M200E

INSTRUCTION BOOK

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FORM M200E-1

THE M200E IS A HIGH PERFORMANCE GROUNDED GRID LINEAR AMPLIFIER.
THE M200E IS DESIGNED TO OPERATE IN THE 25 - 35 MHz BAND.

DRIVE: 1 - 6 WATTS AM -- UP TO 25 WATTS SSB.

POWER OUTPUT: HI - 150 TO 200 WATTS (RMS) WITH 3 WATTS INPUT.
LO - 50 TO 100 WATTS (RMS) WITH 3 WATTS INPUT.

PRIMARY POWER: 13.8 VDC 2½ AMPS STAND-BY 37 AMPS TRANSMIT.

CONTROLS

DRIVE: THIS TUNES THE PLATE CIRCUIT OF THE INTERNAL DRIVER STAGE.
TUNE: TUNES THE PLATE CIRCUIT OF THE POWER AMPLIFIER STAGE.
LOAD: LOADS THE OUTPUT TO THE ANTENNA.

SWITCHES

AM-OFF-SSB: POWER OFF IN CENTER POSITION -- UP POSITION FOR AM MODE -- DOWN POSITION FOR SSB MODE.
HI-STBY-LO: STANDBY IN CENTER POSITION, TUBES STAY WARMED UP AND PRE-AMP IS INOPERATIVE -- UP POSITION FOR HIGH POWER OUTPUT -- DOWN POSITION FOR LOW POWER OUTPUT.
PRE-AMP-OFF: UP POSITION FOR PRE-AMP (BI-LINEAR) OPERATION -- DOWN POSITION FOR PRE-AMP OFF.

TUNING

CONNECT A NINE (9) FOOT SECTION OF RG-58 COAX (NOT SUPPLIED WITH UNIT) FROM THE TRANSCEIVER TO THE XMIT CONNECTOR ON THE AMPLIFIER. CONNECT YOUR ANTENNA TO THE ANTENNA CONNECTOR. CONNECT HOT WIRE AND GROUND WIRE (SEE INSTALLATION DIAGRAM). TURN UNIT ON -- ALLOW ONE MINUTE FOR WARM UP. POSITION DRIVE, TUNE, AND LOAD WITH WHITE DOT UP. DEPRESS MIKE BUTTON. TURN DRIVE, TUNE, AND LOAD KNOB FOR PEAK ON METER. NEXT TURN LOAD CLOCKWISE (VERY SLIGHTLY) UNTIL METER FALLS BACK ONE OR TWO DIVISIONS. REPEAK TUNE CONTROL. YOU SHOULD NOW BE LOADED TO THE ANTENNA.

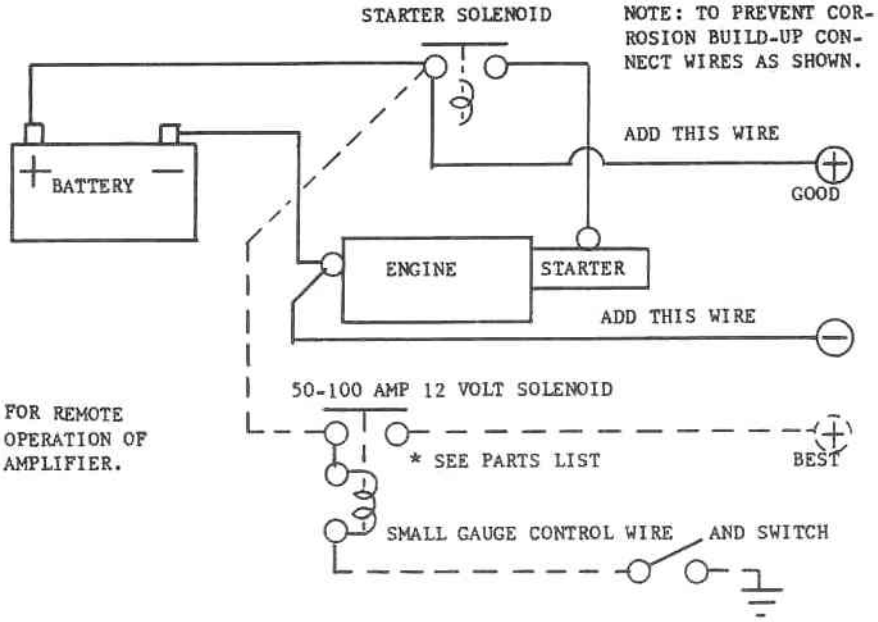
NOTE: IF YOU USE AN IN-LINE WATTMETER, USE IT ONLY FOR INITIAL TUNING, NOT LOADING. A WATTMETER IS DESIGNED TO MEASURE WATTS, NOT MODULATION. YOUR M200E CAN BEST BE LOADED WITH THE FRONT PANEL METER.

IF THE UNIT FAILS TO LOAD PROPERLY, CHECK YOUR SWR; IT SHOULD BE 1.5:1 OR BETTER. TO MEASURE THE SWR, REMOVE CONNECTORS FROM THE AMPLIFIER AND INSERT YOUR SWR BRIDGE.

INSTALLATION

MOBILES

THE HEC LINEAR AMPLIFIER SHOULD BE INSTALLED IN A WELL VENTILATED LOCATION. BOTH A HOT AND GROUND WIRE OF THE SAME GAUGE SHOULD BE PROVIDED.



MINIMUM WIRE GAUGE, M200 10GA. WIRE SHOULD BE STRANDED TYPE. ALL CONNECTIONS SHOULD BE CLEAN AND WIRE LUGS USED.

THE VOLTAGE OF 13.8 (MEASURED AT THE AMPLIFIER WITH THE AMPLIFIER KEYED) MUST BE MAINTAINED FOR MAX OUTPUT. A ONE VOLT LOSS DUE TO BAD CONNECTIONS OR WIRE SIZE TO SMALL WILL REDUCE THE OUTPUT BY APPROXIMATELY 10%.

POWER OUTPUT IS BASED ON FULL 13.8 VOLTS AT THE AMPLIFIER AND A VSWR OF 1:1.5 OR BETTER.

* * * NOTE * * *

A QUARTER WAVE LENGTH SECTION OF RG-58 COAX APPROXIMATELY 9 FEET BETWEEN THE TRANSMITTER AND LINEAR IS RECOMMENDED ON ALL MODELS.

FAULT DETECTOR

THIS UNIT IS EQUIPPED WITH A FAULT DETECTOR. THE DETECTOR MONITORS THE POWER SUPPLY OPERATION. IF FOR ANY REASON THE POWER SUPPLY STALLS, THE DETECTOR WILL DISENGAGE RL1; THEREBY TURNING POWER OFF THE POWER SUPPLY. THIS ACTION WILL PREVENT ANY FURTHER DAMAGE AND REDUCE REPAIR COST.

CIRCUIT DESCRIPTION

AT THE INSTANT AN R.F. SIGNAL IS APPLIED, C1-R9 FORMS A VOLTAGE DIVIDER. THE SIGNAL IS THEN RECTIFIED BY D2 AND FILTERED BY C2. THE RESULTING POSITIVE D.C. VOLTAGE FLOWS THROUGH R11 CHARGING C3. THIS ACTION VIA R12-R13 CAUSES A SHORT DURATION NEGATIVE PULSE TO BE APPLIED TO THE BASE OF Q2 TURNING Q2 OFF. AT THE SAME TIME THE BALANCE OF THE D.C. VOLTAGE FLOWS THROUGH R10 TO THE BASE OF Q1 DRIVING Q1 ON. THIS ENERGIZES RL1, THEN RL1 SUPPLIES 12 V.D.C. TO THE INVERTER. LET US NOW ASSUME WHE HAVE NO FAULTS. THE INVERTER NOW STARTS. WE SAMPLE AND RECTIFY THE OUTPUT WITH 2 PICK-UPS D5 AND D6. THE RESULTING NEGATIVE VOLTAGE FLOWS THROUGH D7, A 6.2 VOLT REGULATOR, CURRENT LIMITING RESISTOR R14 TO THE SUMMING POINT AND THE BASE OF Q2, HOLDING Q2 OFF. WE ARE NOW IN NORMAL OPERATION

NOW LET'S ASSUME WE HAVE A FAULT. ALL EVENTS LEADING UP TO RL1 ENERGIZING AND APPLYING 12 V.D.C. TO THE INVERTER ARE THE SAME. HOWEVER, LET'S ASSUME WE HAVE A SHORTED RECTIFIER IN THE POWER SUPPLY. THE INVERTER SEES THIS SHORT AS AN OVERLOAD AND WILL NOT OSCILLATE. WITH NO OSCILLATIONS WE NOW SEE "0" VOLTAGE AT D5 AND D6. WE STILL HAVE A POSITIVE VOLTAGE AT THE JUNCTION OF D2-R10-R11. AS SOON AS C3 HAS CHARGED-UP, OUR SUMMING POINT SWINGS POSITIVE TURNING ON Q2. Q2 THEN SHUNTS THE BASE OF Q1 TO GROUND TURNING OFF Q1. ALL RELAYS RELAX AND THE UNIT IS SHUT DOWN.

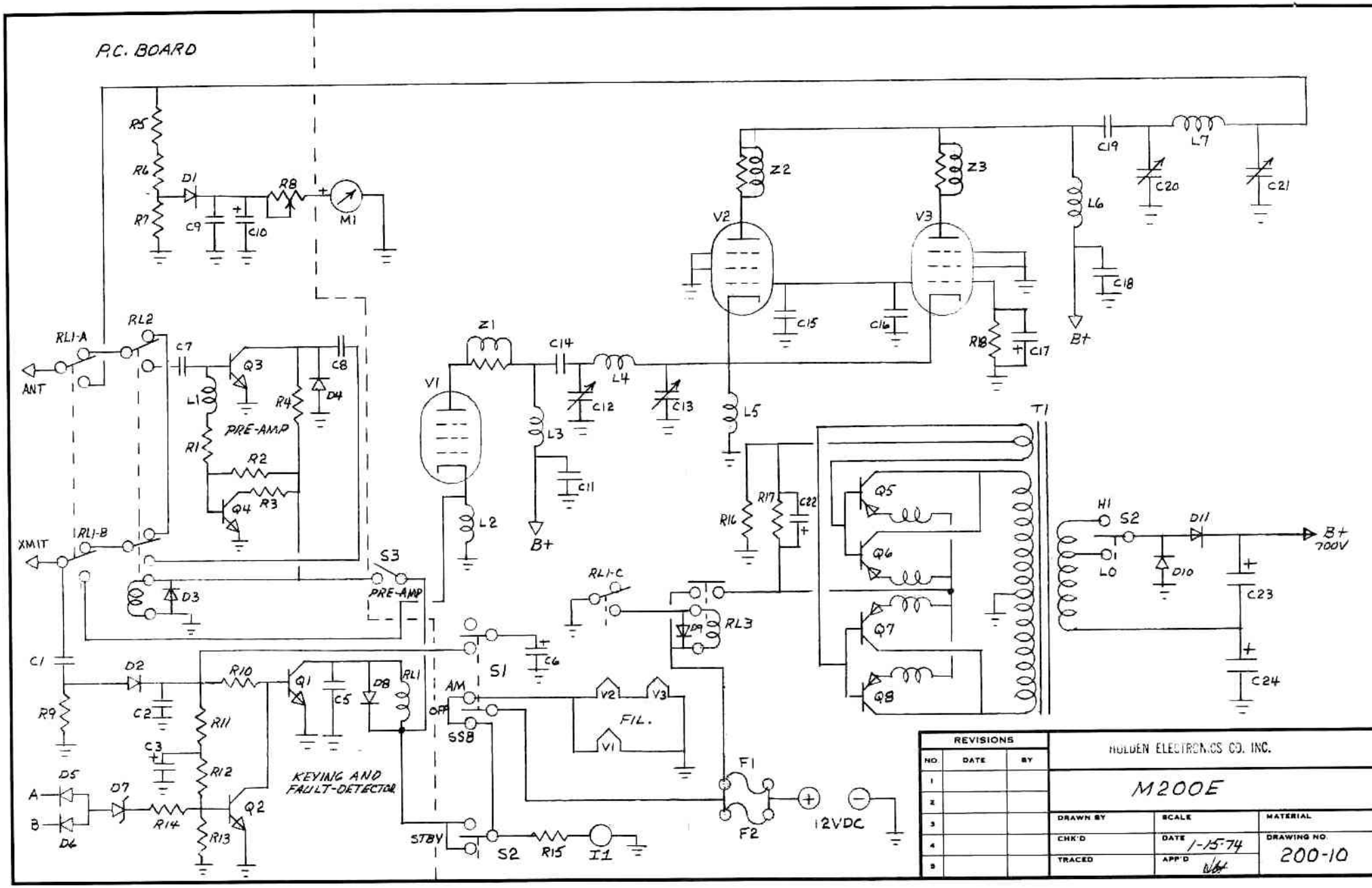
IF YOU UNKEY THE MIKE AND THEN RE-KEY, THE SAME EVENTS OCCUR.

WHEN A PROBLEM OCCURS AND YOU DEPRESS THE MIKE BUTTON AND HEAR THE RELAY ENGAGE AND IMMEDIATELY DISENGAGE, THE FAULT DETECTOR IS DOING IT'S JOB. THE PROBLEM IS NOT IN THE CIRCUIT BOARD - IT IS ELSEWHERE.

PARTS LIST

M200E

ITEM	P/N	DESCRIPTION
C1	1005-016	20pf CAPACITOR
C2,C4,C5,C9	1005-021	.01 CAPACITOR
C3	1005-025	33MFD 10V CAPACITOR
C6	1005-028	100MFD 12V CAPACITOR
C7,C8	1005-026	100pf CAPACITOR
C10	1005-024	10MFD 16V CAPACITOR
C11,C14,C18,C19	1005-014	.001 2KV CAPACITOR
C12,C20	1005-002	4-55pf VAR. CAP.
C13	1005-007	100-550pf TRIMMER
C15,C16	1005-015	.001 CAPACITOR
C17,C22	1005-012	33MFD 50V CAPACITOR
C21	1005-020	50-400pf VAR. CAPACITOR
C23,C24	1005-009	50MFD 450V CAPACITOR
D1,D2	1020-009	1N4148 DIODE
D3,D4,D5,D6	1020-007	1N4002 DIODE
D7	1020-008	6.2V ZENER DIODE
D10,D11	1020-002	2½A 1000V DIODE
F1,F2	1025-005	25A FUSE
I1	1040-003	LIGHT EMITTING DIODE
L1,L2,L3,L5	1010-001	15uh CHOKE
L6	1010-002	Z28 CHOKE
M1	1045-002	0-1 MA METER
Q1,Q2	1075-003	2N3643 TRANSISTOR
Q3,Q4	1075-007	2N3904 TRANSISTOR
Q5,Q6,Q7,Q8	1075-004	2N2156 TRANSISTOR
R1	1055-017	470 OHM RESISTOR
R2,R5,R6	1055-032	12K RESISTOR
R3,R4	1055-038	270 OHM RESISTOR
R7,R9,R13	1055-024	1.2K RESISTOR
R8	2038-002	10K POTENTIOMETER
R10,R12,R14	1055-031	2.4K RESISTOR
R11	1055-029	5.6K RESISTOR
R15	1055-037	1K RESISTOR
R16	1055-009	50 OHM 10W
R17	1055-003	2 OHM 15W RESISTOR
R18	1055-002	25 OHM 5W RESISTOR
RL1	1050-005	3PDT RELAY
RL2	1050-004	DPDT RELAY
RL3	1050-002	SPST RELAY
S1,S2	1065-004	DPDT SWITCH
S3	1065-001	SPST SWITCH
T1	1072-006	POWER TRANSFORMER
V1	1080-004	12JB6A TUBE
V2,V3	1080-005	6LF6/6LR6 TUBE
Z1,Z2,Z3	200-5	SUPPRESSOR


P.C. BOARD
R5
R6
R7
D1
R8
C9
C10
M1
RL1-A
RL2
ANT
C7
C8
Q3
L1
R4
D4
PRE-AMP
R1
R2
Q4
R3
XMIT
RL1-B
D3
S3
PRE-AMP
C1
D2
R10
Q1
C5
D8
RL1
S1
C6
R9
C2
R11
C3
R12
D5
A
B
D6
D7
R14
R13
Q2
KEYING AND FAULT-DETECTOR
AM
OFF
SSB
STBY
S2
R15
I1
V2
V3
FIL.
V1
F1
F2
12VDC
Z1
V1
L2
C14
L4
C12
C13
L3
C11
B+
L5
RL1-C
D9
RL3
R16
R17
C22
T1
Q5
Q6
Q7
Q8
Z2
Z3
V2
V3
C15
C16
R18
C17
B+
C19
L7
C20
C21
L6
C18
H1
S2
D11
B+
700V
L0
D10
C23
C24
REVISIONS
NO
DATE
BY
HOLDEN ELECTRONICS CO. INC.
M200E
DRAWN BY
SCALE
MATERIAL
CHK'D
DATE 1-15-74
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