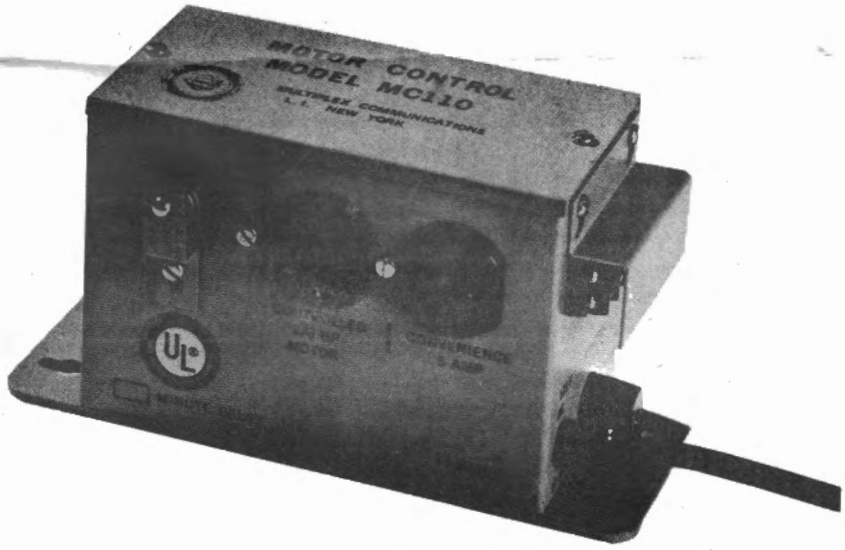
INSTRUCTION MANUAL



Motor Control
Model MC110

Teletype No. 334760

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ILLUSTRATIONS

1. GENERAL DESCRIPTION

The Multiplex Model MC110 Motor Control is a fully solid state device that is primarily used for automatic control of a teleprinter motor, or similar equipment. This unit is especially useful where it is not convenient to shut down operation of a teletypewriter when no traffic is present. After a preset period of time the teleprinter motor is shut down when a message is complete. Upon receipt of the first mark to space or space to mark transition of a new message the control unit automatically energizes the teleprinter motor, and sustains operation throughout the transmission period. An internally provided strapping option starts a timed interval prior to shut down when line signal becomes either marking (line closed), spacing (line opened) or both marking and spacing (line opened). Automatic operation can be by-passed when desired by a switch provided on the Motor Control.

2. MECHANICAL DESCRIPTION

The entire MC110 including the self contained power supply is housed in a box approximately 3" wide, 4" high and 5 3/4" deep. All electronic components are mounted on a plug in printed circuit board with the exception of the solid state power switch. External connections are made via a terminal strip, dual AC outlet, and an AC power cord.

3. SPECIFICATIONS

A) Input signal level and impedance:
8.5 ma to 100 ma polar or neutral
200 ohms non reactive
14K ohm (for use with equipment requiring E.I.A. standard input.)

B) Data Speed: Up to 2000 BAUD

C) Power Cut Off Timing: Set by resistor R 24 (normally set by factory in 1, 5, 10 or 25 minutes as initially specified)

D) Restart Time Less than 5 milliseconds after receipt of mark to space transition

E) Power Ratings for UL approved Model MC110

Controlled Outlet	115 VAC	1/6 H.P.
Convenience Outlet	115 VAC	5 Amps

4. INSTALLATION INSTRUCTIONS (See Figure 1)

A) Signal Line:

Connect positive end of signal line to the 4 pin terminal strip marked Line (+), and connect the negative end of the signal line to Line (-). For polar operation mark positive connect as indicated above, for mark negative reverse polarity indicated above.

B) Selector, Or Line Relay:

Connect selector or line relay to terminals marked selector 1 and 2 of 4 pin terminal strip. Polarity must be observed when connecting to a line relay or solid state driver. Connect positive to terminal 2 and negative to terminal 1.

C) Control Output:

Connect motor or item to be controlled to one half of dual receptical marked controlled outlet.

D) Setting Control Function:

If cutoff delay is to start from a steady mark only, make straps "X" and "B" as indicated on printed board. If cutoff delay is to start from a steady spacing line only, make straps "X" and "A" as indicated on the printed board. If cutoff delay is to start from both a steady mark or a steady space, do not make strap "X".

Note: Motor Control comes from factory with strap "X" normally unstrapped, and "B" strap made.
If strap "A" is made, MC110 will start from a space to mark transition.
If strap "B" is made, MC110 will start from a mark to space transition.

E) By-Pass Switch:

For normal operation by-pass switch is locked to one position by switch stop plate. If one desires to by-pass automatic operation, remove switch stop plate and place switch in down position. Motor is now controlled in the normal manner.

F) If MC110 is required to work to E.I.A. RS-232-B input characteristics, cut both straps Y and Z indicated on printed circuit board.

Note: Motor Control comes from factory with both straps Y and Z in.

5. CIRCUIT DESCRIPTION

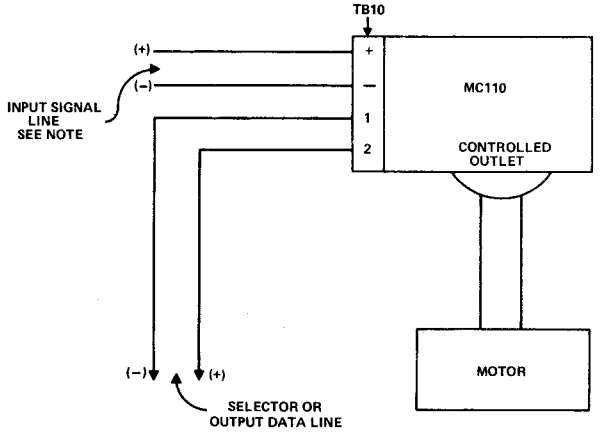
In the following write up, reference is made to schematic Fig. #3. Teleprinter line signals are applied through pins + and - of TB10 and on through the selector coil connected to pins 1 and 2 of TB10. Pins + and 2 are connected in turn to resistor R13, and R12 through P10 and J10. If we consider strap Z and Y made, during line marking condition the current flowing through R12 develops a voltage across that resistor with the polarity as indicated. This voltage is applied to an oscillator circuit through an RC filter consisting of R11 and C11. Transistor Q11 and tank transformer T11 make up the major components of an emitter feedback oscillator. This oscillator remains in operation as long as line current is present. During line spacing conditions no voltage appears across the oscillator circuit. The resultant output at pins 5 and 6 of T11 is an isolated signal for line marking, or no signal for line spacing. Diode CR11 is used to prevent excess current from being drawn when the line polarity reverses, such as in polar operation.

The amplitude modulated output of T11 is peaked detected by CR12, and C14, and applied to amplifier transistor Q12. Normally straps "B" are made at the factory by-passing transistor inverter Q13. This allows capacitor C16 to be charged negative when the line goes from a mark to a space. This is accomplished through emitter follower Q14 and coupling capacitor C15. If straps "A" are made, capacitor C16 will be charged negative from a space to mark transition. Let us assume that the line has been at a steady mark, or steady space for a long enough period of time to allow C16 to discharge fully. This would bring the gate of field transistor Q15 to common potential which allows Q15 to conduct and in turn would make DC amplifier transistor Q16 to conduct. With the anode of CR15 at B+ all the current normally needed to allow control transistor Q17 to conduct is diverted through Q16, thus Q17 is cut off. In the cutoff condition Q17 allows no gate current for CR1 through J10 and P10, thus no AC voltage is present at controlled outlet J1A.

During the first mark to space or space to mark (depending on strapping option) transition capacitor C16 is charged through the low impedance source of emitter follower transistor Q14 to approximately -10 Volts. This in turn cuts off Q15 and Q16 which allows Q17 and CR1 to conduct. 115 VAC is now present at the controlled outlet. Diode CR14 does not allow capacitor C16 to discharge through R23 or the emitter of Q14, but instead C16 discharges through time control resistor R24 and the gate of Q15. Because the input impedance to the field effect transistor Q15 is approximately 100 megohms, the discharge path is effectively through R21. Because the charge to discharge ratio of capacitor C16 is very high it remains fully charged as long as mark to space or space to mark transitions occur. When these transitions stop (no traffic) C16 discharges through R24 which allows Q15 to conduct after C16 discharges fully. By varying the value of R23, one can change the cutoff delay time. CR15 and CR16 are provided to allow for snap off of Q17 at times during long delays when Q15 goes into conduction slowly. Strapping option X allows for DC or AC coupling of Q12 to Q13 or Q14. DC coupling allows cutoff delay to start from a steady mark, where the emitter of Q14 is at common potential and straps "B" is made. When straps "A" are made, a steady space will bring the emitter of Q14 to common potential. Transformer T1, CR17, CR18, CR19, CR20, CR21, C15 and C16 provide the B+ and B- regulated directly from the 115 VAC line. To increase the input impedance of the signal circuit for E.I.A. interface, resistor R13 is added in series with the input signal path while shunt resistor R11 is removed. This is accomplished by removing both straps Y and Z on printed circuit card.

6. READJUSTMENT OF TIME DELAY

If a time delay other than that which is set by the factory is required, change resistor R24. A longer time delay requires a higher value of resistance. A shorter time delay requires a lower value of resistance. See Figure 2 to obtain the approximate value of R24 for time delay required. For an accurate setting of delay time, an electric clock with a second hand placed in the controlled outlet will act as a good timing device. Allow the signal line to go through a number of mark space transitions. Timing should begin when line is brought to a steady mark condition, or steady space, depending on the strapping option made.



NOTE: NORMALLY MC110 IS CONNECTED IN SERIES WITH THE INCOMING 8.5 TO 100 MA SIGNAL LINE. WHEN EIA RS-232B INTERFACE IS REQUIRED, THE + AND − INPUTS ARE CONNECTED DIRECTLY ACROSS THE SIGNAL LINE

FIGURE 1

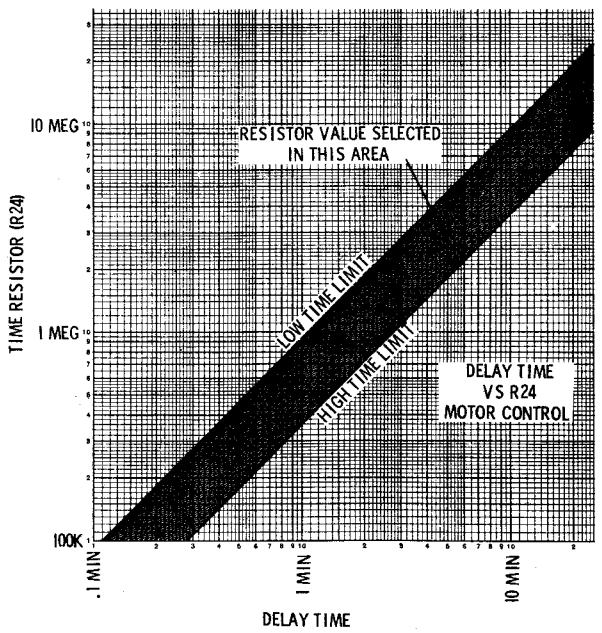
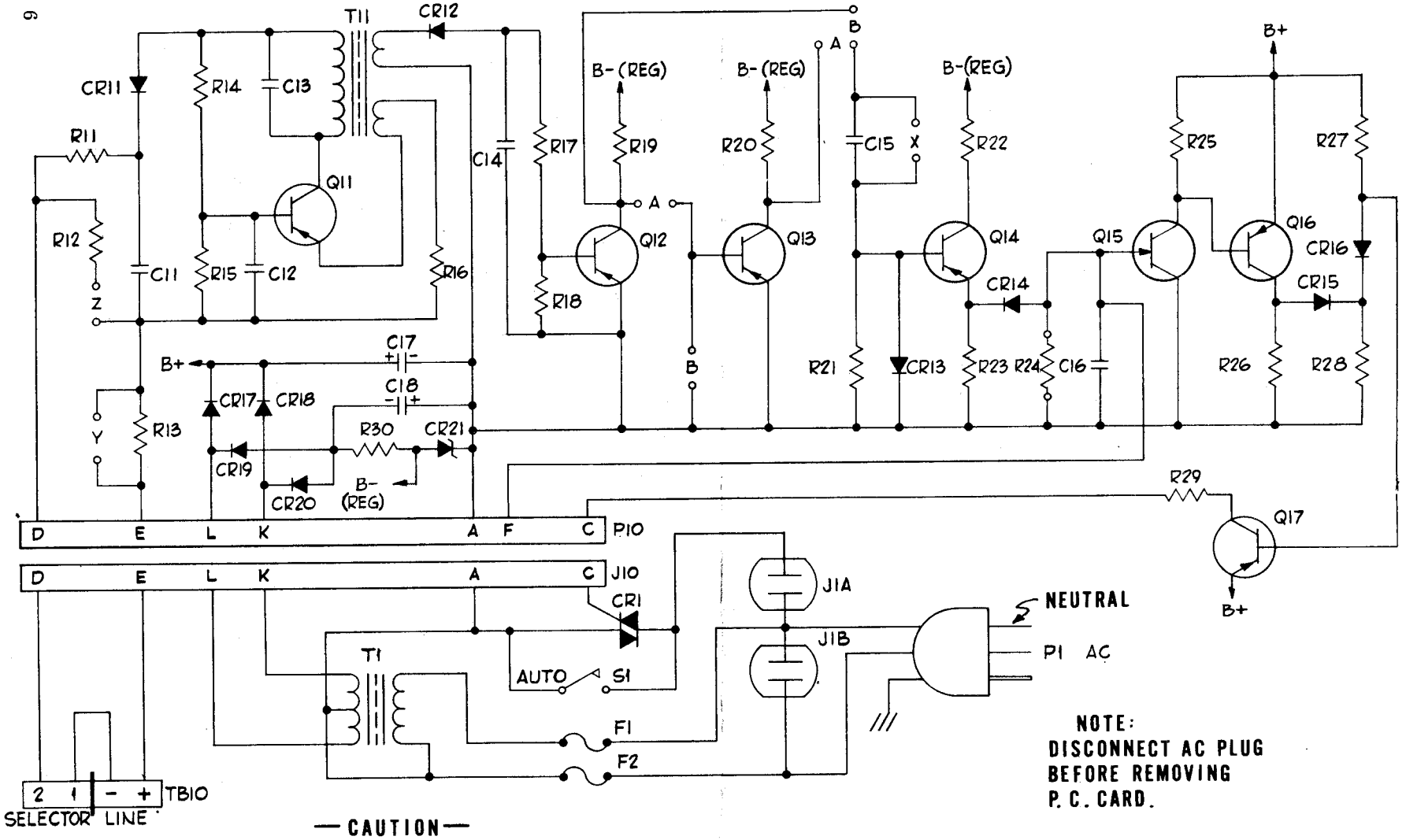


FIGURE 2



— CAUTION —
AC POLARITY MUST BE OBSERVED WHEN USING AC POWERED TEST INSTRUMENT.

NOTE:
DISCONNECT AC PLUG BEFORE REMOVING P. C. CARD.

FIGURE 3

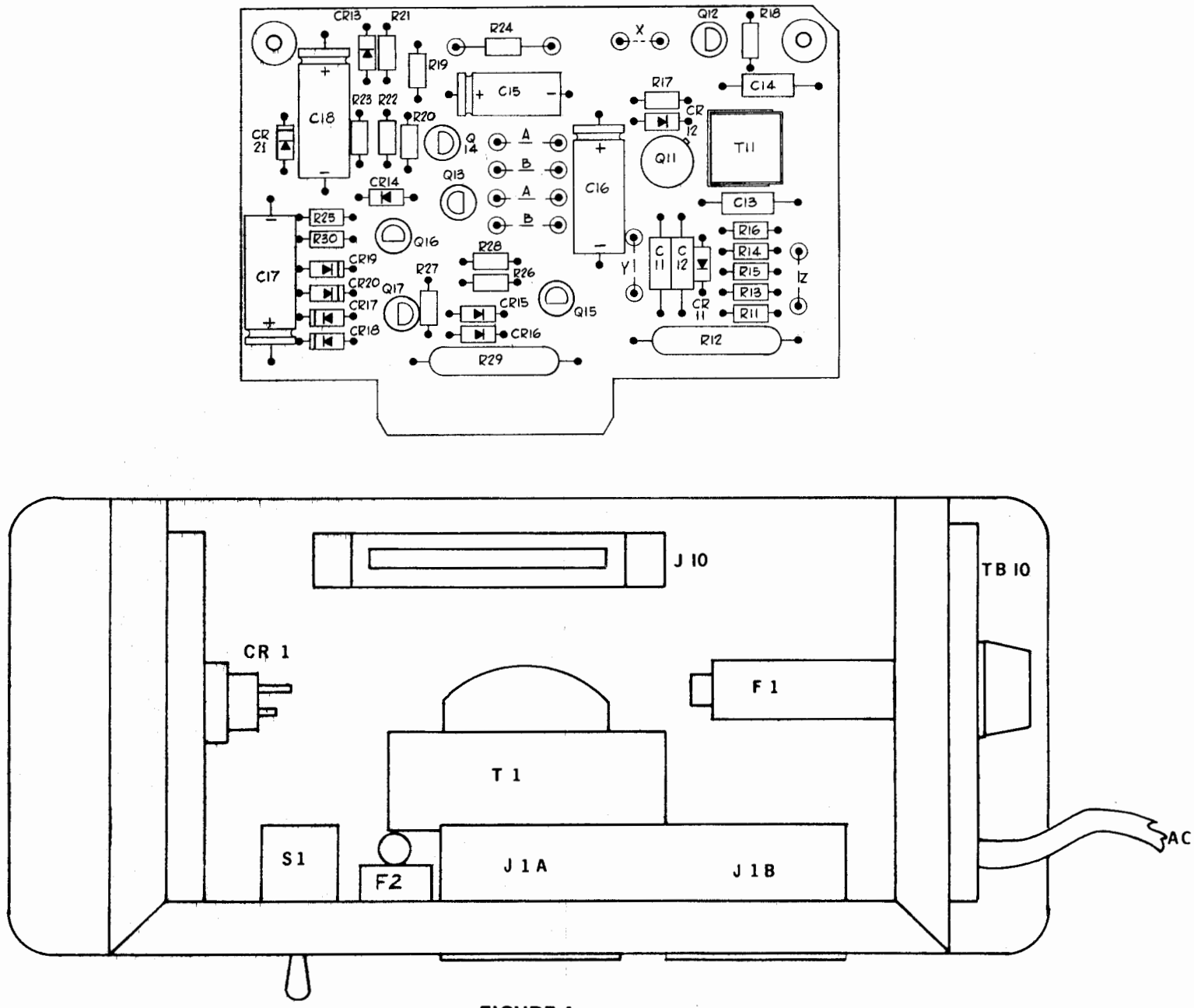

CR13
R21
R24
X
Q12
R18
C18
R19
C15
C14
R17
CR 21
R23
R22
R20
Q 14
A
B
A
B
CR 12
Q11
T11
Q13
C16
CR14
C13
R25
R30
Q16
R28
C17
CR19
R27
R26
Y1
C 11
C 12
R16
R14
R15
R13
R11
IZ
CR20
Q17
CR17
CR15
Q15
CR 11
CR18
CR16
R12
R29
J 10
TB 10
CR 1
F 1
T 1
S1
F2
J 1A
J 1B
AC

FIGURE 4

ELECTRICAL PARTS LIST
MOTOR CONTROL MC110

Symbol	Description	Part Number
TB1	P.C. Board Assy	MC110-12
CR1	Triac	SC-40B
F1	Fuse 1/10 AMP SLO-BLO	3AG
F2	Fuse 7 AMP	3AG
J1A, J1B	Duplex Receptacle	3200
J10	Connector, Female, 10 Pin	143-010-01
S1	Switch, Toggle SPST	8381-K7
T1	Transformer	TP10001
P1	AC Line Cord W/Plug	17236V
TB10	Barrier Strip	4-14OY

ELECTRICAL PARTS LIST
MC110-12

C11, C12, C14	Capacitor Mylar .01	WMF 1S1
C13	Capacitor Mylar .0015	WMF 1D15
C16, C17, C18	Capacitor Electrolytic 100 MFD 25WV	TE-1211
C15	Capacitor Electrolytic 25MFD 25WV	TE-1207
CR11, CR12, CR13	Diode	1N191
CR17, CR18, CR19, CR20	Diode	1N4004
CR14, CR15, CR16	Diode	1N456A
CR21	Diode, Zener	1N759
Q11	Transistor PNP	2N1305
Q15	Transistor Field Effect	MPF105 or equiv.
Q12, Q13, Q14, Q16, Q17	Transistor PNP	2N4125
R12, R29	Resistor 200 ohm 5 watt	243E2015
R11, R22, R30	Resistor 100 ohm, 1/4 W, 10%	RC07GF-101
R14	Resistor 27K ohm, 1/4 W, 10%	RC07GF-273
R15, R17, R19, R20, R23	Resistor 4.7K ohm, 1/4 W, 10%	RC07GF-472
R16	Resistor 330 ohm, 1/4 W, 10%	RC07GF-331
R18	Resistor 22K ohm 1/4 W, 10%	RC07GF-223
R24	Factory Selected Resistor	RC20 Type
R25, R26	Resistor 10K ohm 1/4 W, 10%	RC07GF-103
R27	Resistor 100K ohm 1/4 W, 10%	RC07GF-104
R28	Resistor 2.7K, 1/4W, 10%	RC07GF-272
R21	Resistor 47K, 1/4 W, 10%	RC07GF-473
R13	Resistor 6.8K, 1/4 W,	RC07GF-682
T11	Transformer Oscillator	TO-10001

NOTE:

IN ORDER TO USE MC110 ON A 50 HZ 110V AC LINE, FUSE F1 HAS BEEN CHANGED TO 1/2 AMP. MAKE NECESSARY CHANGES TO PARTS LIST ON PAGE 8.