COMMANDER 300 MACHINE SCHEMATIC G4357 REV: A

POSITIVE OUTPUT TERMINAL +

NEGATIVE OUTPUT TERMINAL −

WELD CHOKE 68 / 69

located center of power module assembly.

DIODE MODULE

IGBT MODULE - EMMITTER IS COMMON TO HEATSINK

CHOPPER PC BOARD (SCHEM.#M18709) (board description on pg 3)

J13-2 J13-1 J13-4 J13-5 PWM IN — PWR IN 35VAC — 14 13

IGBT MODULE - EMMITTER IS COMMON TO HEATSINK

CHOPPER PC BOARD (SCHEM.#M18709) (board description on pg 3)

J12-2 J12-1 J12-4 J12-5 PWM IN — PWR IN 35VAC — 16 15

24000uf 100vdc (×4)

located on left and right outside heat sinks

chopper pc boards located on left and right outside heat sinks

located below left and right outside heat sinks

POWER MODULE ASSEMBLY

consists of weld choke, bridge chopper heat sinks, capacitor mounted on metal rack; located directly behind lower output panel.

THREE PHASE RECTIFIER heat sinks located on each side of weld choke

POS. HEAT SINK

NEG. HEAT SINK

84.0VDC

TERMINAL STRIP

located center of power module assembly, in front of weld choke

STATOR WELD WINDINGS W1 W2 W3 W4 W5 W6

62.0VAC (×3)

62.0 VAC

FOUR POLE 1800 RPM ALTERNATOR

250 ohm 25 watts

BLEED RESISTOR

located left side of power module, outside of left heat sink

located center of lower outut panel

SEE OCV TABLE FOR OUTPUTS

BY-PASS PC BOARD (schem.# S21252)

mounting screw

67 / 67A

21B / 21C / 67A

TO AMPHENOL 1

WIREFEEDER VOLTMETER POLARITY SWITCH (POSITIVE POSITION)

21A 22A

SHUNT 50MV=400 AMPS located directly behind negative output stud

25 23 25A 23A

SHIELDED CABLE

IGBT DRIVER PCB POWER

CTRL PCB POWER

18 17

13 14 17 18 15 16 5G 6E — P16 J16

YEL / RED / BLK / BRN

CONTROL TRANSFORMER located bottom center of control box

AUX PWR INS. STUD (page 2)

GND STUD 1 (page 2)

PWM's TO CHOPPER BDS

AUX PWR INS. STUD (page 2)

J14 P14 — 21 22

located on left fuel tank rail between fire wall and fuel tank

42 VOLT AC WIRE FEEDER POWER (optional)

6C / 10A / 41 / 5D — J40 P40

AUX NEUT STUD (page 2)

located back of control box far right side

AMPHENOL (RF) BYPASS BOARD (SCHEM.# M18948)

FROM REMOTE CONTROL SWITCH — 77C 76C 75B

FROM OUTPUT CONTROL POT — 2C

FROM ENGINE PROT. BOARD (PAGE 2) — 4B

J61-5 J61-8 J61-4 J61-3 J61-2 — J62-6 J62-3 J62-2 J62-1 J62-4 J60-6 J60-3 J60-2 J60-1 J60-4

77E 76E 75E 2E 4E — 42VAC / REMOTE CTRL / CONTACTOR

from 15 amp circuit breaker — 31 32

FROM POLARITY SWITCH — 21C 242H — WORK / GND — 115VAC

AMPHENOL 1

GND STUD 2 (page 2) (×3)

77D 76D 75D 2D 4D — REMOTE CTRL

242H — GND — CONTACTOR

AMPHENOL 2

mounting screw

DISPLAY BOARD (optional) (SCHEM.# L10658) (board description on pg 3)

107A 106A 104A 103A 102A 105A 101A

OPTOISOLATORS / A/D CONVERTER / EE-MEMORY / μ-PROCESSOR / LED DRIVE CIRCUITRY / AMPS / VOLTS

J9-5 J9-4 J9-2 J8-3 J8-1 J8-5 J8-4 J9-1 J9-2

232 — 232J

+12V - TO RUN/STOP SWITCH (page 2)

GND STUD 1 (page 2)

DISPLAY BOARD INTERFACE

CONTROL PC BOARD (SCHEM.# G3001) (board description on page 3)

located back of control box, left side

NOTE: PCB GND COMMON TO WELD CIRCUIT HERE.

*1.0vdc = 100A ARC CURRENT OUT — 101A — J2-1

ARC VOLTS OUT — 105A — J2-5

77 OUT — 102A — J2-7

76 OUT — 104A — J2-6

75 OUT — 103A — J2-8

CTRL +12V — 106A — J2-3

CTRL COM — 107A — J2-2

*3.39-3.87vdc (cv mode, min pot, no load)

*Measure per TABLE 1

*11.6-12.4vdc

TO CURRENT SENSE & ARC CONTROL

CURRENT AMP gain=79.46

ARC CURRENT FEEDBACK — J3-6 — 22

**0 - 75mvdc — J3-15 — 21

voltage measured from J3-2 to J3-6 = stud volts

ARC VOLTAGE FEEDBACK — J3-2 — 67

12V

divider=.12

TO ARC CONTROL CIRCUITRY

MODE SELECT CIRCUITRY

FOLDBACK CIRCUIT IF ARCVOLTAGE < 12V FOR 7 SEC. THEN MAX CURRENT = 375 AMPS

BUFFER (in=out) ×6

+12V CTRL

CTRL COM

HOT START

CURRENT LIMIT avg limit = 600a peak limit = 825a

ERROR AMP

IN

PWM CONTROLLER

OUT

RESET

LATCH

SET POINT CIRCUITRY

WELD CURRENT SENSE = 20AMPS

FROM CURRENT AMP

IMBALANCE DETECTOR CIRCUIT

+12VCTRL

OPTO

CV- PINCH (AVG CURRENT CONTROL)

CC- ARC FORCE (BOOST AT SHORT CIRCUIT)

ARC CONTROL CIRCUITRY

FROM VOLTAGE FEEDBACK CIRCUIT

ARC FORCE CONTROL — R2 50K

J3-8 77 — TO AMPHENOL BYPASS BOARD 77C / 76C

REMOTE CONTROL SWITCH (LOCAL POSITION)

OUTPUT CONTROL POT - 10K — 77B / 76B — R1 (max / ccw / min)

*Measure per TABLE 1

J3-16 76 — J3-7 75 — 75B / 75A — TO AMPHENOL BYPASS BOARD

J4-4 213 CV

J4-9 214 90A PIPE

J4-6 215 150A PIPE

J4-2 216 250A PIPE

J4-5 217 350A PIPE

J4-7 218 500A PIPE

J4-8 219 CC

J4-10 220 TIG

MODE SWITCH — 11.5vdc = on 0vdc = off (each tap)

J4-1 222 — 11.5vdc

J3-14 278

J3-5 277

J1-1 CTRL COM — J1-4 CTRL +12V — J1-2 WELD CURRENT SENSE — J1-3 J1-6 PWM ENABLE

108A 109A 110A 91 90

1.1vdc = pwm's on 0v = pwm's off

9.0vdc = load>20A 0v = no load

11.6-12.4vdc

TO ENGINE PROTECTION BOARD (PAGE 2)

J3-10 25A — 200 OHM — 20KHZ — PWM OUTPUT (left chopper bd)

J3-11 23A — 200 OHM

J3-13 25 — 200 OHM — PWM OUTPUT (right chopper bd)

J3-12 23 — 200 OHM

J3-3 69 — J3-4 68

7.5v / 0v — 40us 10us — (375A at 34v)

CURRENT FEEDBACK

VOLTAGE FEEDBACK

RF BYPASS PCB

J61 (4 8 / 1 5) — J62 (3 6 / 1 4) — J60 (3 6 / 1 4)

DISPLAY PCB

OPTIONAL ON STANDARD MODEL

5 J8 1 — 5 J9 1

CONTROL PCB

J3 (1 8 / 9 16) — J4 (1 5 / 6 10) — J2 (1 4 / 5 8) — J1 (1 3 / 4 6)

OCV TABLE (ocv's measured at 1900 rpm)

MODE	MIN POT	MAX POT
CV	30.0vdc	62.0vdc
60		83.0vdc
90		83.0vdc
150		83.0vdc
230		83.0vdc
300		83.0vdc
CC	83.0vdc	83.0vdc

TABLE 1
(MEASURE FROM CONTROL BD J2-6 TO J2-2)

CONTROL DIAL POSITION	MODE SWITCH POSTION	DC VOLTAGE
MIN	CV	1.233-1.299
MIN	60A	1.868-1.984
MIN	90A	1.524-1.618
MIN	150A	1.162-1.234
MIN	230A	.844-.896
MIN	300A	.533-.587
MIN	CC	.319-.339
MAX	CV	4.799-5.095
MAX	60A	3.669-3.895
MAX	90A	2.998-3.184
MAX	150A	2.285-2.427
MAX	230A	1.660-1.762
MAX	300A	1.085-1.153
MAX	CC	3.870-4.110

* NOTE: Measured with respect to control board J2-2

** NOTE: To check shunt accuracy: Measure voltage from J3-6 to J3-15 then use following formula to calculate weld current and compare results to accurate external meter.

(400)(volts) / .050 = actual weld amps

COMMANDER 300 - CODES 10469, 10470, 10642, 10643
PRE-COMMON CONTROL
WELD CONTROL SCHEMATIC

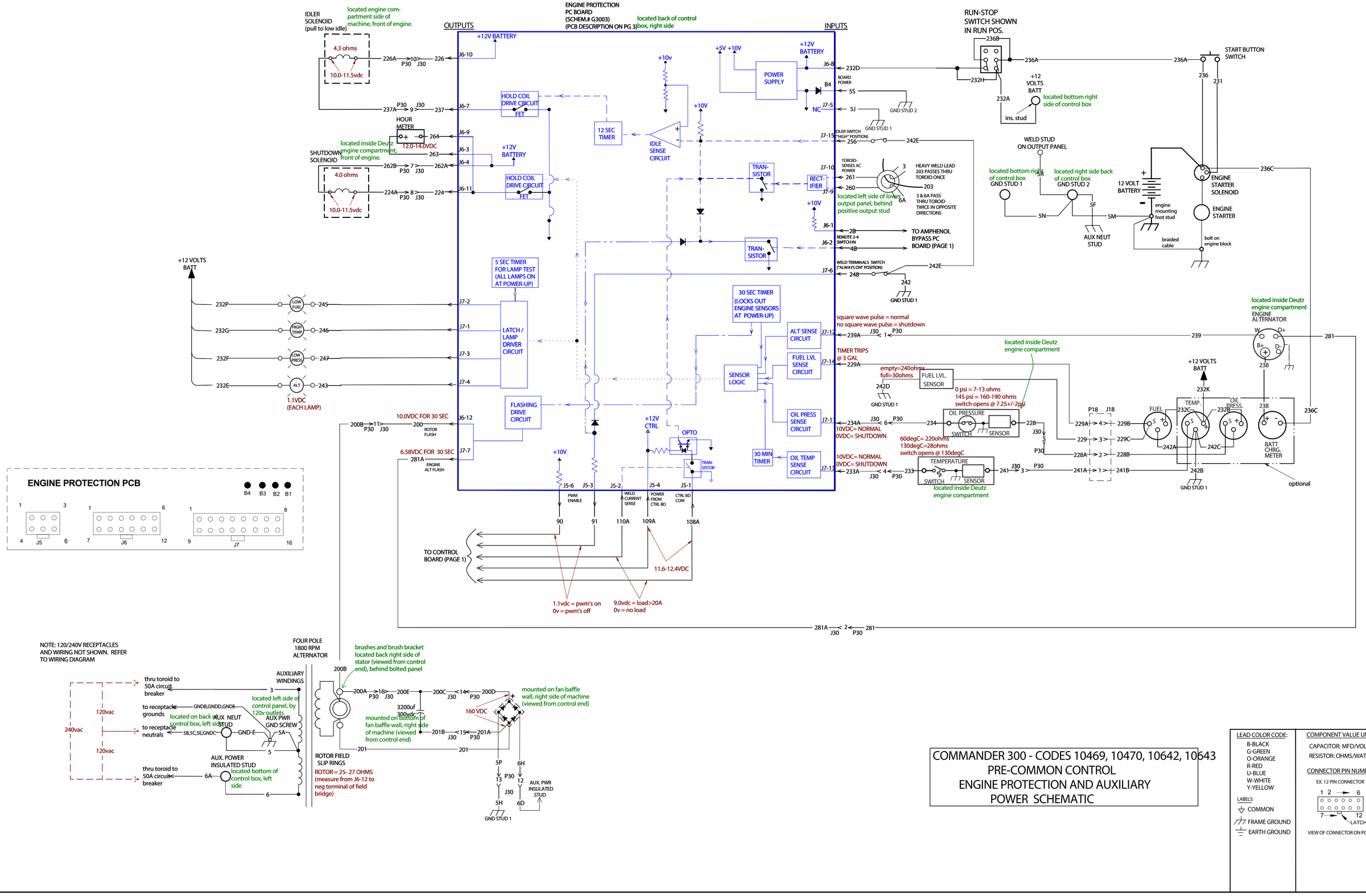
LEAD COLOR CODE:
B-BLACK
G-GREEN
O-ORANGE
R-RED
U-BLUE
W-WHITE
Y-YELLOW

LABELS:
COMMON
FRAME GROUND
EARTH GROUND

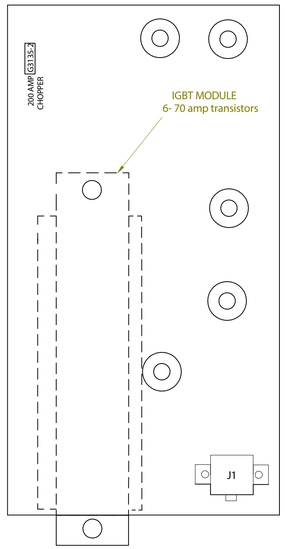
COMPONENT VALUE UNITS:
CAPACITOR: MFD/VOLTS
RESISTOR: OHMS/WATTS

CONNECTOR PIN NUMBERS:
EX. 12 PIN CONNECTOR (1 2 … 6 / 7 … 12 LATCH)
VIEW OF CONNECTOR ON PC BOARD

COMMANDER 300 MACHINE SCHEMATIC G4357 REV: A PAGE 2



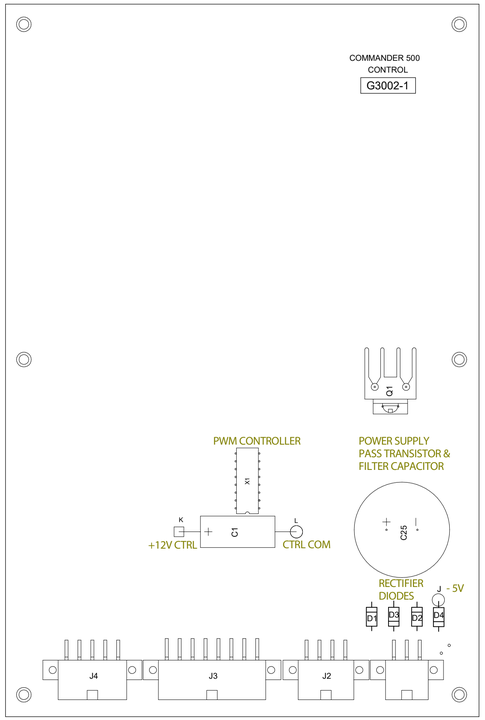
COMMANDER 300 MACHINE SCHEMATIC G4357 REV: A PAGE 3



CHOPPER PC BOARD

CHOPPER PCB FUNCTIONS:

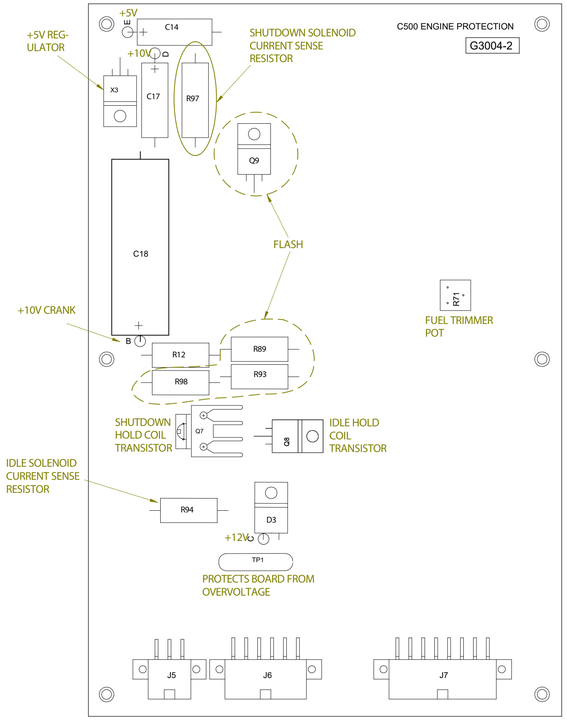
- *Receives 20 Khz PWM (pulse-width-modulated) signal from control PC board to control weld current via IGBT transistor modules.*
- *Receives board power from control transformer.*



CONTROL PC BOARD

CONTROL PCB FUNCTIONS:

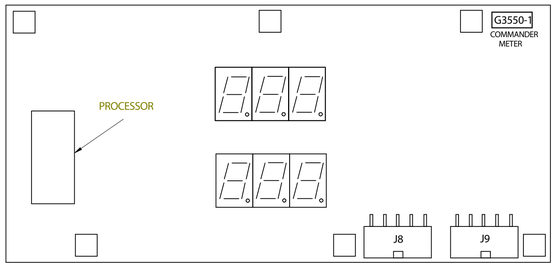
- *Compares control pot setting vs. voltage and current feedback and regulates weld output via 20 Khz PWM (pulse-width-modulated) signals to chopper boards.*
- *Uses mode switch to change machine weld characteristics (CC-stick, CV-wire, pipe welding). Each tap changes control pot voltage rails and amplifier gains that control output load curves or slopes.*
- *Sends preset output volts and amps to display PC board.*
- *Sends actual output volts and amps to display PC board.*
- *Limits machine output current to 550 amps during first few milliseconds of arc start, and 400 amps thereafter.*
- *Provides start enhancement for CC and CV modes.*
- *Provides arc force control in CC mode by sensing short circuit condition and then boosting current according to arc force/pinch pot setting.*
- *Provides bead control in CV by controlling average current according to arc force/pinch pot setting.*
- *Sends signal to engine protection PC board when sensing more than 20 amps of weld current.*
- *Receives signal from engine protection board to turn weld output on at "weld terminal" switch or remote 2-4 switch closure.*
- *Receives board power from control transformer.*



ENGINE PROTECTION PC BOARD

ENGINE PROTECTION PCB FUNCTIONS:

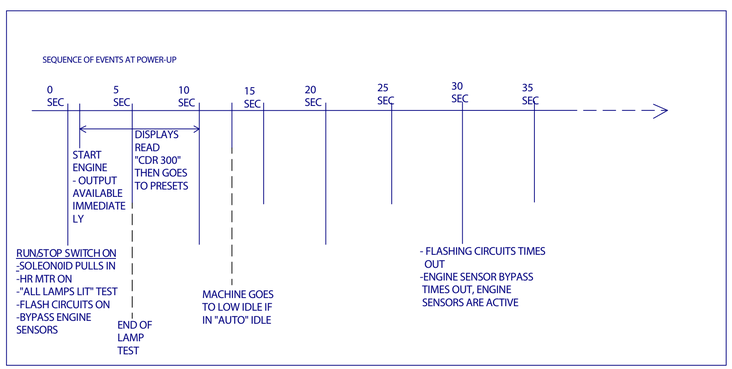
- *Controls engine start up and shutdown via shutdown solenoid.*
- *Controls engine speed via idle solenoid. (Idle solenoid driven in same manner as shutdown solenoid.)*
- *Protects the engine against low oil pressure, over-temperature, and no alternator output. Indicates engine fault via panel lights.*
- *Blocks engine sensors during first 30 seconds of power up to allow engine to reach operating speed and stability.*
- *Flashes engine alternator and rotor field during first 30 seconds of power up.*
- *Senses weld current and auxiliary current flow and then picks machine up to hi idle in "auto idle" mode.*
- *Provides 12 second delay from hi to low idle when no weld or auxiliary current is sensed.*
- *Shuts down engine in 30 minutes if low fuel condition is sensed. Indicates low fuel via panel light.*
- *Provides 5 second lamp test at machine power up (all panel lights on).*
- *Senses "welding terminal" switch and remote 2-4 switch closure. Sends signal to control board to turn output on or off.*
- *Receives board power from 12v battery.*



DISPLAY PC BOARD

DISPLAY BOARD FUNCTIONS:

- *Receives scaled arc voltage and arc current signals from control board and uses them to display actual weld amps and volts.*
- *Receives control pot rail and wiper voltages from control board and uses them to display preset amps or volts.*
- *LED driver section and processor powered from 12v battery.*
- *Voltages from control board are optically isolated.*



QUICK TROUBLESHOOTING TIPS

SYMPTOM	CHECK
No weld output	- aux pwr ok?; flashing ok?
	- bad chopper pcb?; broken leads at chopper pcb plug?
	- bad 5 & 6 leads at J30/P30?
	- imbalance protection - disconnect leads 68 & 69
Won't make max output	- low field?; Bad field capacitor?
	- engine rpm's low?; bad fuel?
	- bad control pcb?
Erratic arc/ No control	- voltage feedback & curmet feedback ok?
	- bad control pot or mode switch?
	- bad remote switch?
Dead display	- broken leads at display board?
	- flashing ok?
No low idle	- no loads on weld studs or receptacles?
	- plunger sticking? long stickout?
	- voltages at idle sol. coil ok?
	- bad engine protection pcb?
No hi idle	- machine won't load?
	- bad idle switch?
	- bad engine protection pcb?
Won't start	- dead battery?
	- voltages at shutdown sol. coil ok?
	- bad engine protection pcb?
Display pcb calibration	- set control panel as follows:C32
	Weld Terminals sw to "Remotely Controlled"
	Local/Remote sw to "Local" Range Selector sw to "90A"
	Control Dial to "minimum"(ccw)
	High/Auto Idler sw to "high"
	Arc Force dial to "minimum"(ccw)
	- start the engine. While the display reads "CDR 500", switch the Selector Switch to the CV tap
	and back to the 90A tap a minimum of 5 times. Selector Switch must end up in the 90A position.
	- top display should read "001" for 5 sec, then "cal" for 5 sec
	- top display should read "30", bottom should read "---"

COMMANDER 300 - CODES 10469, 10470, 10642, 10643

PRE-COMMON CONTROL
PC BOARD AND OPERATION DESCRIPTIONS

LEAD COLOR CODE:
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G-GREEN
O-ORANGE
R-RED
U-BLUE
W-WHITE
Y-YELLOW

LABELS:
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FRAME GROUND
EARTH GROUND

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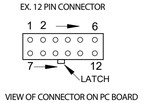

VIEW OF CONNECTOR ON PC BOARD