC
7C	GENERATOR 3 DC CONTROL SCHEMATIC
7D	GENERATOR 4 DC CONTROL SCHEMATIC
8A	GENERATOR 1 DC CONTROL SCHEMATIC
8B	GENERATOR 2 DC CONTROL SCHEMATIC
8C	GENERATOR 3 DC CONTROL SCHEMATIC
8D	GENERATOR 4 DC CONTROL SCHEMATIC

DRAWING LEGEND

9	MASTER DC CONTROL SCHEMATIC
10	MASTER DC CONTROL SCHEMATIC
11	MASTER DC CONTROL SCHEMATIC
12	BLANK
13	BLANK
14	PLC COMMUNICATION DIAGRAM
15	COMMUNICATION NETWORK DIAGRAM
16	EPM MONITORING & SYSTEM COMMUNICATION DIAGRAM
17	HEATER & LIGHTING CONTROL SCHEMATIC
18	CONTROL SWITCH TARGET DIAGRAM
19	NAMEPLATE DETAILS
20	INTERCONNECTION DIAGRAM

NOTES

1	WIRE MARKERS: HEATSHRINK TYPE c/w INDELIBLE INK MARKINGS
2	WIRE TYPE: ALL CONNECTIONS TO BUS AND BREAKERS TO BE #14AWG SIS. WIRING THAT IS TO BE PROVIDED AS PART OF OR IS AN INTEGRAL PART OF SUPERVISORY CONTROL EQUIPMENT SHALL BE #18-14AWG SIS. CT WIRING TO BE #10AWG SIS MIN.
3	WIRING COLOR CODED: NO WIRE NUMBERS TO MATCH TERMINAL NUMBERS UNLESS NOTED
4	LOAD BUS TO BE 1000A 3PH 4W SILVER PLATED COPPER BRACED AT 35KA.
5	ENCLOSURE TYPE NEMA 1 BUILT TO UL891.
6	PAINT ASA #61 GREY EXTERIOR, WHITE MOUNTING PAN
7	ENCLOSURE SUPPLIED IN THREE PIECES
8	FULL LENGTH COPPER GROUND BUS 0.25" X 2.5" C/W (6) #6-250MCM GROUND LUGS
9	POWER CABLES: UTILITY FROM BOTTOM; GEN & LOAD TOP. FRONT AND REAR ACCESS REQUIRED.
10	LAMICOIDS WHITE C/W BLACK LETTERS, MECHANICALLY ATTACHED
11	CABLE LUG SIZES: GEN 1, 2: (1) #8 - 600MCM Cu/AL PER PHASE GEN 3, 4: (1) #8 - 350MCM Cu/AL PER PHASE LOAD: (1) #8 - 600MCM Cu/AL PER PHASE SS: (1) #12 - 3/0 Cu/AL PER PHASE

EZGEN READOUT

* INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING LIST OF METERING, STATUS, AND ALARMS.

METERING LEGEND
1. VOLTS: AØ, BØ, CØ L-N, L-L
2. AMPS: AØ, BØ, CØ
3. KW
4. PF
5. KWH

ALARM LEGEND
1. LOW OIL PRESSURE ALARM
2. LOW OIL PRESSURE SHUTDOWN
3. HIGH WATER TEMPERATURE ALARM
4. HIGH WATER TEMPERATURE SHUTDOWN
5. OVERCRANK
6. OVERSPEED
7. LOW OIL LEVEL

ANALOG INPUT LEGEND
1. OIL PRESSURE (PSI)
2. WATER TEMP (°F)

MISC. LEGEND
1. ENGINE HOURS
2. ENGINE START COUNTER
3. MAINTENANCE CALL

CROOKED CREEK SWITCHGEAR UPGRADE, 25 SHEETS TOTAL. NOTE THAT THESE DRAWINGS SHOW A PRIOR UPGRADE TO EXISTING SWITCHGEAR THAT IS SIMILAR TO THE WORK FOR CHIGNIK LAKE AND TAKOTNA. THEY ARE PROVIDED FOR REFERENCE ONLY TO SHOW THE TYPE AND EXTENT OF MODIFICATIONS.

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: GENERATOR CONTROL PANEL ELEVATION VIEW, OUTLINE DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-4101-D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CROOKED CREEK EASYGEN UPGRADE

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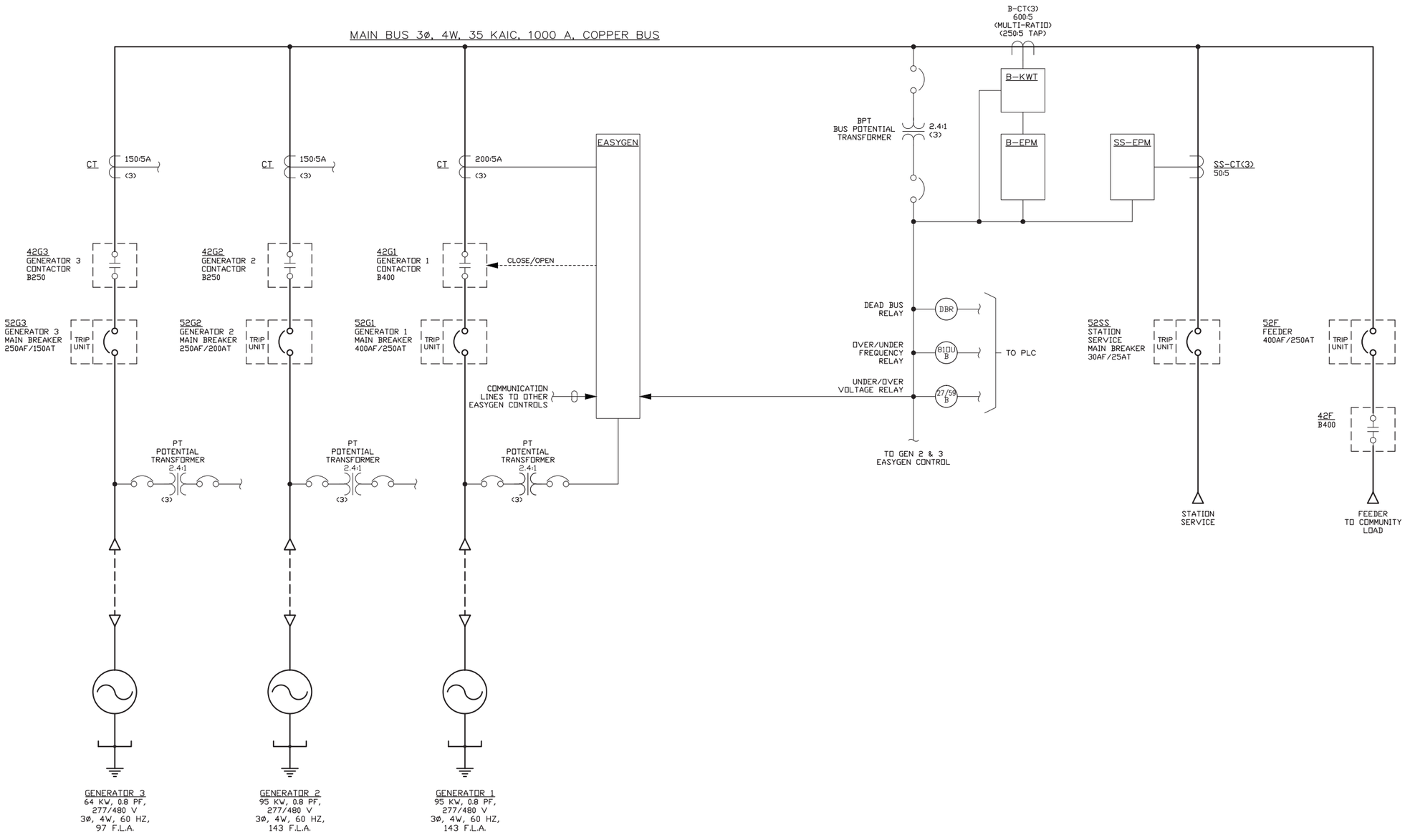
LINE No.

MAIN BUS 3ø, 4W, 35 KAIC, 1000 A, COPPER BUS



GENERATOR 3
64 KW, 0.8 PF,
277/480 V
3ø, 4W, 60 HZ,
97 F.L.A.

GENERATOR 2
95 KW, 0.8 PF,
277/480 V
3ø, 4W, 60 HZ,
143 F.L.A.

GENERATOR 1
95 KW, 0.8 PF,
277/480 V
3ø, 4W, 60 HZ,
143 F.L.A.

NOTE:
GENERATORS 2 & 3 SIMILAR TO GENERATOR 1.

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: GENERATOR SINGLE LINE, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5101-D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CROOKED CREEK EASYGEN UPGRADE

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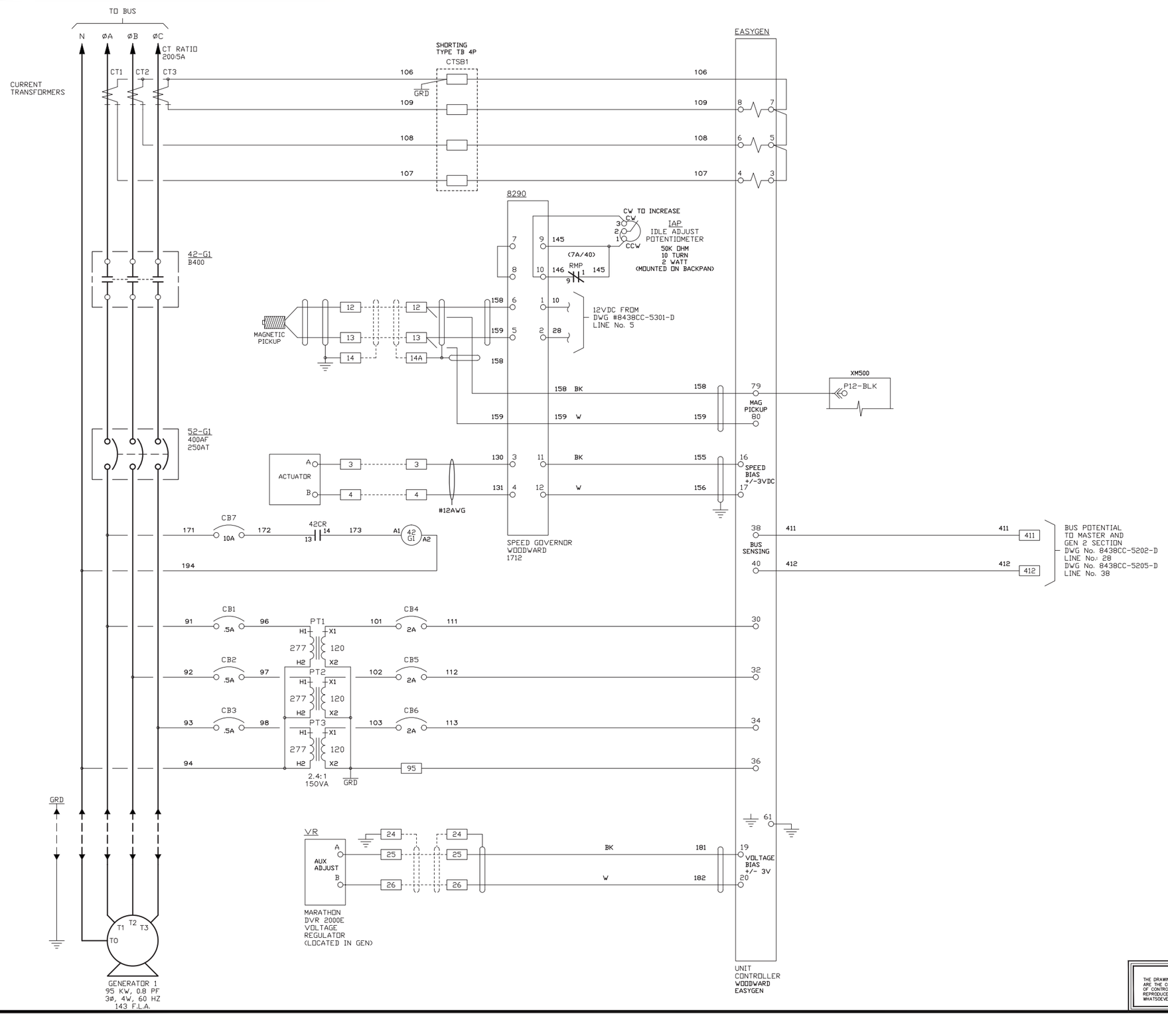

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: GENERATOR 1 AC THREE LINE, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5201-D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CROOKED CREEK EASYGEN UPGRADE

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LINE No.

TO BUS

N ØA ØB ØC

CT RATIO 150:5A

CURRENT TRANSFORMERS

CT1 CT2 CT3

SHORTING TYPE TB 4P

CTSB1

106 GRD

109

108

107

EASYGEN

106 106

109 8 7

108 6 5

107 4 3

42-G2 B250

52-G2 250AF 200AT

12 158 158 79

13 159 159 MAG PICKUP 80

14A

5VDC 5K OHM RMP

SPEED BIAS TO ENGINE ECU

BIAS+ 130 BK 155 16 SPEED BIAS .5-4.5V

500 OHM

BIAS- 156 W 156 17

CB7 10A

171 172 42CR 13 14 173 A1 42 G2 A2

194

38 411 411 411

BUS SENSING

40 412 412 412

BUS POTENTIAL TO SECTION GEN 1 & 3 DWG No. 8438CC-5201-D DWG No. 8438CC-5203-D LINE No. 28

CB1 .5A 91 96 PT1 H1 X1 277 120 H2 X2 101 CB4 2A 111 30

CB2 .5A 92 97 PT2 102 CB5 2A 112 32

CB3 .5A 93 98 PT3 103 CB6 2A 113 34

94 2.4:1 150VA GRD 95 36

GRD

61

VR

A AUX ADJUST B

24 25 26 24 25 26

BK 181 19 VOLTAGE BIAS +/- 3V

W 182 20

MARATHON DVR 2000E VOLTAGE REGULATOR (LOCATED IN GEN)

T1 T2 T3 TO

GENERATOR 2 95 KW, 0.8 PF 30, 4W, 60 HZ 143 F.L.A.

UNIT CONTROLLER WOODWARD EASYGEN

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: GENERATOR 2 AC THREE LINE, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5202-D	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CROOKED CREEK EASYGEN UPGRADE		

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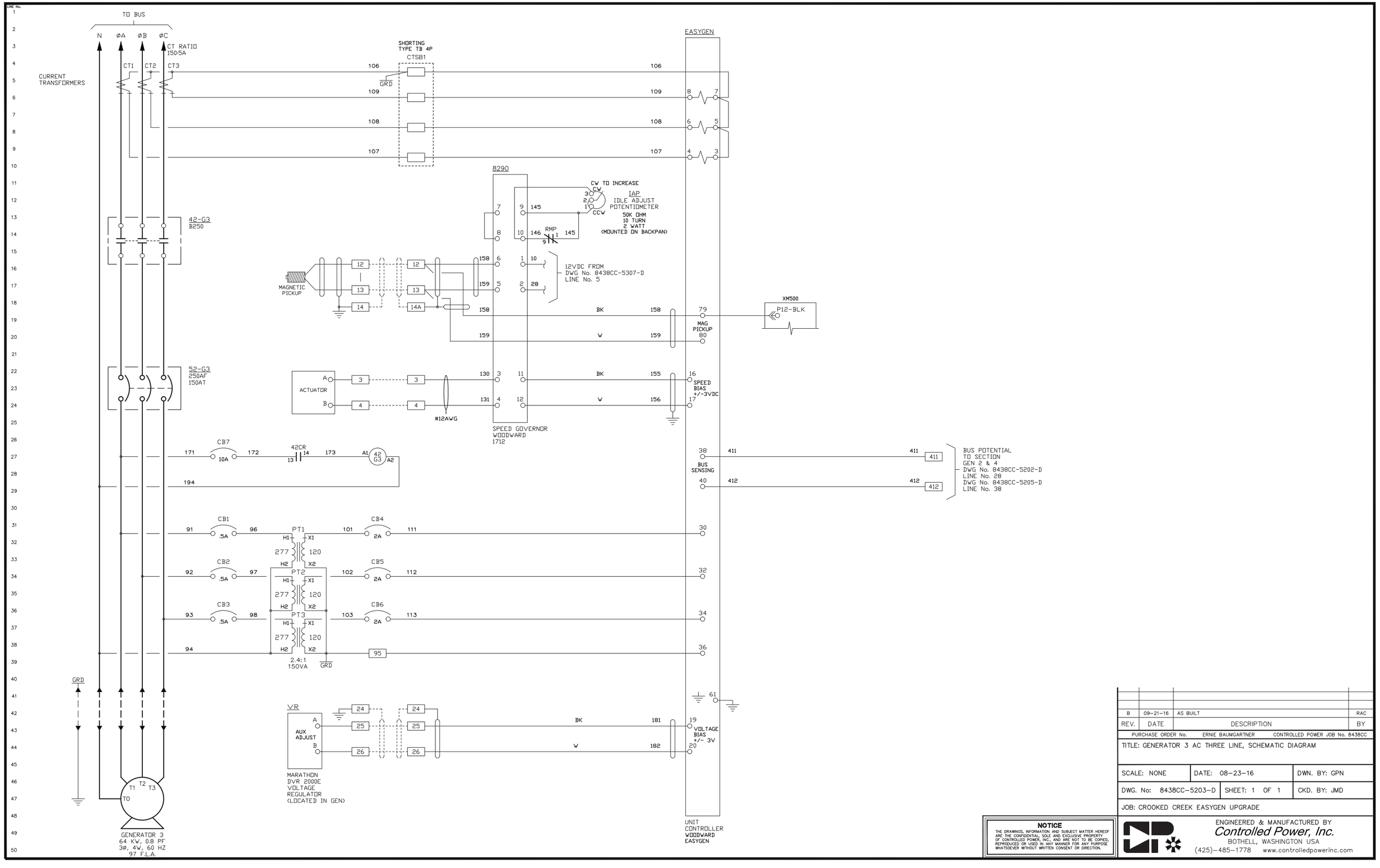

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: GENERATOR 3 AC THREE LINE, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5203-D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CROOKED CREEK EASYGEN UPGRADE

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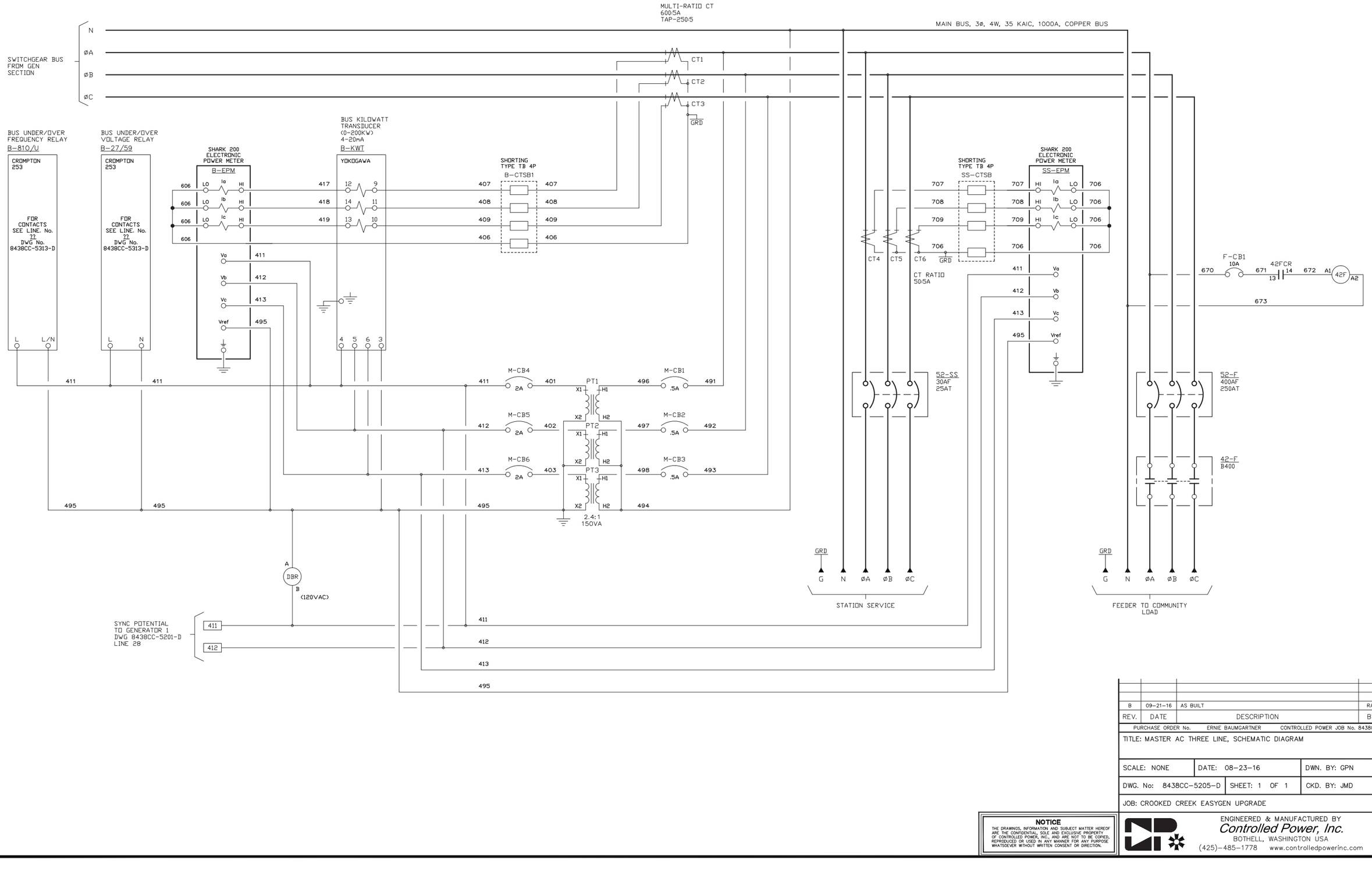

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: MASTER AC THREE LINE, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5205-D	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CROOKED CREEK EASYGEN UPGRADE		

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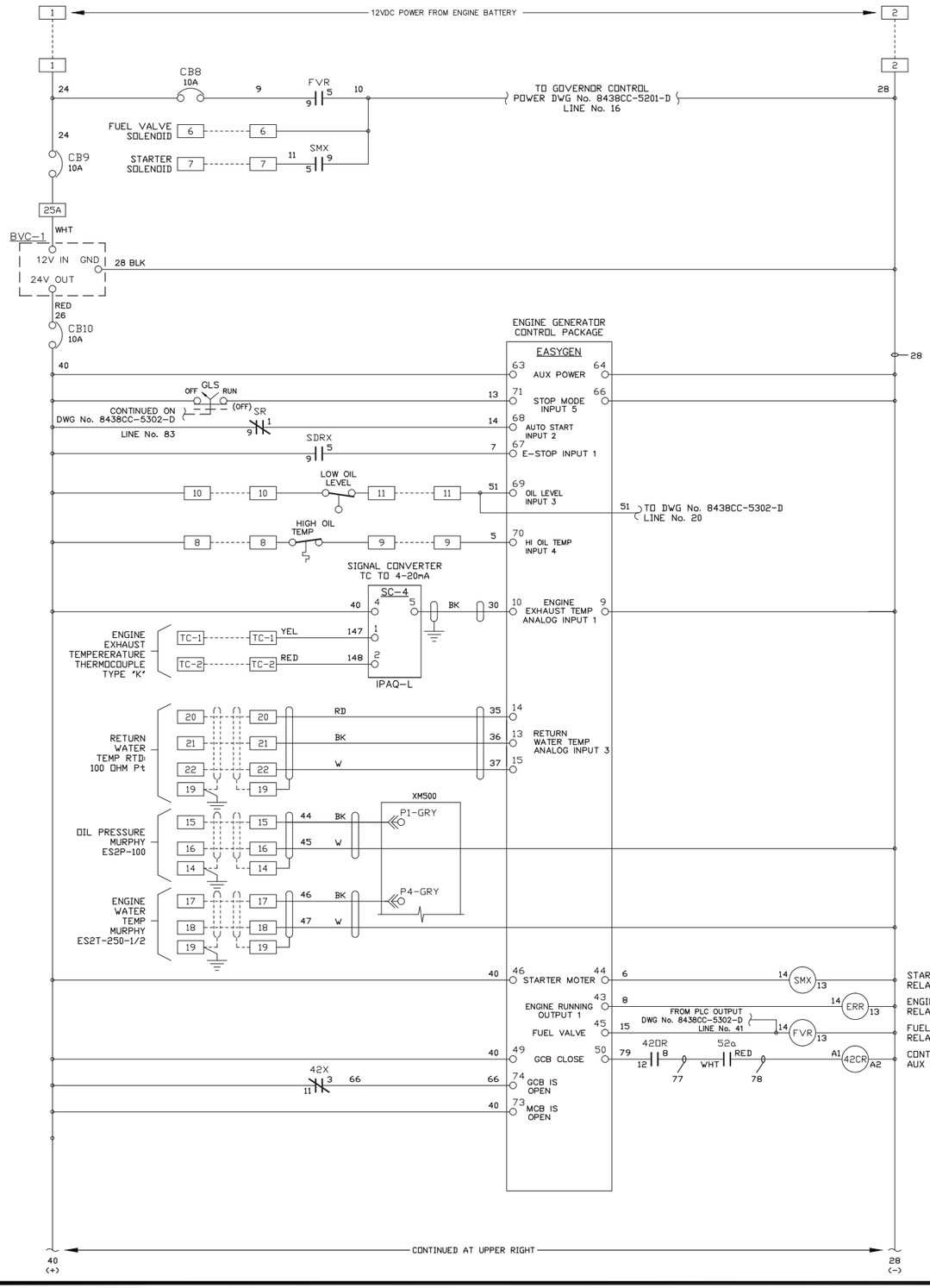

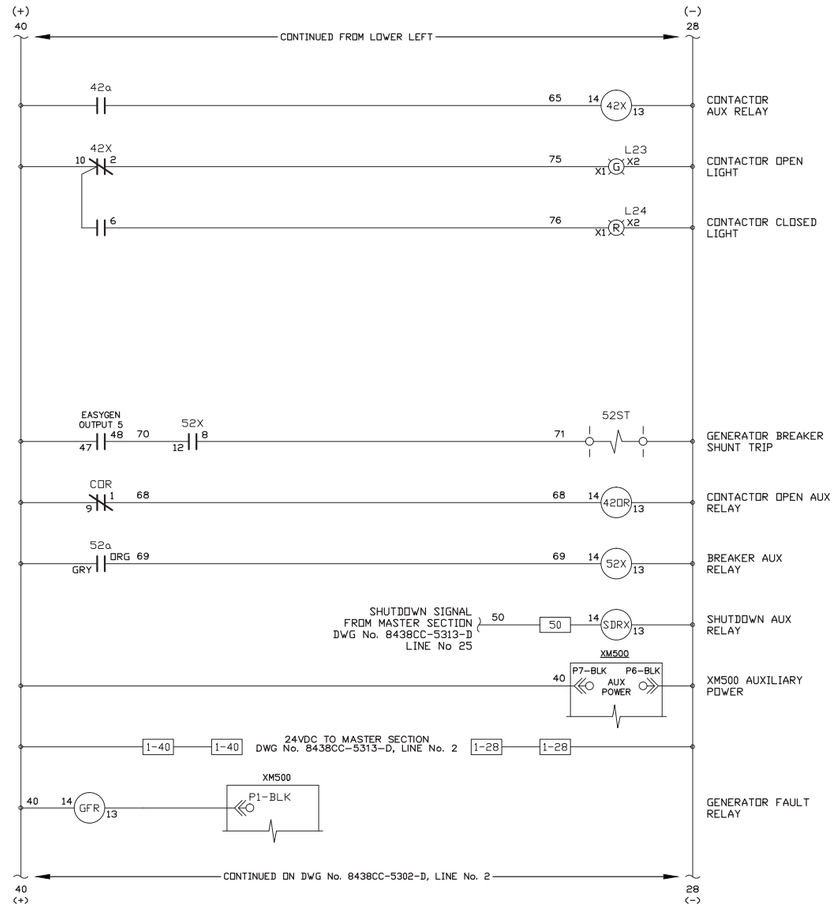

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: GENERATOR 1 DC CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5301-D	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CROOKED CREEK EASYGEN UPGRADE		

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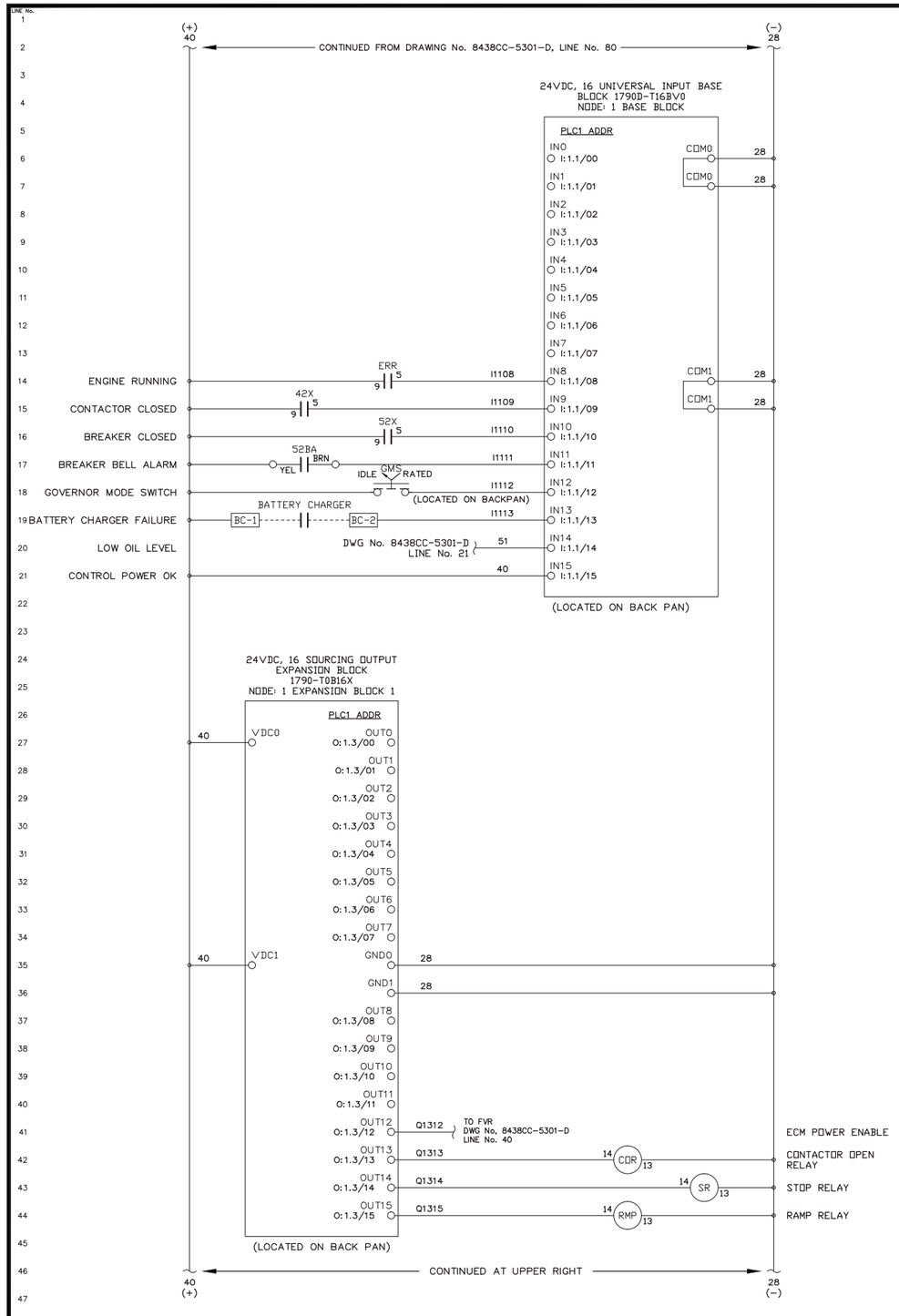

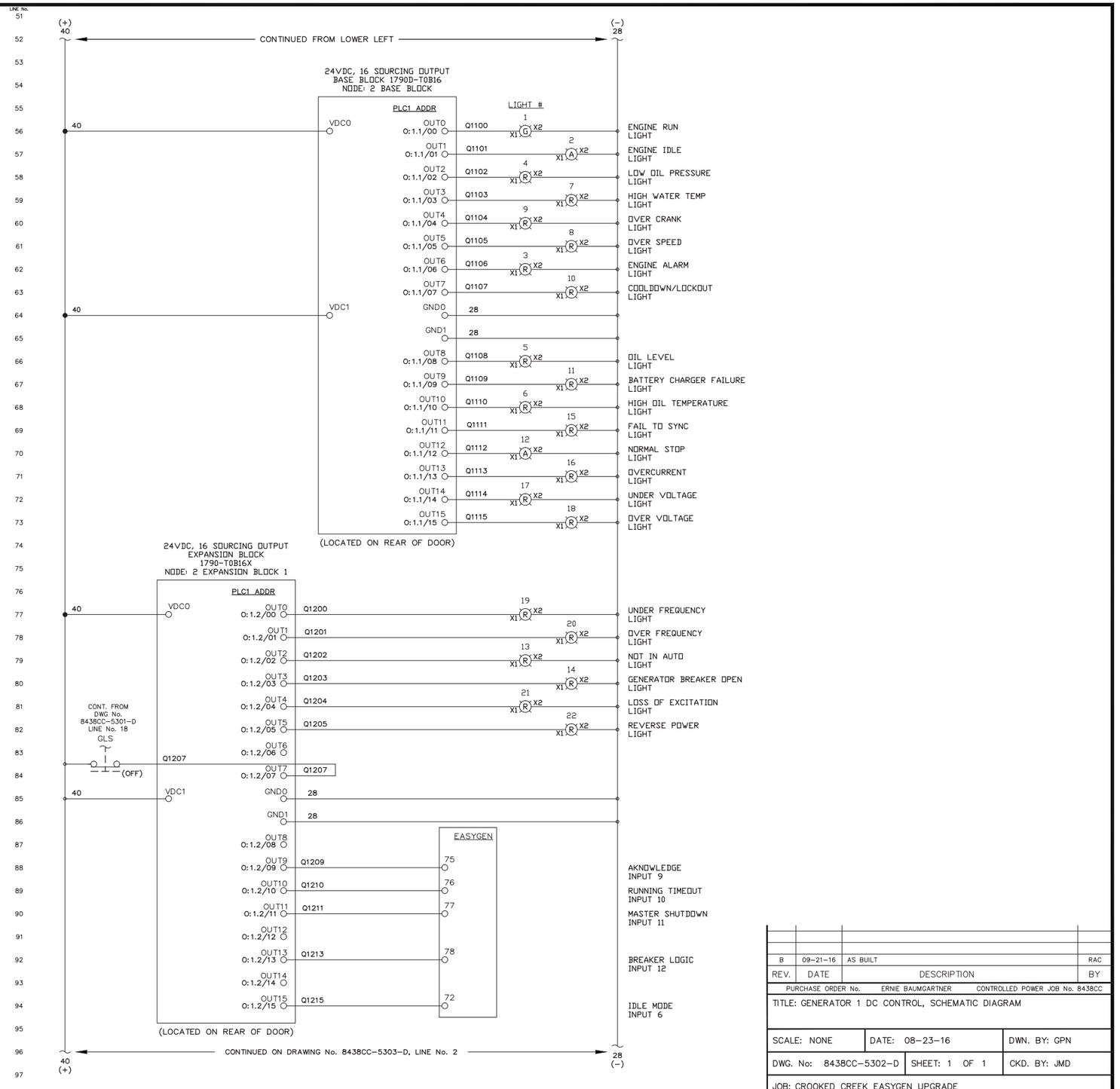

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: GENERATOR 1 DC CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5302-D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CROOKED CREEK EASYGEN UPGRADE

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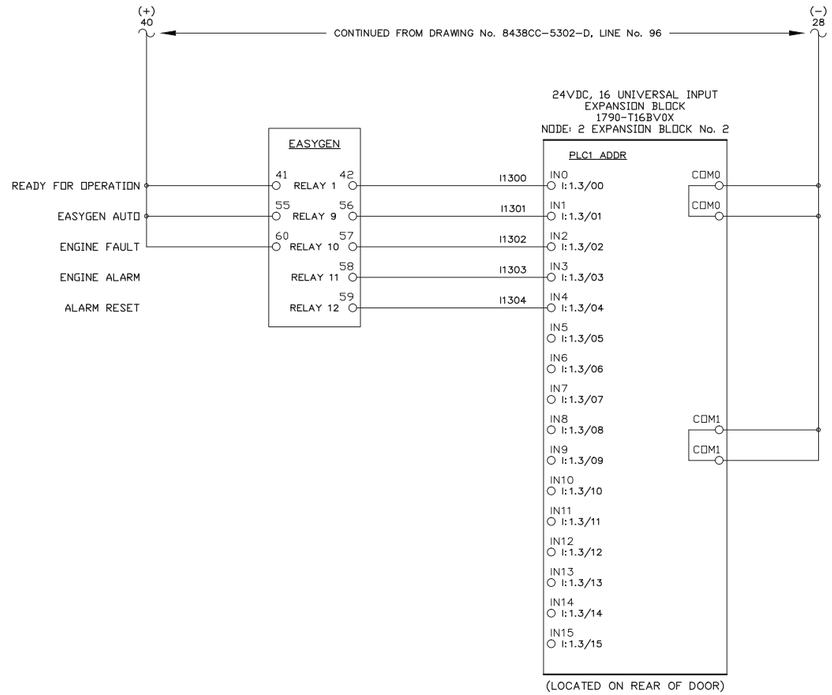

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: GENERATOR 1 DC CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5303-D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CROOKED CREEK EASYGEN UPGRADE

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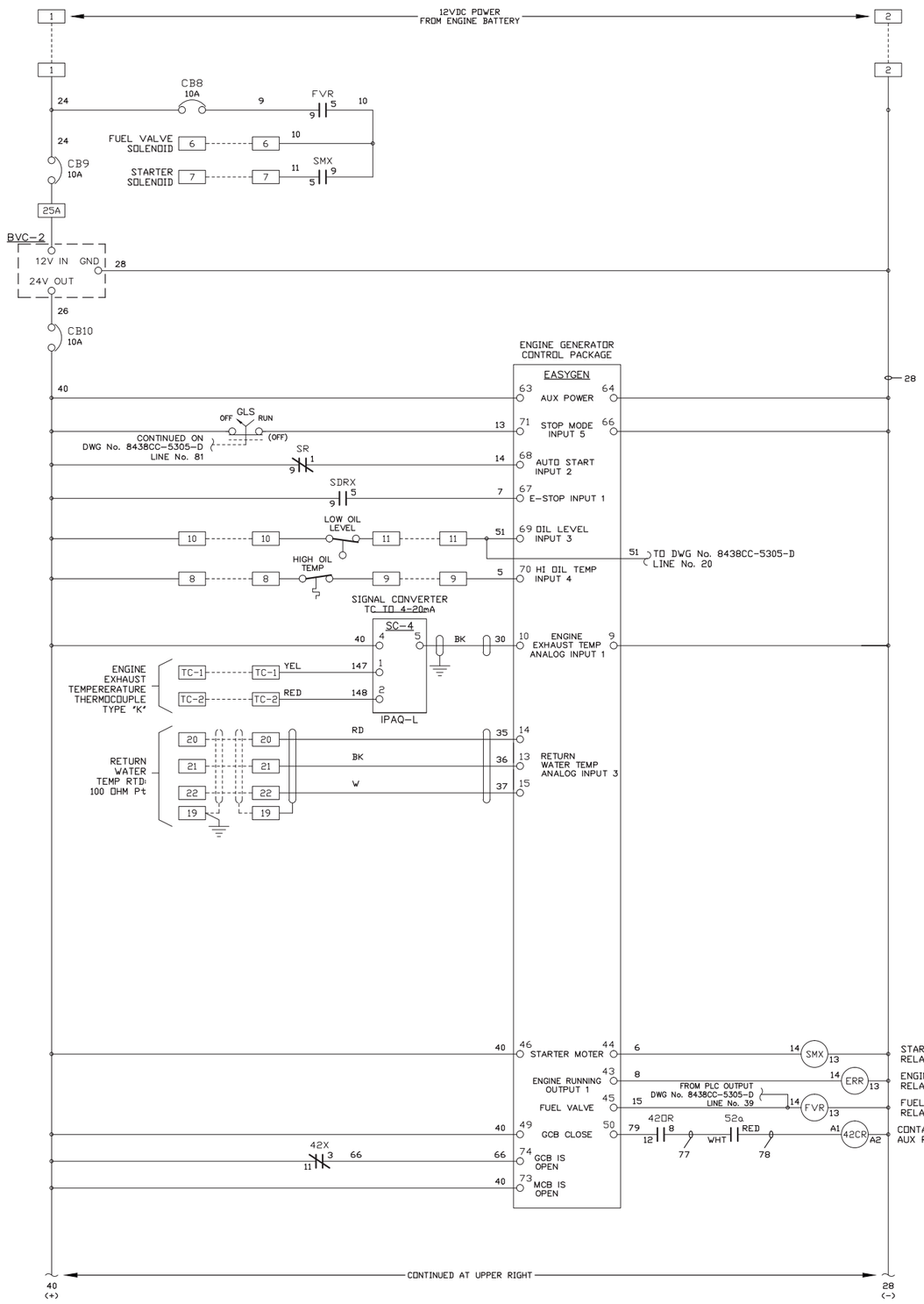

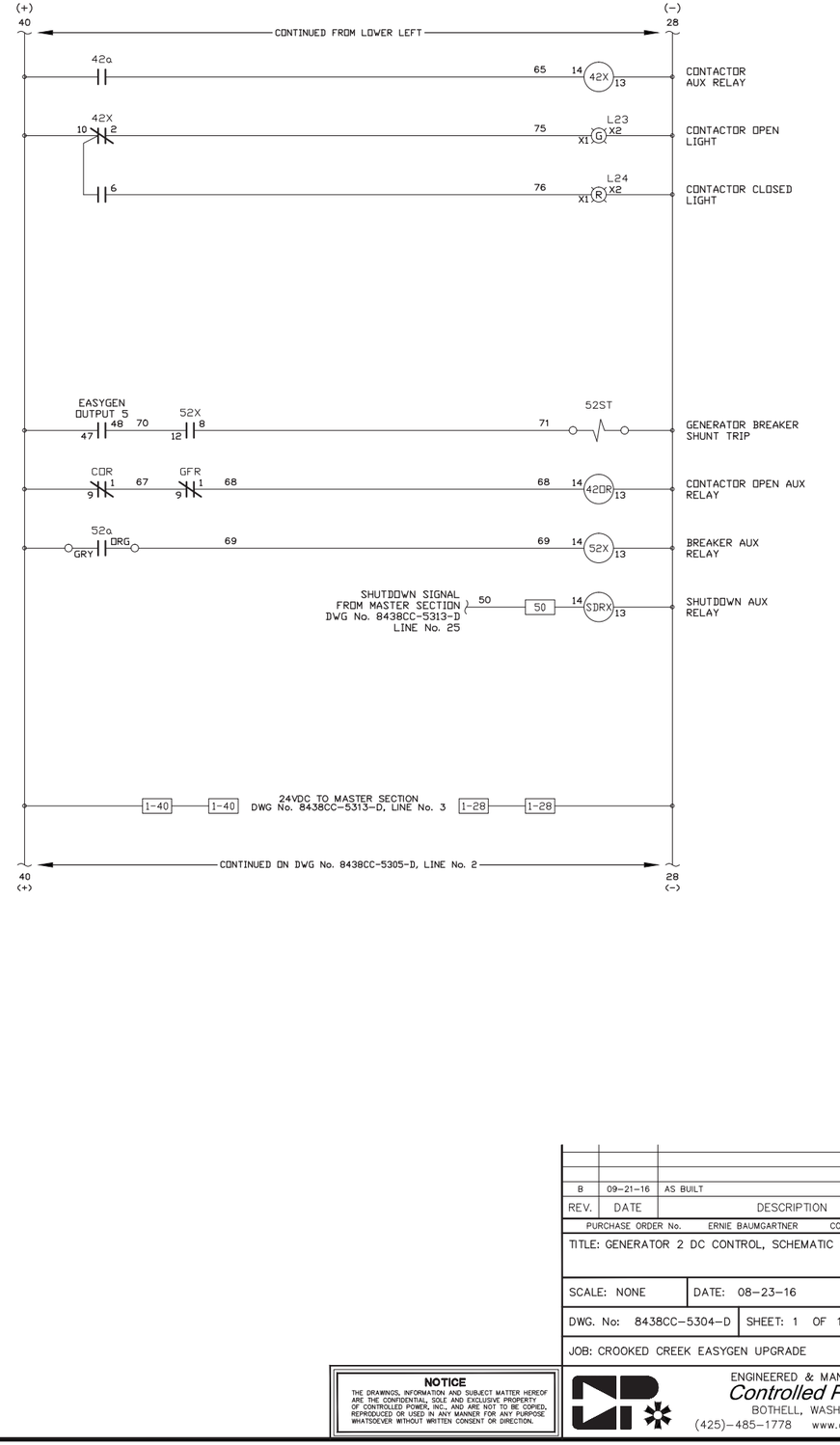

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: GENERATOR 2 DC CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5304-D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CROOKED CREEK EASYGEN UPGRADE

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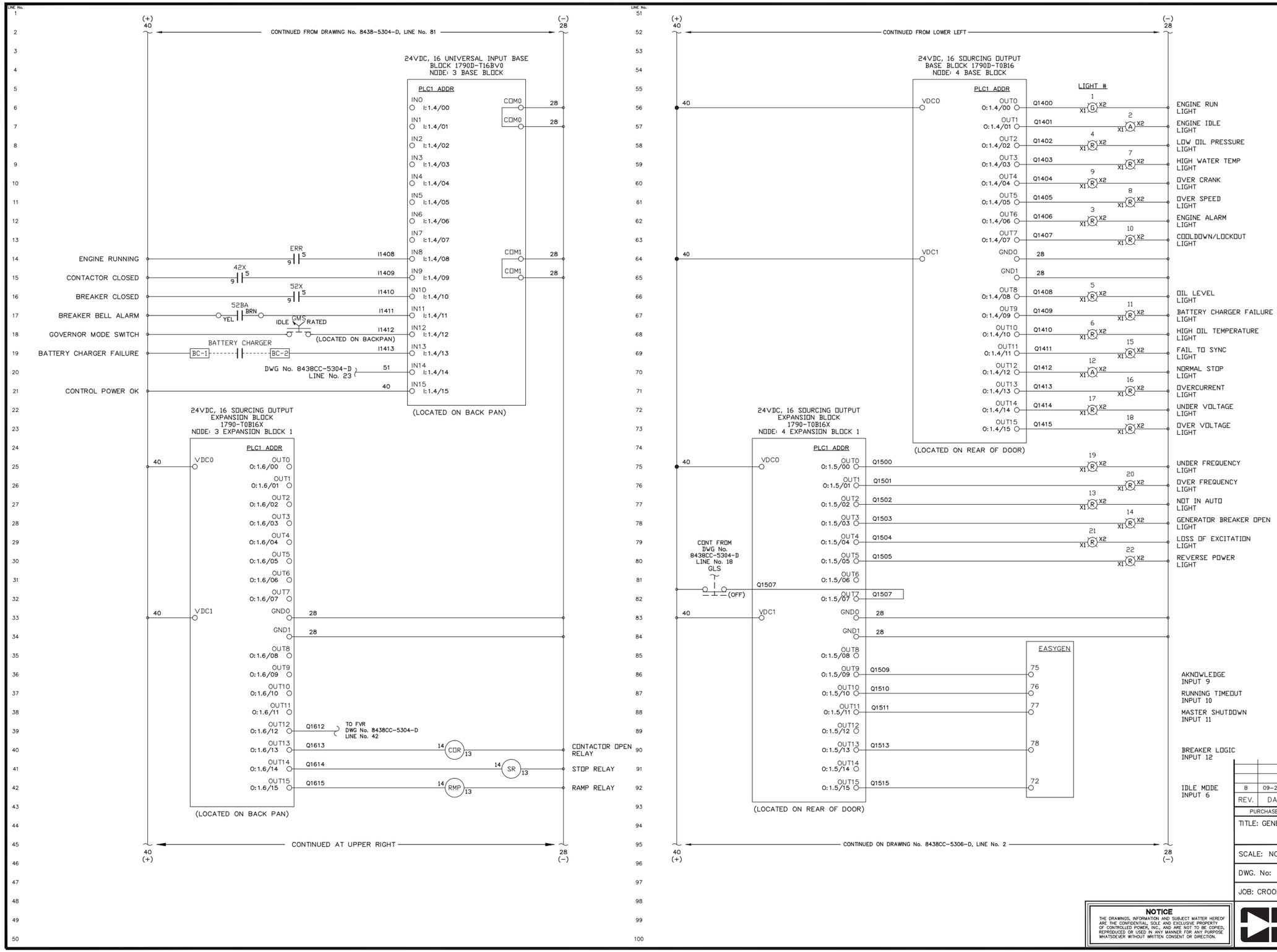

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: GENERATOR 2 DC CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5305-D	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CROOKED CREEK EASYGEN UPGRADE		

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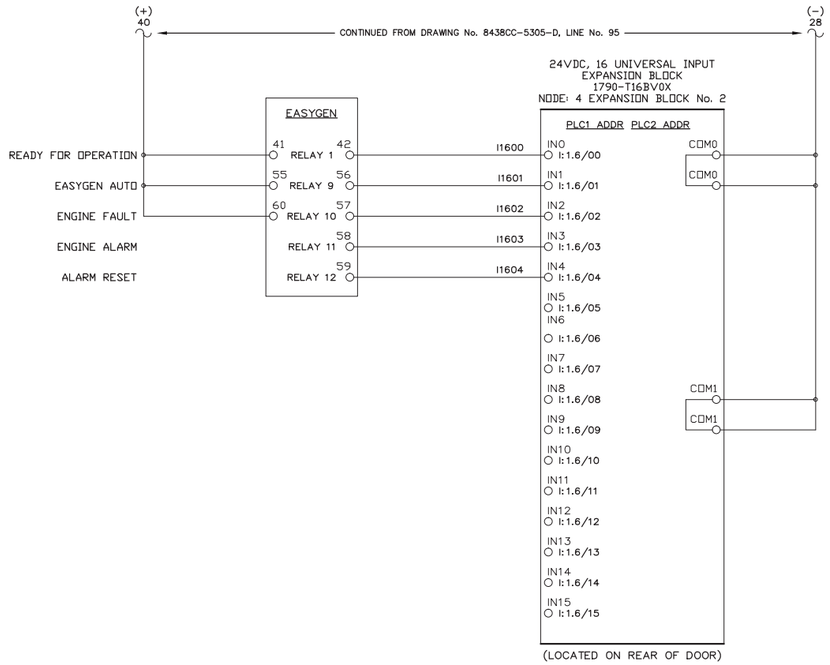

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: GENERATOR 2 DC CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5306-D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CROOKED CREEK EASYGEN UPGRADE

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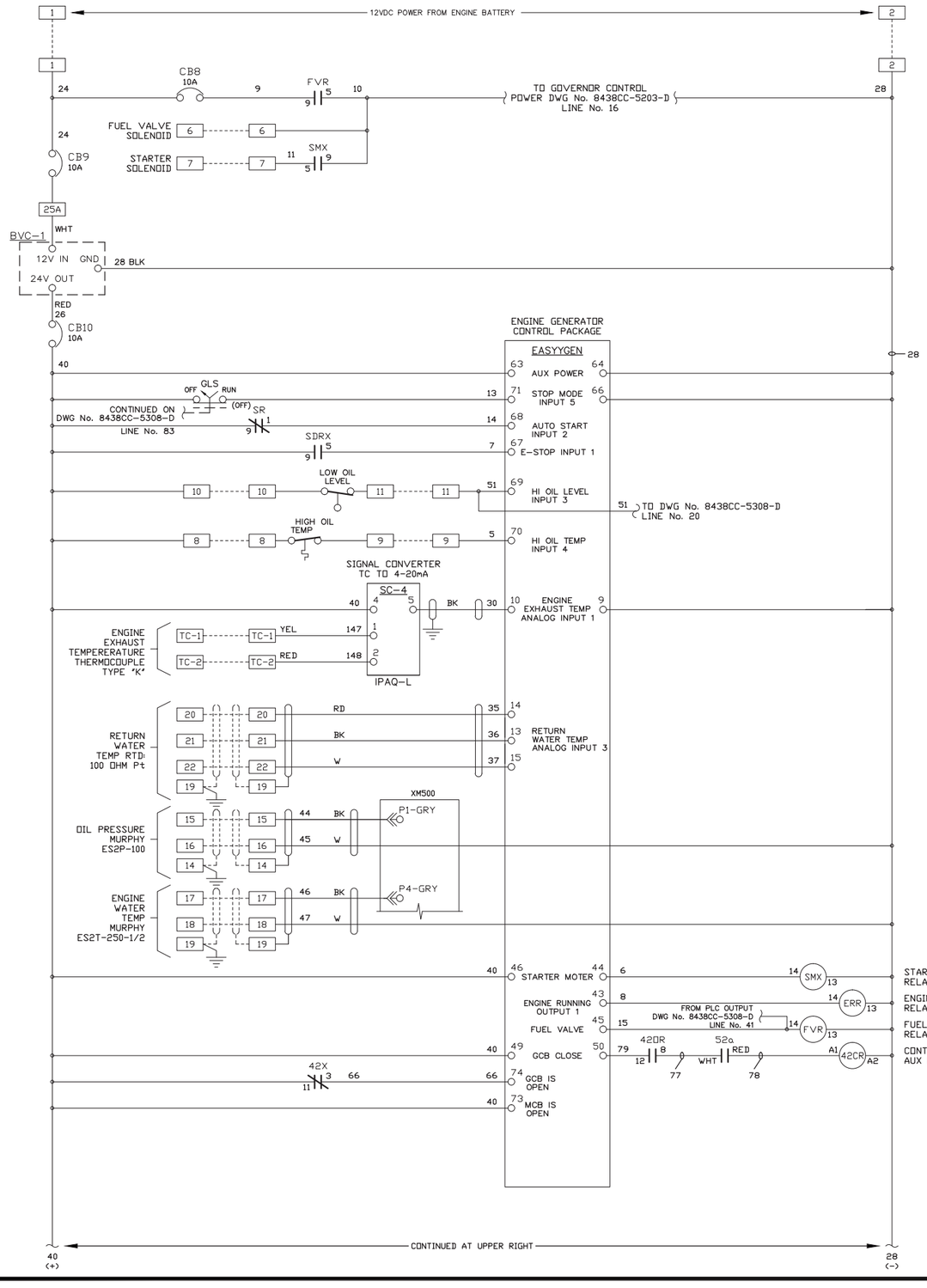

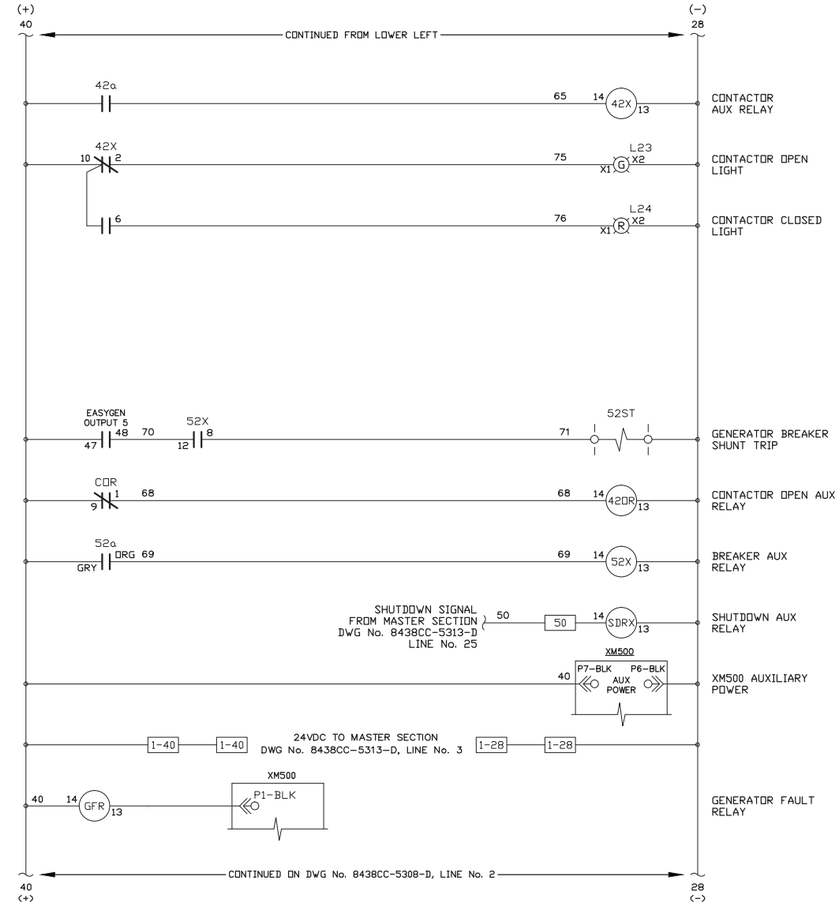

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: GENERATOR 3 DC CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5307-D	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CROOKED CREEK EASYGEN UPGRADE		

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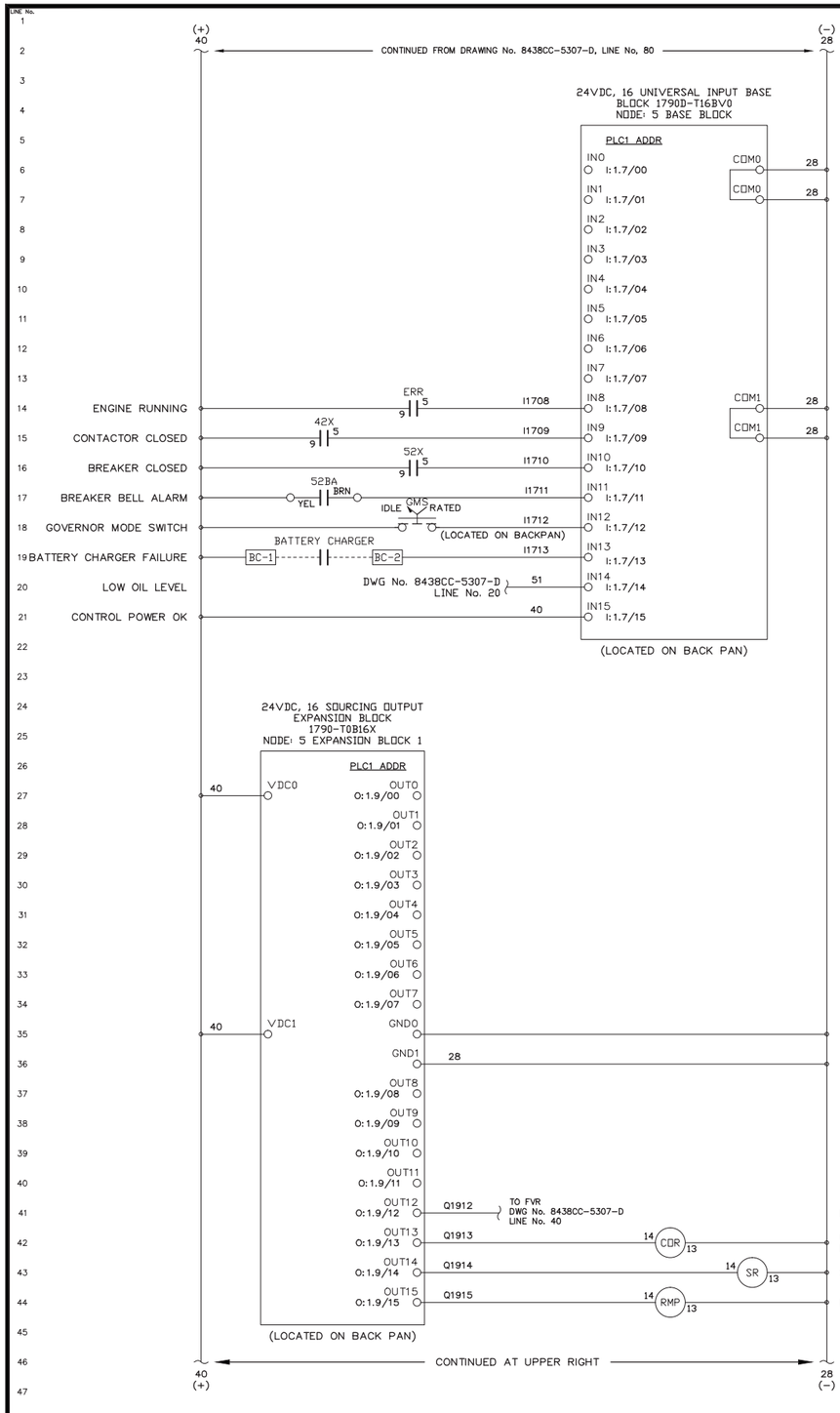

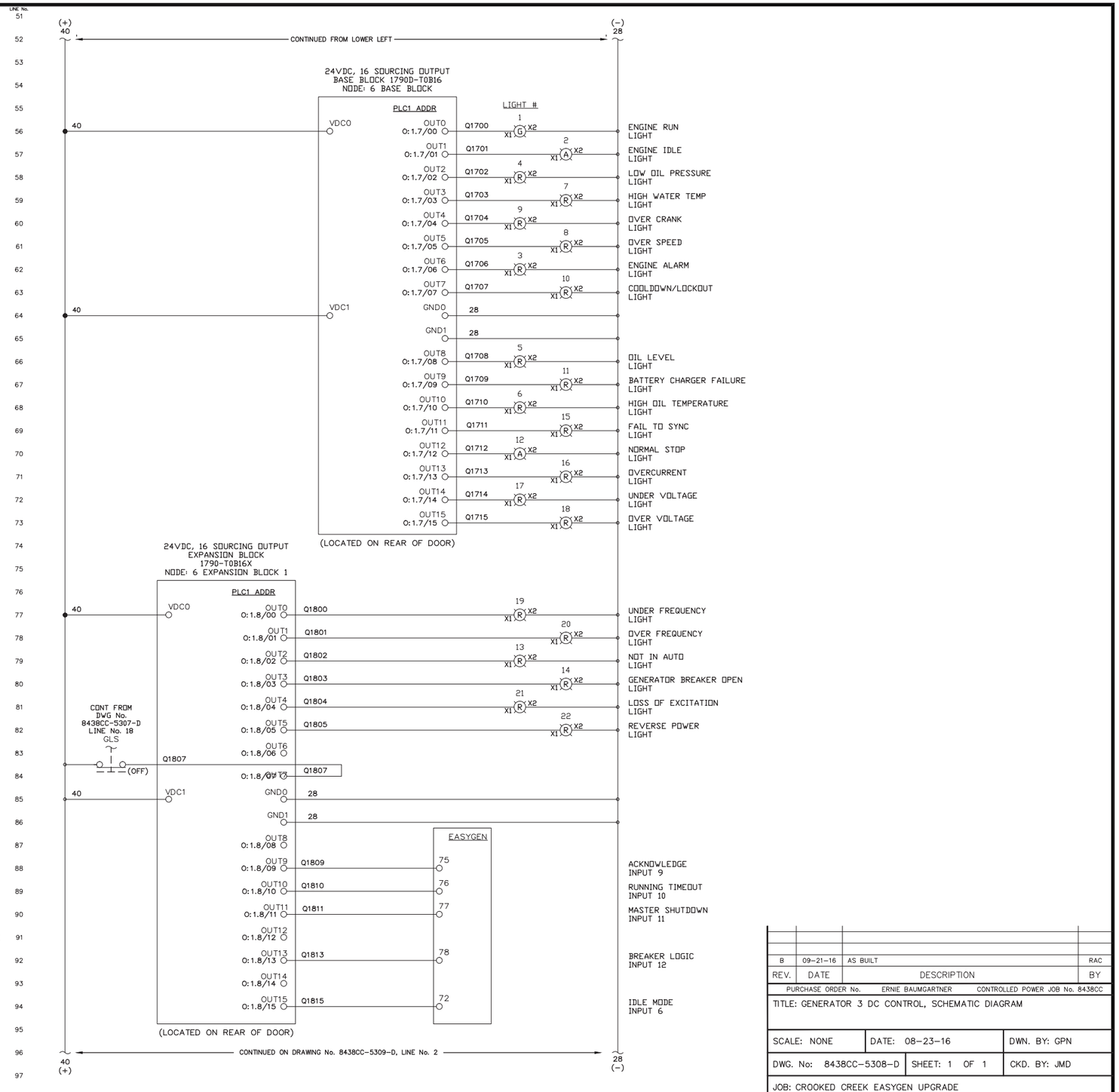

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: GENERATOR 3 DC CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5308-D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CROOKED CREEK EASYGEN UPGRADE

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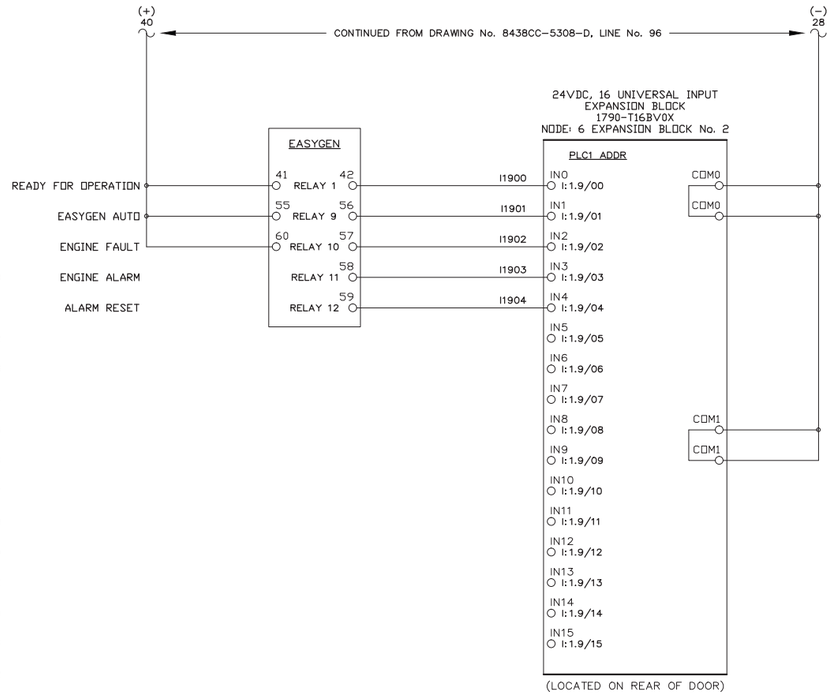

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: GENERATOR 3 DC CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5309-D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CROOKED CREEK EASYGEN UPGRADE

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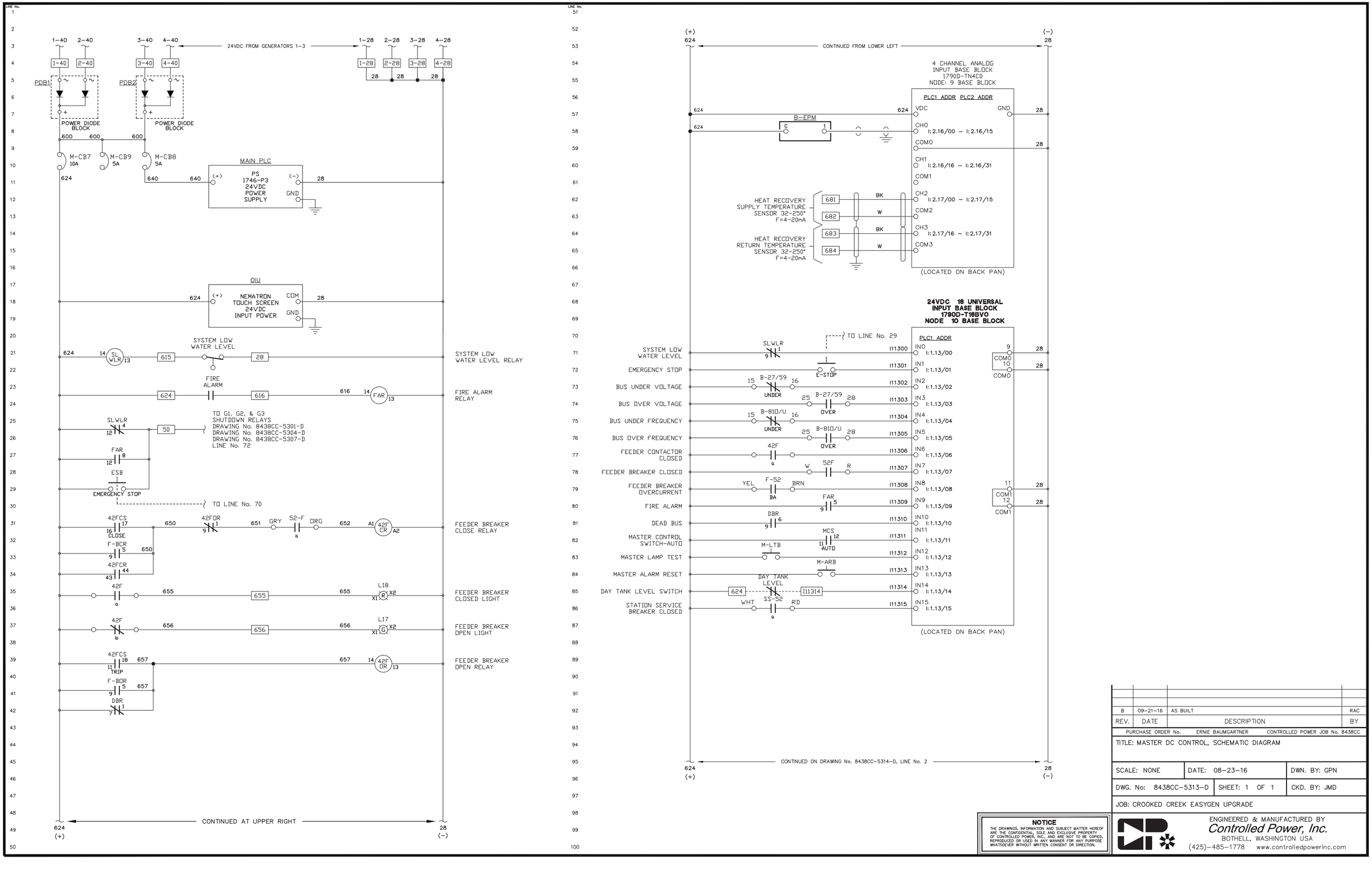

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: MASTER DC CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5313-D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CROOKED CREEK EASYGEN UPGRADE

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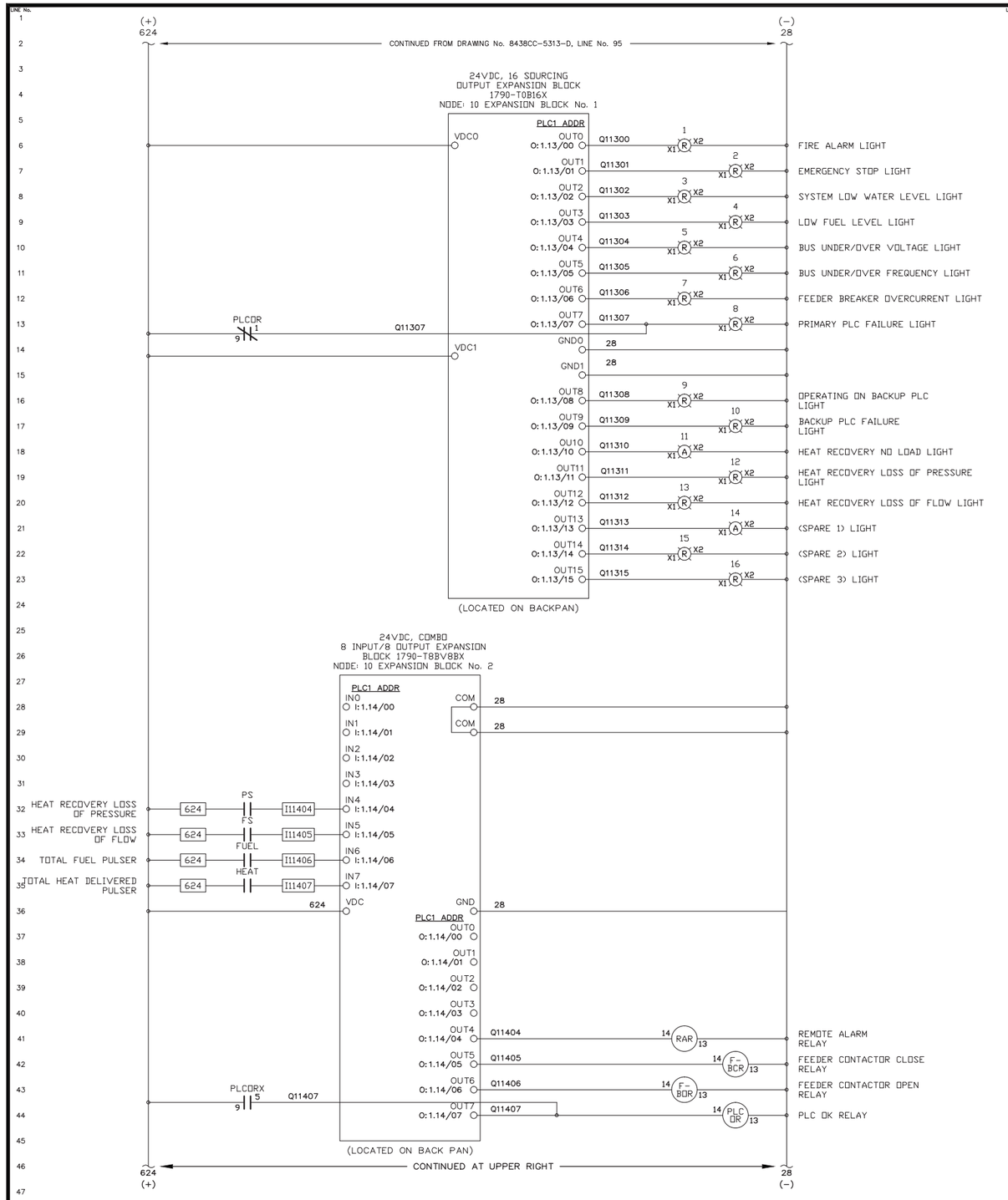

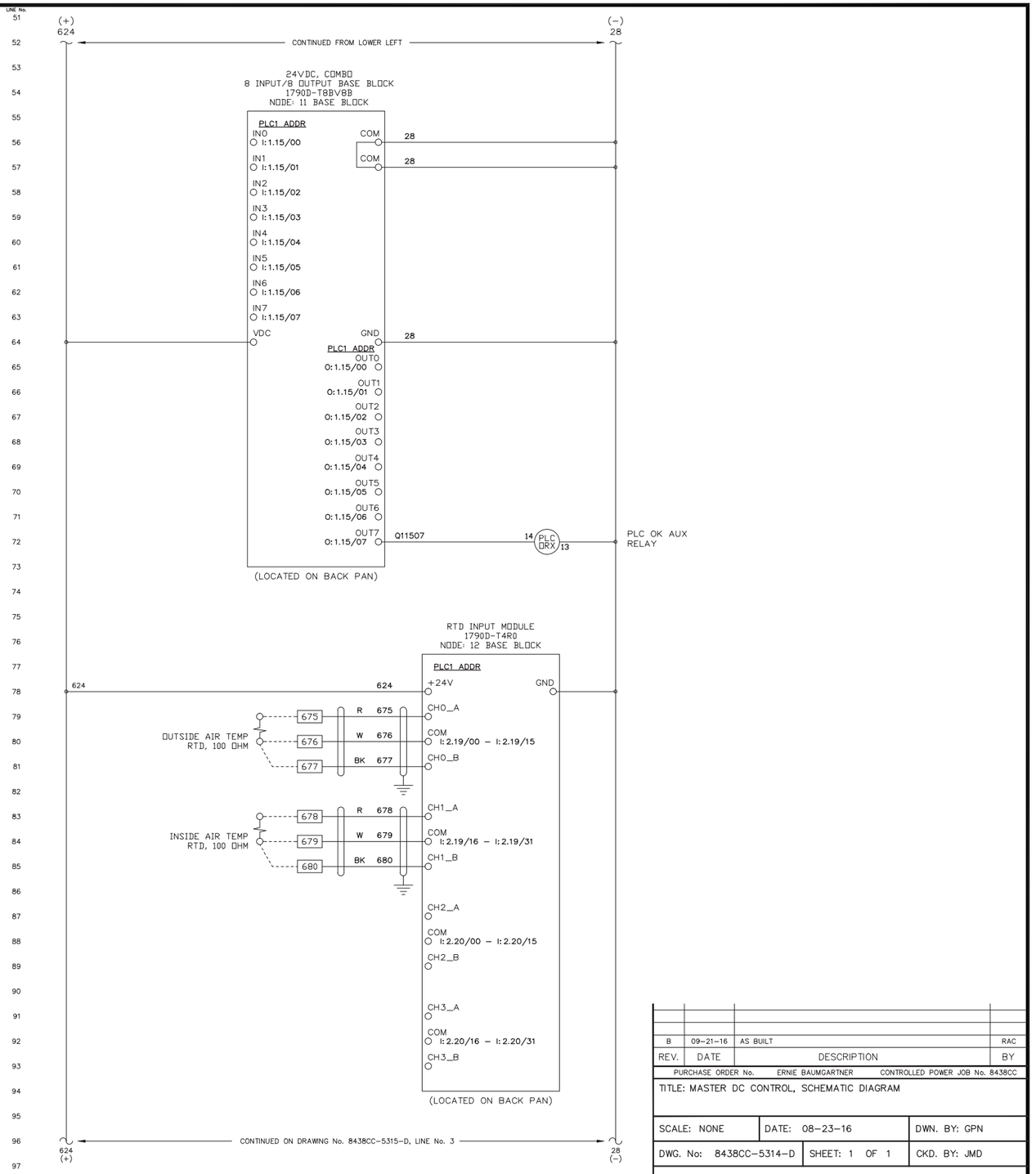

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: MASTER DC CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5314-D	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CROOKED CREEK EASYGEN UPGRADE		

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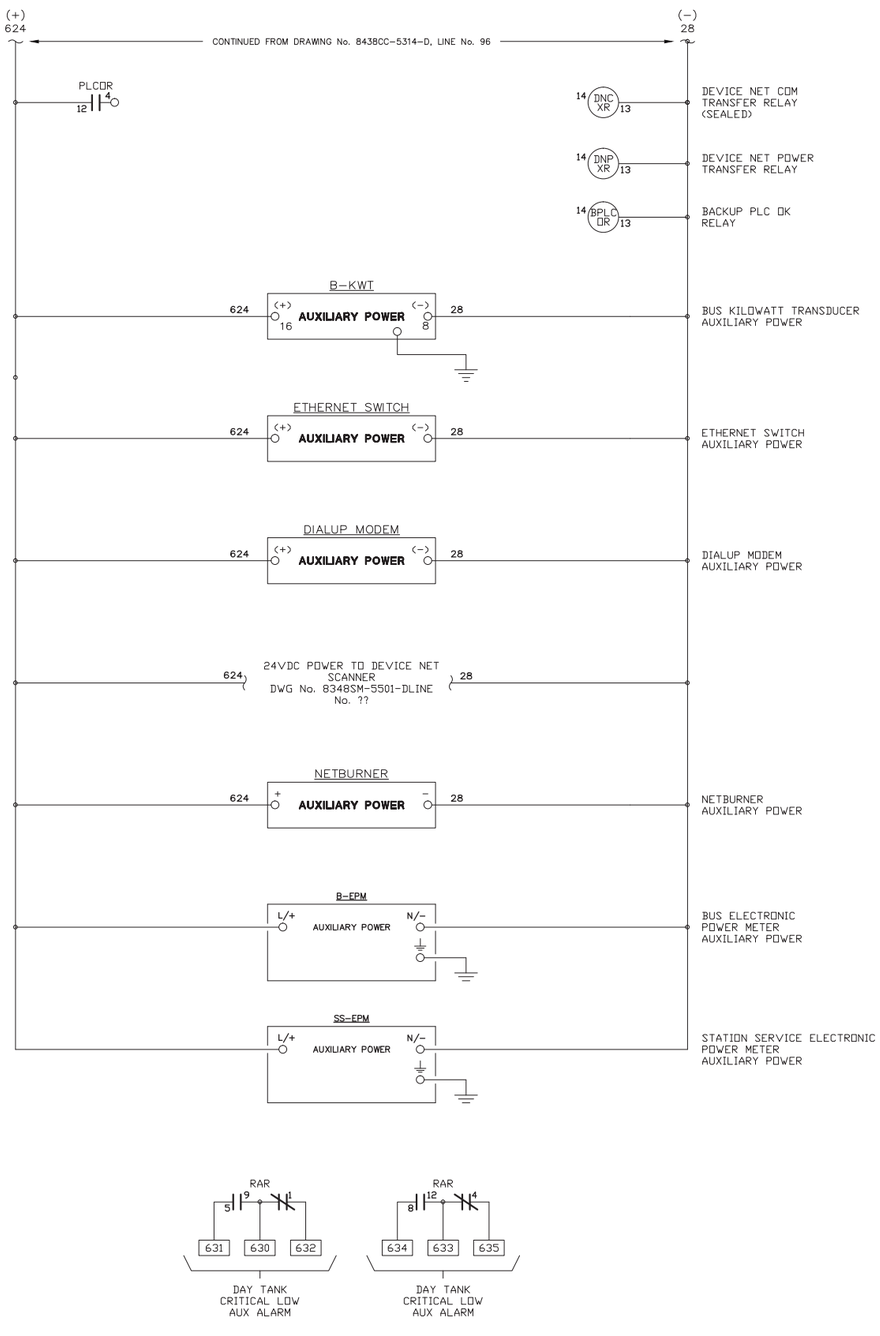

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: MASTER DC CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5315-D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CROOKED CREEK EASYGEN UPGRADE

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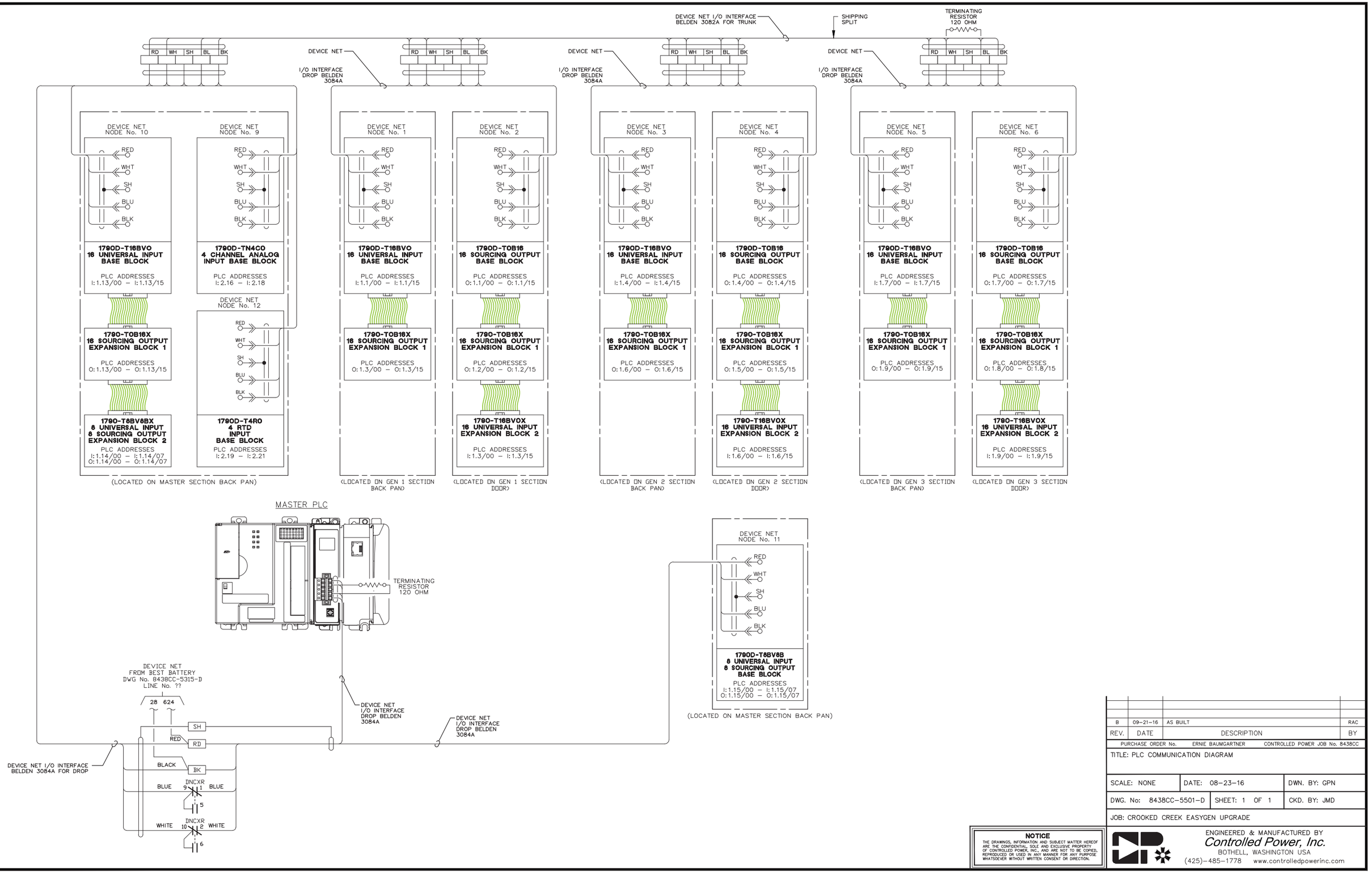

REV.	DATE	DESCRIPTION	BY
B	09–21–16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: PLC COMMUNICATION DIAGRAM

SCALE: NONE	DATE: 08–23–16	DWN. BY: GPN
DWG. No: 8438CC–5501–D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CROOKED CREEK EASYGEN UPGRADE

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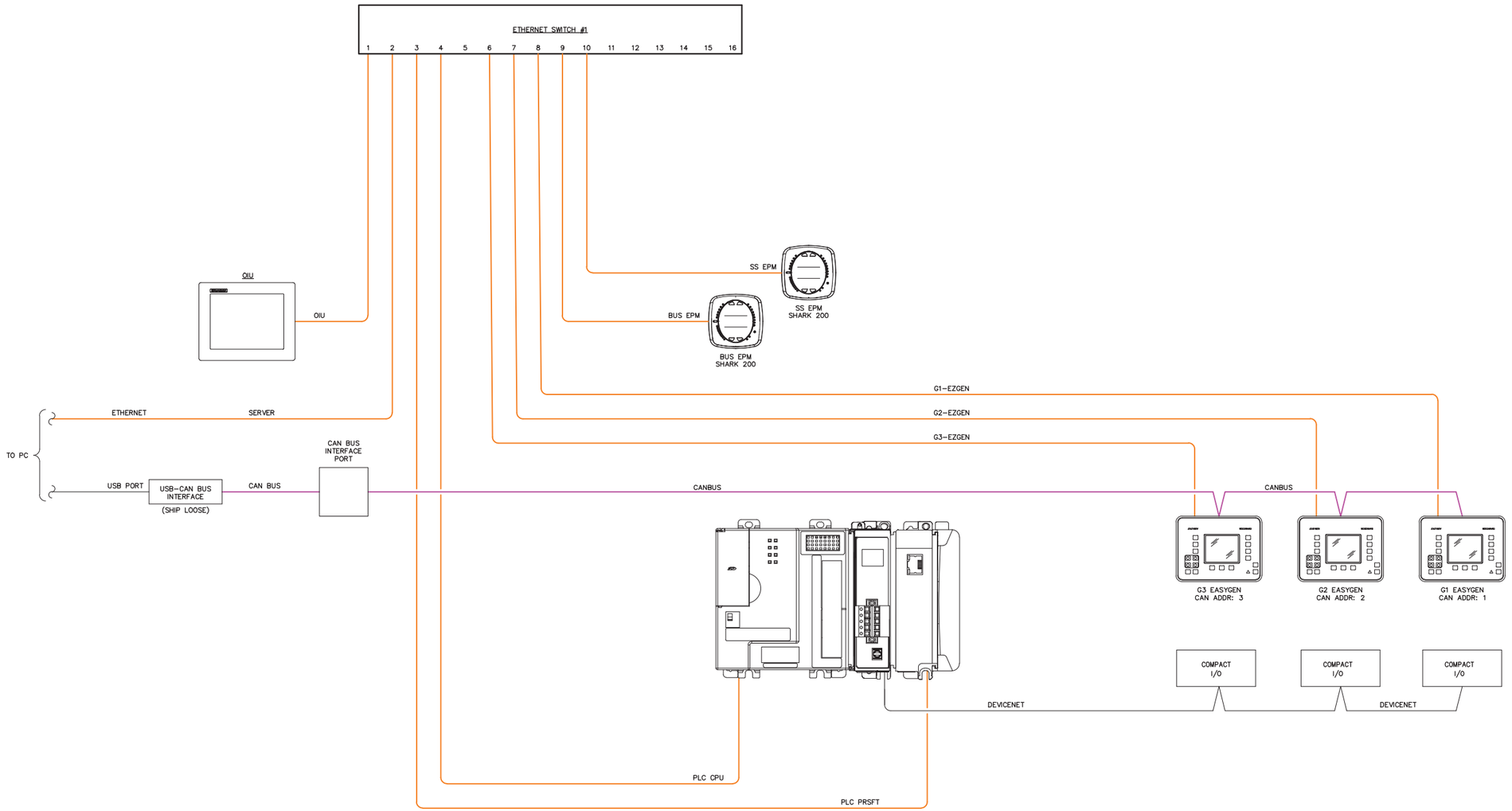
DEVICE	IP ADDRESS
SERVER	192.168.1.142
OIU	192.168.1.182
PLC CPU	192.168.1.183
PLC PROSOFT	192.168.1.187
BUS EPM	192.168.1.190
SS EPM	192.168.1.191
G1 EZGEN	192.168.1.161
G2 EZGEN	192.168.1.162
G3 EZGEN	192.168.1.163



REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: COMMUNICATION NETWORK DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5601-D	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CROOKED CREEK EASYGEN UPGRADE		

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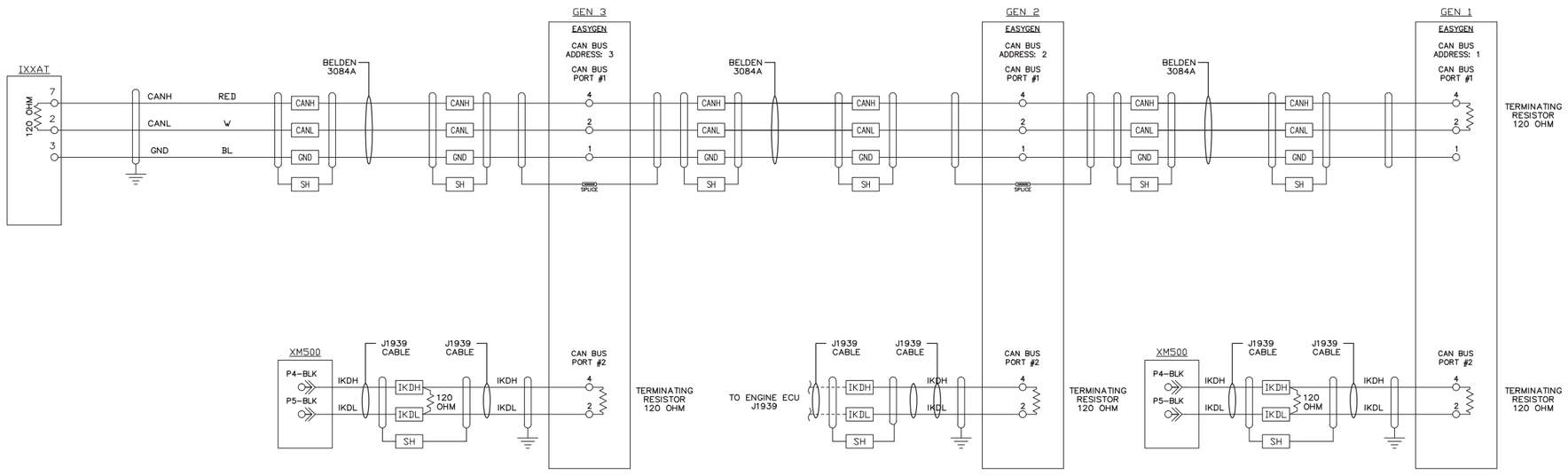

REV.	DATE	DESCRIPTION	BY
B	09-21-16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: EPM MONITORING & SYSTEM COMMUNICATION DIAGRAM

SCALE: NONE	DATE: 08-23-16	DWN. BY: GPN
DWG. No: 8438CC-5602-D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CROOKED CREEK EASYGEN UPGRADE

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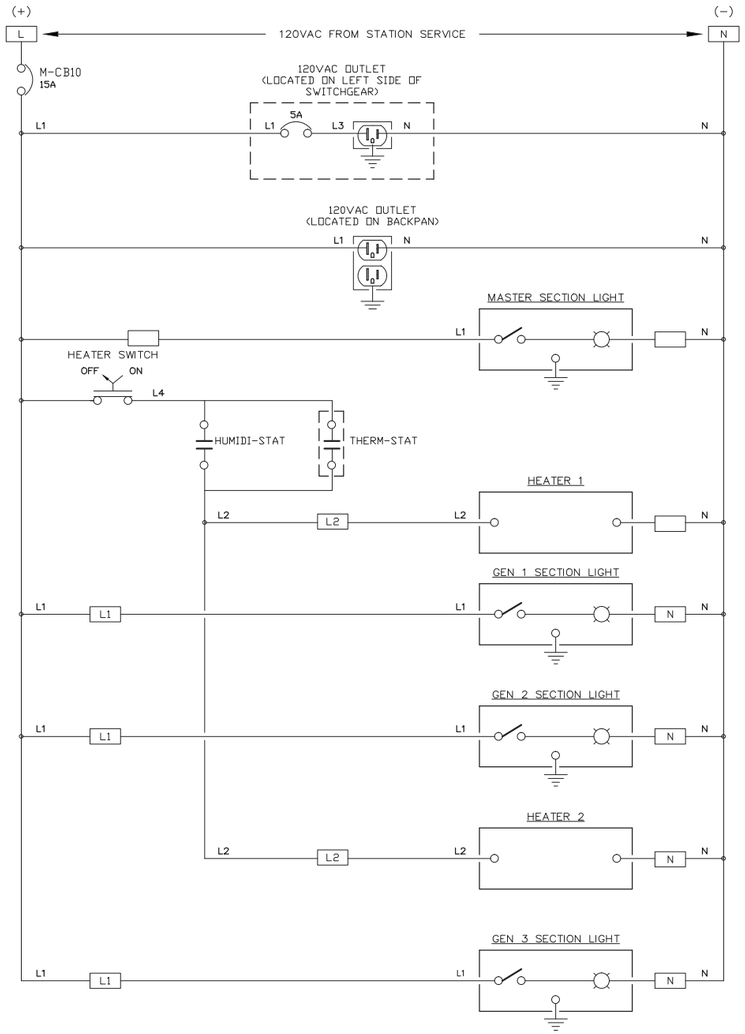

REV.	DATE	DESCRIPTION	BY
B	09−21−16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: HEATER & LIGHTING CONTROL, SCHEMATIC DIAGRAM

SCALE: NONE	DATE: 08−23−16	DWN. BY: GPN
DWG. No: 8438CC−5701−D	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CROOKED CREEK EASYGEN UPGRADE		

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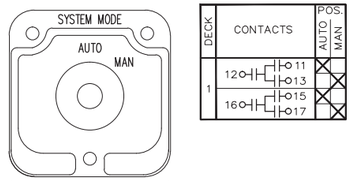
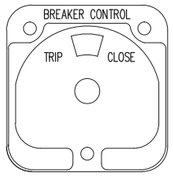
SYSTEM MODE SWITCH – SMS



DECK	CONTACTS	POS. AUTO	POS. MAN.
1	12 – 11		
	13		
	16 – 15		
	17		

(ELECTROSWITCH 24201C)
KNURLED HANDLE
QTY 1

MAIN CONTACTOR CONTROL SWITCH – 42CS



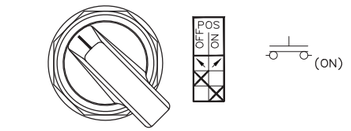
DECK	CONTACTS	POS. TRIP	POS. NORM.	POS. CLOSE
1	11 – 18			
	16 – 17			

(ELECTROSWITCH 2438D)
PISTOL GRIP HANDLE
SPRING RETURN TO CENTER
QTY 1

GOVERNOR MODE SWITCH – GMS

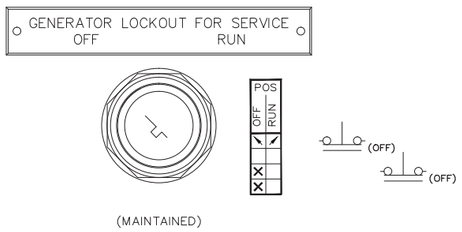
(MAINTAINED)
LOCATED ON BACK PAN

HEATER CONTROL SWITCH – HCS



(MAINTAINED)
LOCATED ON MASTER BACK PAN

ENGINE CONTROL SWITCH – GLS



(MAINTAINED)

REV.	DATE	DESCRIPTION	BY
B	09–21–16	AS BUILT	RAC

PURCHASE ORDER No. | ERNIE BAUMGARTNER | CONTROLLED POWER JOB No. 8438CC

TITLE: CONTROL SWITCH TARTGET DIAGRAM

SCALE: NONE	DATE: 08–23–16	DWN. BY: GPN
DWG. No: 8438CC–6101–D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CROOKED CREEK EASYGEN UPGRADE

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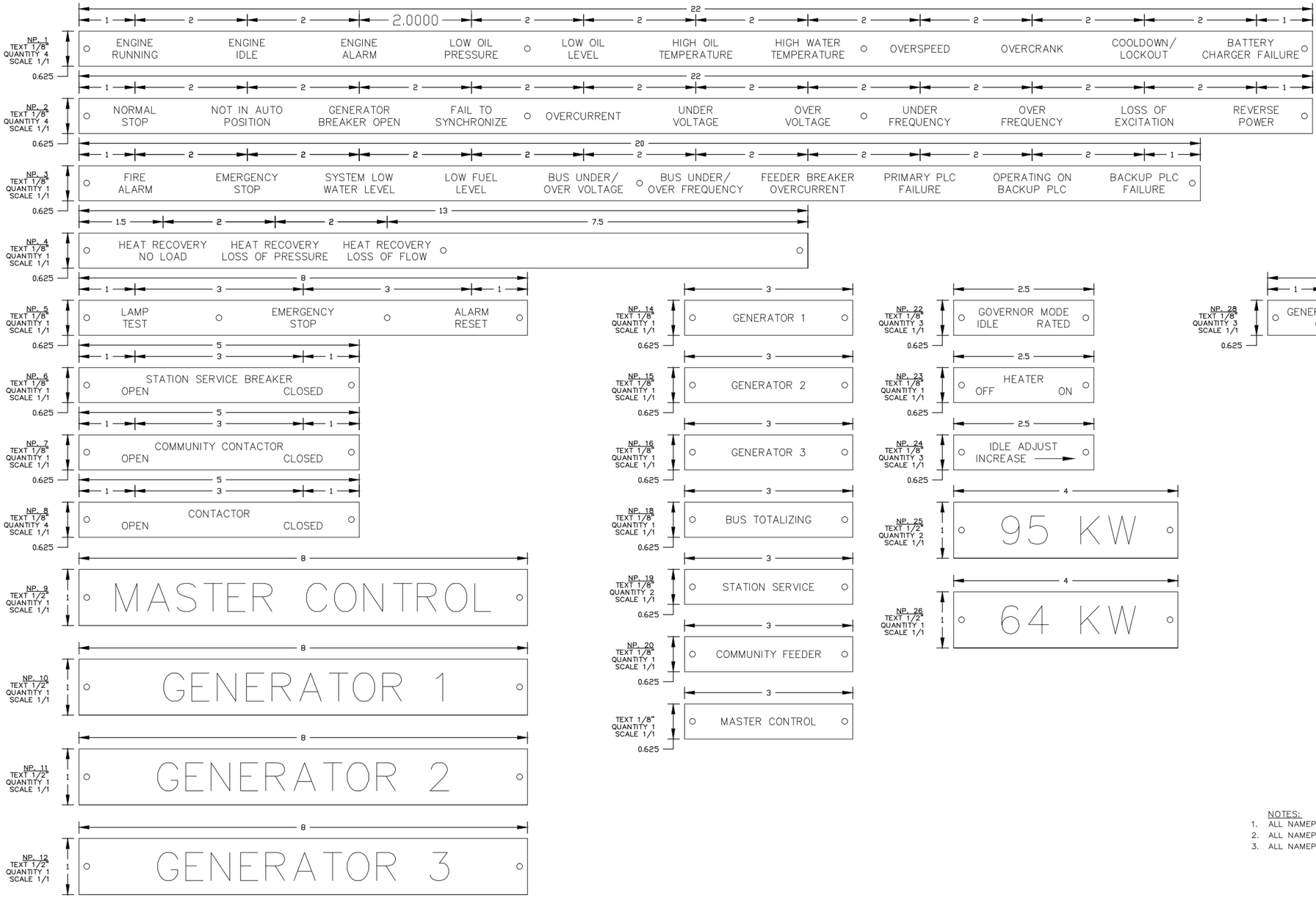

NOTES:

1. ALL NAMEPLATES SHALL BE WHITE FACE WITH BLACK LETTERS EXCEPT AS NOTED.
2. ALL NAMEPLATES SHALL HAVE PRESSURE SENSITIVE ADHESIVE ON BACK
3. ALL NAMEPLATES MECHANICALLY ATTACHED

REV.	DATE	DESCRIPTION	BY
B	09–21–16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: NAMEPLATE ENGRAVING SCHEDULE, FABRICATION DIAGRAM

SCALE: NONE	DATE: 08–23–16	DWN. BY: GPN
DWG. No: 8438CC–6201–D	SHEET: 1 OF 1	CKD. BY: JMD

JOB: CROOKED CREEK EASYGEN UPGRADE

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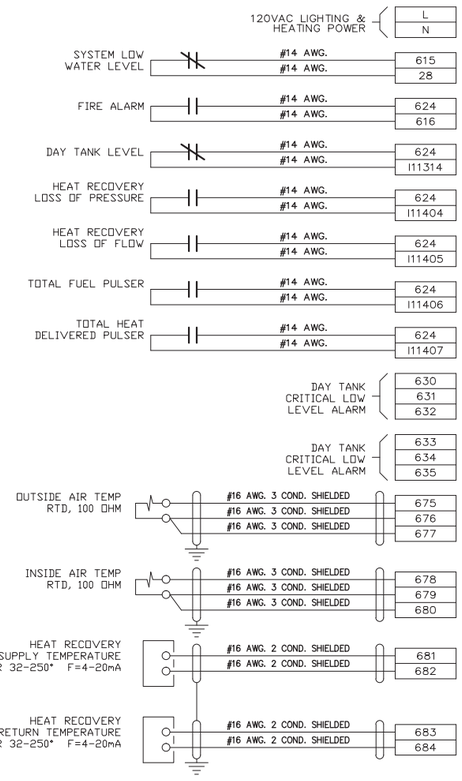
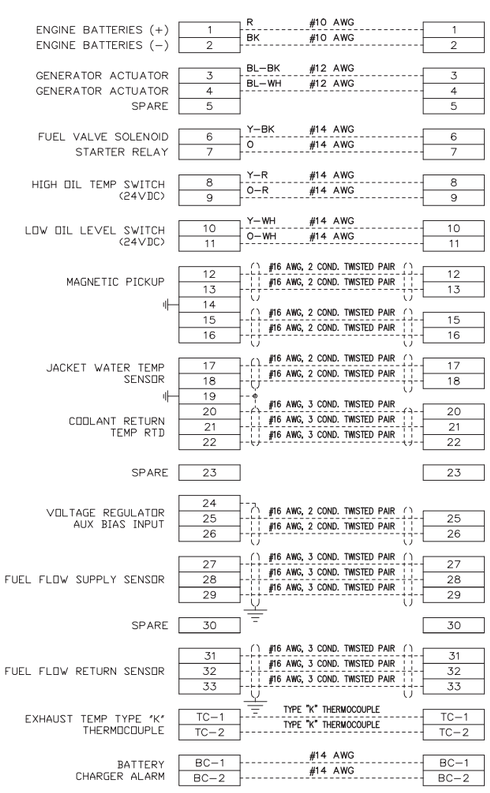
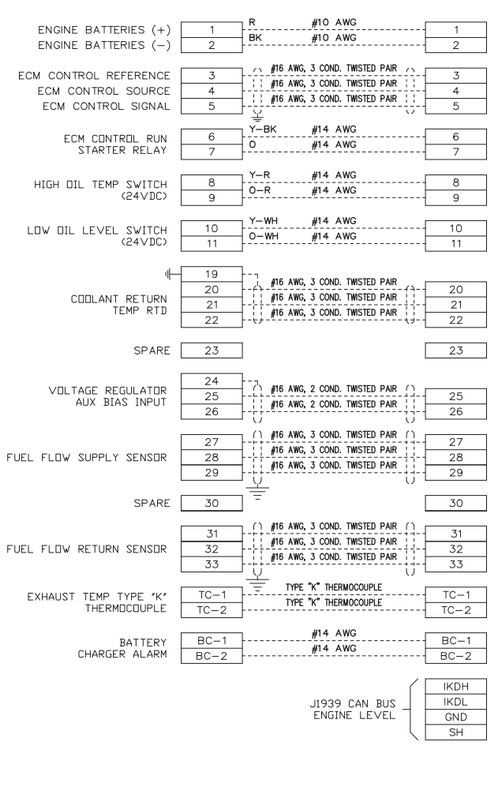
MASTER CONTROL



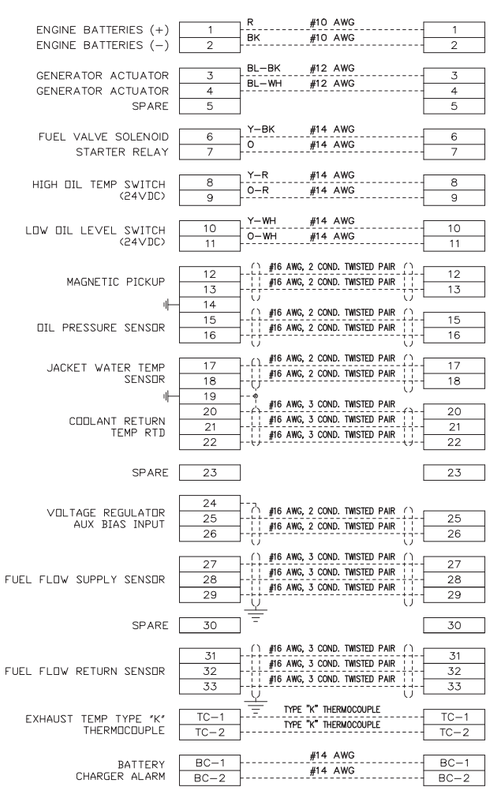
GENERATOR 1



GENERATOR 2



GENERATOR 3



REV.	DATE	DESCRIPTION	BY
B	09–21–16	AS BUILT	RAC

PURCHASE ORDER No. ERNIE BAUMGARTNER CONTROLLED POWER JOB No. 8438CC

TITLE: INTERCONNECTION DIAGRAM

SCALE: NONE	DATE: 08–23–16	DWN. BY: GPN
DWG. No: 8438CC–7101–D	SHEET: 1 OF 1	CKD. BY: JMD
JOB: CROOKED CREEK EASYGEN UPGRADE		

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