



for
Manual No. 6881106C65-O
SABER™ SERIES
Handie-Talkie Portable Radios
Model NTN4734A and NTN4786A
Single-Unit Rapid-Chargers
Instruction Manual

This revision outlines changes that have occurred since the printing of your manual. Use this information to supplement your manual. Installation of these changes in earlier equipment is not necessary except as recommended in Motorola Service and Repair Notes (SRN's).

REVISION DETAILS

<u>NO.</u>	<u>CHANGE AFFECTS</u>
1	CIRCUIT BOARD DETAIL
2	ELECTRICAL PARTS LIST
3	SCHEMATIC DIAGRAM
4	EXPLODED VIEW PARTS LIST AND DIAGRAM
5	INTRODUCTION
5	DESCRIPTION
5	IN CASE OF TROUBLE
5	CIRCUIT DESCRIPTION

CHANGES

NO.

- On page 5, **CIRCUIT BOARD DETAIL**, delete C1 and C2.
- On page 6, **ELECTRICAL PARTS LIST** change the following:

<u>REF.</u>	<u>MOTOROLA</u>		
<u>SYM.></u>	<u>PART NO.</u>	<u>ACTION</u>	<u>DESCRIPTION</u>
C1	2360561H19	delete	
C2	2360561H19	delete	
C5	2360561H19	change to	
	2360561M85		3300

- On page 7, **SCHEMATIC DIAGRAM** delete C1 and C2 and change the value of C5 from 1000 μ F to 3300 μ F

- On page 8, **EXPLODED VIEW PARTS LIST AND DIAGRAM**, delete item 19.

5. 1. INTRODUCTION, page 1.

A. Insert, **and nickel metal hydride (NI-MH)**, after nickel-cadmium in the first sentence.

B. At the end, just before the **WARNING**, add the following battery:

- NTN7014A High-Capacity Nickel-Metal Hydride

C. After the batteries and just before the **WARNING**, add the following note:

NOTE

Nickel-metal hydride batteries (NI-MH) as offered by Motorola are lead, mercury, and cadmium free and are considered "environmentally friendly." Additionally, with proper care and use, these batteries deliver increased capacity over nickel-cadmium batteries of similar size.

TO ASSURE MAXIMUM BATTERY LIFE, and gain maximum usage (duty cycle and product life), **RAPID CHARGE ONLY** with these higher capacity batteries.

Although compatible with existing product chargers, the use of continuous slow or standard-rate charging will reduce the useful life and capacity of batteries. Battery life can be optimized if batteries are removed from the rapid charger after the charge cycle is completed. The charge cycle is completed when the red indicator light goes out and the green light comes on.

For optimal charge performance, nickel-metal hydride batteries should be at room temperature (20-30°C) prior to placement in the charger.



D. Add the following to the WARNING:

* Motorola recommends proper recycling of ALL rechargeable batteries.

7. On page 1, under 3. DESCRIPTION, after nickel-cadmium in the safety instruction (WARNING section), insert, and nickel-metal hydride (NI-MH).

8. On page 2, under 5. IN CASE OF TROUBLE, complete the following changes:

A. Change the WARNING to read:

WARNING

USE ONLY MOTOROLA NICKEL-CADMIUM (NI-CD) OR NICKEL-METAL HYDRIDE (NI-MH) BATTERIES WITH THIS CHARGER.

B. Before 6. CIRCUIT DESCRIPTION, add the following:

BLINKING CHARGER INDICATOR LIGHTS

The battery circuitry has been designed to regulate the rapid charge rates to provide optimum performance and maximum cycle life. In some cases, new batteries and batteries that have had periods of prolonged storage may require more than a 2-hour rapid-charge cycle to achieve rated capacity. SABER™ (MX1000) chargers have a maximum 2-hour rapid-charge fault mode and will time-out if rapid-rate charging has not been completed prior to two hours.

If this condition occurs, the charger's red indicator lights will flash. When this happens, remove the battery from the charger, allow the battery temperature to cool, and then re-insert in the charger to complete the charge cycle. The period of time required for the battery to reach normal temperatures should not exceed one hour. If the problem with flashing lights continues to exist, a fault has been detected in the battery or charger, indicating repair or replacement.

9. On pages 2 and 3, under 6. CIRCUIT DESCRIPTION, add the following:

A. On page 3, Table 1. Normal RC Values, and in the first box under battery type, add NTN7014A.

B. In Table 2. Charging Rates, and in the first box under battery type, add NTN7014A.

Manual Scan

I hope this service manual is of use to you. Motorola does not make this available as a PDF and all other available copies are of poor quality.

Each page is captured at 600 DPI, and as 24-bit color, 8-bit grayscale or black and white and at the proper page size, up to 11x34 inches in many cases. OCR has been performed on the document, even on the large pages. The document is condensed into one single PDF with text overlay. You should be able to print the larger sheets on 11x17 or tile them onto 8.5x11 if needed.

Please do not charge for access to this, or put it on a pay-wall site. Please don't pay for access to any such sites, they are against the ethos of hacking, and it only encourages them to profit off the hard work of others which has been shared openly. Please don't change this/recompress it; this defeats the point of capturing this at high resolution.

If something is incorrect here, or unreadable please reach out; I likely have the original lossless compressed images. In the final PDF that's color or grayscale will be JPEG 2000 format with highest quality selected. B&W images will be compressed using CCITT Group 4. This is quite close to the source material, but there may be some artifacts due to lossy compression. If there's a choice between file size and image quality, image quality will win. It's 2021 and storage and bandwidth is cheap.

This was captured on a Canon DR-G2140 scanner which is ~ 7500 USD unit circa 2021. You may note some artifacts and lines in on the scans, these are due to scratches on the sensor glass, and are minor. The replacement glass is about 250 USD if you're feeling generous :-)

If you have a hard to find/out of print manual and would like to make it available please reach out, I may be able to scan and return it to you.

Thank you,

Bryan Fields, W9CR
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MOTOROLA

“SABER” SERIES

“Handie-Talkie” Portable Radios

Model NTN4734A and NTN4786A Single-Unit Rapid-Charge Battery Chargers

1. INTRODUCTION

The Model NTN4734A (115Vac) and NTN4786A (220Vac) Single-Unit Rapid-Charge Battery Chargers are accessory items for the SABER Series “Handie-Talkie” Portable Radios using rechargeable nickel-cadmium batteries. The chargers are approved for use with the following rapid-charge batteries:

- NTN4537A, and NTN4592A Light-Capacity
- NTN4819A, and NTN4820A Medium-Light-Capacity
- NTN4538A, NTN4593A, NTN4657A, and NTN4671A Medium-Capacity
- NTN4539A, and NTN4594A High-Capacity
- NTN4595A, NTN4596A, and NTN4992A Ultra-High-Capacity

WARNING

DO NOT DISCARD BATTERIES IN FIRE; THEY MAY EXPLODE.

2. SPECIFICATIONS

INPUT POWER: 115Vac, 220Vac, 240Vac; 50/60Hz
SIZE: 6.5" × 7.75" × 3.5"
WEIGHT: (Charger With Cord) 4.0 lbs.
RAPID CHARGE TIME: Approximately 1 hour
OPERATING TEMPERATURE RANGE: 0°C - 50°C
RAPID-CHARGE TEMPERATURE WINDOW: 10°C - 40°C

3. DESCRIPTION

The single-unit rapid chargers are constant-current devices which provide two different charge rates: a one-hour rate, and a 16-hour rate. A rapid-charge nickel-cadmium battery is charged initially at the one-hour rate, after which the charging rate automatically reduces to the 16-hour rate. The battery may be left in the battery charger indefinitely without any resultant harm.

The NTN4734A Charger operates from a 115Vac 50/60Hz power source, whereas the NTN4786A Charger operates from a 220Vac 50/60Hz power source. A line voltage selector (placement of ac fuse F1 and receptacle) at the bottom of the unit permits either charger to operate

from a 115Vac, a 220Vac, or a 240Vac power source. The only difference between the two chargers is the placement of the ac fuse (F1) and receptacle, and the ac plug.

IMPORTANT SAFETY INSTRUCTIONS SAVE THESE INSTRUCTIONS

- This manual contains important safety and operating instructions.
- Before using battery charger, read all instructions and cautionary markings on (1) battery charger, (2) battery, and (3) radio using battery.
- **WARNING** – To reduce risk of injury, charge only Motorola nickel-cadmium type rechargeable batteries listed. Other types of batteries may burst, causing personal injury and damage.
- Do not expose charger to rain or snow.
- Use of an attachment not recommended or sold by Motorola may result in a risk of fire, electric shock, or injury to persons.
- To reduce risk of damage to electric plug and cord, pull by plug rather than cord when disconnecting charger.
- Make sure cord is located so that it will not be stepped on, tripped over, or otherwise subjected to damage or stress.
- An extension cord should not be used unless absolutely necessary. Use of improper extension cord could result in a risk of fire and electric shock. If extension cord must be used, make sure:
 - (1) That pins on plug of extension cord are same number, size, and shape as those on plug on charger;
 - (2) That extension cord is properly wired and in good electrical condition; and
 - (3) The cord size is 18AWG for lengths up to 100ft., and 16AWG for lengths up to 150 ft.
- Do not operate charger with damaged cord or plug - replace them immediately.
- Do not operate charger if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified serviceman.
- Do not disassemble charger; take it to a qualified serviceman when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.
- To reduce risk of electric shock, unplug charger from outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.

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4. OPERATION

After a period of use, a battery normally requires approximately one hour of rapid charging. The radio should be turned off while attached to a battery being recharged. Place the charger in operation as follows:

a. Make sure that the line voltage selector (fuse F1 and receptacle) is placed in the proper position to accept either 115Vac, 220Vac, or 240Vac as applicable. If the desired Vac is not displayed in the receptacle's window, refer to the exploded view at the back of this manual, and:

(1) Remove the fuse drawer (item 22) from the ac connector (item 2).

(2) Remove the voltage selector insert (item 21) from the fuse drawer.

(3) Replace the voltage selector insert in the fuse drawer with the desired Vac showing through the fuse drawer's slotted window.

(4) Replace the fuse drawer in the ac connector.

b. Connect the ac cord (jack J1 end) to the battery charger.

c. Connect the ac cord (plug P1 end) to the proper ac receptacle. The battery charger performs a self test, which is evidenced first by all four LEDs in the display simultaneously turning on and off, and then by each of the four LEDs in sequence (yellow, orange, red, green) turning on and off.

d. Insert the battery, with or without the radio attached, into the charger compartment and seat it firmly to assure that proper contact has been made. Again, each of the LEDs turns on and off, then the red **Charging** LED turns on to indicate that the battery is being rapid charged.

NOTE

- (1) If the yellow **Stand-By** LED illuminates instead of the red LED, the battery is either too hot or too cold to be rapid-charged. Refer to "Circuit Description" for details.
- (2) If the orange LED flashes, a problem exists with the battery. **TRY RESEATING THE BATTERY.** Refer to "Circuit Description" for details.

e. Allow approximately one hour for batteries to charge.

NOTE

When a rapid-charge battery reaches full charge, the red **Charging** LED turns off and the green **Complete** LED turns on.

5. IN CASE OF TROUBLE

Before requesting service, refer to the following table for possible remedies.

WARNING

USE ONLY MOTOROLA NICKEL-CADMIUM (NI-CD) BATTERIES WITH THIS CHARGER.

Condition (Refer to Figure 1 for LED location)	Remedy
Red Charging LED does not light when battery is inserted in pocket	<ul style="list-style-type: none"> ● Check battery and charger contacts for dirt, grease, or foreign material. Wipe with a soft cloth.
Orange LED flashes.	<ul style="list-style-type: none"> ● Try reseating battery. ● If a light-capacity battery with a radio attached is being charged and the radio is turned on, turn the radio off, then reseat battery. ● Check battery and charger contacts for dirt, grease, or foreign material. Wipe with a soft cloth. ● Try another battery. If problem goes away, the problem is with the first battery.
Yellow Stand-By LED lights	<ul style="list-style-type: none"> ● Battery is either too hot or too cold to be rapid charged.
No LEDs light	<ul style="list-style-type: none"> ● Make sure charger is plugged in. ● Check to see if charger has a fuse. ● Check to see if fuse is blown.

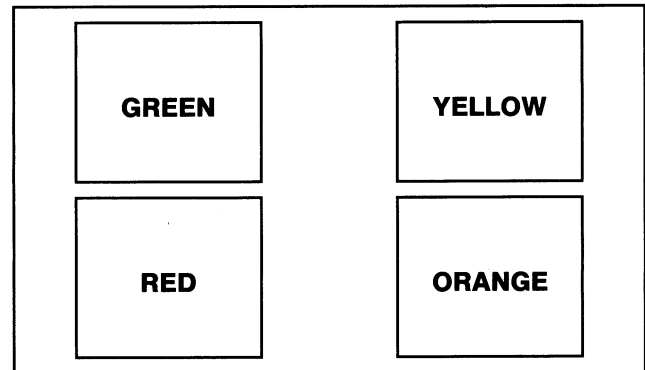


Figure 1. Front Panel LED Locations

6. CIRCUIT DESCRIPTION

(Refer to the schematic diagram)

a. General

The mechanical placement of fuse F1 and its receptacle select the primary windings of transformer T1 for the 115Vac, 220Vac, or 240Vac input source. Operating B+ is developed from a step-down transformer (T1), with a fused primary and a fused secondary, driving a conventional full-wave bridge rectifier (CR1-CR4). B+ is applied to the display board LEDs, to charging circuit transistors

Q1, Q3, and Q15, and to a 5-volt regulator (U1), which provides power to the microcomputer (U3).

All of the timing, monitoring, and sensing of the circuits is performed by the microcomputer (U3). Upon power-up, with no battery inserted, the microcomputer performs a self check of its read-only memory (ROM), random-access memory (RAM), and timer. Next, the microcomputer momentarily turns on all four LEDs via U3, pins 33 thru 36. Then, the microcomputer momentarily turns on each LED in the sequence: yellow, orange, red, and green. Completing the self check with no problems encountered, the microcomputer turns all the LEDs off.

After the microcomputer self check has been completed, the microcomputer monitors the capacity coding resistor (RC) RC IN line (U3, pin 23), and the thermistor (RT) TEMP IN line (U3, pin 24) for battery indications. When a battery is inserted, the microcomputer again momentarily turns on each LED in the sequence: yellow, orange, red, and green.

Next, U3 checks the RC and RT in the battery to determine charging conditions. If the value of the battery's RC is abnormal (see Table 1), the microcomputer senses a problem and, via U3, pin 36, keys the orange LED to flash on and off. If the RC value is normal, the microcomputer proceeds to monitor the battery's temperature.

Table 1. Normal RC Values

RC VALUE	BATTERY TYPE
2.4k Ω	NTN4537A, NTN4592A
5.1k Ω	NTN4538A, NTN4593A, NTN4657A, NTN4671A
10k Ω	NTN4539A, NTN4594A
18k Ω	NTN4595A, NTN4596A, NTN4992A
33k Ω	NTN4819A, NTN4820A

If the battery temperature is outside the temperature window (below 10°C (3.33Vdc on the RT contact) or above 40°C (1.87Vdc on the RT contact), the microcomputer lights the yellow **Stand-By** LED and waits for the battery's temperature to fall within the temperature window. Once this occurs, the microcomputer turns off the yellow LED (if turned on at all) and turns on the charging circuits; these circuits condition the battery by charging it at 600mA for 30 seconds. At the end of 30 seconds, the microcomputer checks the battery voltage via the VCHG IN line at U3, pin 22. The voltage should be between 7Vdc and 11Vdc. If the voltage is outside this range, the microcomputer senses the battery problem and indicates it by flashing the orange LED (RESEAT/REPLACE THE BATTERY).

b. Charging Circuits

Following the power-up, microcomputer self check, battery installation, and normal battery RC, RT, and voltage checks, rapid charging begins. There are four rapid-charge rates as indicated by the battery RC (see Table 2).

Table 2. Charge Rates

BATTERY TYPE	CHARGE RATE (mA)	
	RAPID	TRICKLE
NTN4537A, NTN4592A	600	50
NTN4819A, NTN4820A	780	65
NTN4538A, NTN4593A, NTN4657A, NTN4671A	1080	90
NTN4539A, NTN4594A	1500	125
NTN4595A, NTN4596A, NTN4992A	1500	150

The signal at pin 5 of op amp U2B (voltage drop across resistor R6) is amplified by U2B. The op amp's output (pin 7), sensed by the microcomputer on the CURRENT IN line (U3, pin 21), is used by the microcomputer to select the resistance (R23 thru R33) required to achieve the proper voltage level at the input (pin 3) of op amp U2A. The resultant output at U2A, pin 1, drives transistor Q7, which drives transistors Q3 and Q1.

The microcomputer, via a high at U3, pin 29, turns on switching transistor Q8, achieving a lower emitter resistance at Q7 for the rapid-charge condition. At the same time U3, pin 34, goes high to turn on a display board driver transistor, which illuminates the red **Charging** LED. As the battery rapid charges, the microcomputer monitors the current (U3, pin 21) every 30 seconds and makes adjustments (selection of resistors R23 thru R33) as necessary to maintain constant charging current.

The microcomputer monitors the battery voltage on the VCHG IN line (U3, pin 22). Should this voltage approach 11Vdc, the microcomputer will cut back the charging current and maintain a constant voltage charge.

Every three minutes, the microcomputer stops the charging current and checks the temperature of the battery via the TEMP IN line (U3, pin 24). As the battery reaches full charge in the rapid-charge mode, the battery temperature rises. When the rate of increase within the three minutes exceeds 1.6°C (80mV), U3, pin 29, goes low, Q8 turns off, and the charger switches to the trickle-charge mode. At the same time, U3, pin 34, goes low to turn off the red **Charging** LED, and U3, pin 35, goes high to turn on a driver transistor and the green **Complete** LED. In any temperature environment, should the battery temperature reach 45°C, the charger will switch to the trickle-charge mode.

In the trickle-charge (**Complete**) mode, as in the rapid-charge mode, the microcomputer monitors the charging current and makes the necessary adjustments every 30 seconds. The trickle current charge rates are shown in Table 2.

Whenever a high- or ultra-high-capacity battery is installed, transistors Q17 and Q15 are turned on, via a logical high from U3, pin 32. Q17 and Q15 pull charging current from transistor Q1 through parallel resistors R47 and R60.

c. Reset Circuit

Integrated circuit U5 is a “watchdog” timer. At least once every second, a positive signal from U3, pin 31, is received at U5, pin 2. This signal keeps Q18 from resetting the microcomputer. If a problem occurs in the microcomputer, such as the microcomputer’s internal timer ceasing to function correctly, the microcomputer stops sending the signal at U3, pin 31. As a result, the following sequence occurs: U5, pin 3, goes low, turning off Q19. This turns on Q18, which resets the microcomputer. When the microcomputer is reset, Q14 is turned on, pulling U5, pin 2, low, and resetting the U5 timer. Resetting the timer causes U5, pin 3, to go high, which turns on Q19, turns off Q18, and pulls the microcomputer out of reset via U3, pin 2.

d. Interrupt Circuit

Transistor Q4 is normally turned on. But, if the battery is removed, or if “contact bounce” occurs, the voltage at the collector of Q1 goes high, which turns off Q4 and pulls U3, pin 3, low. This low signal interrupts U3’s internal processor and keys the microcomputer to check the battery’s RC and RT. If the interrupt was just contact bounce, then the microprocessor will continue its normal function. If the interrupt was a removed battery, the microcomputer blanks the display. If the battery is open, the microcomputer senses a problem and, via U3, pin 36, keys the orange LED to flash on and off.

7. MAINTENANCE

a. Fuse

If the charger does not operate, check fuses F1 and F2, and replace if necessary. If the replaced fuse “blows,” check for short circuits in the transformer, charger circuits, and transistor Q1.

b. Contacts

If the red **Charging** LED does not turn on with a radio or battery inserted into the pocket, check the contacts of the battery or charger for dirt, grease, or other foreign materials. Clean the contacts, if necessary, with a soft cloth.

CAUTION

THE FOLLOWING MAINTENANCE PROCEDURES SHOULD ONLY BE PERFORMED BY QUALIFIED SERVICE PERSONNEL:

c. Voltage Measurements

The dc voltage measurements table below lists the voltage levels that should be present with varying batteries and operating conditions.

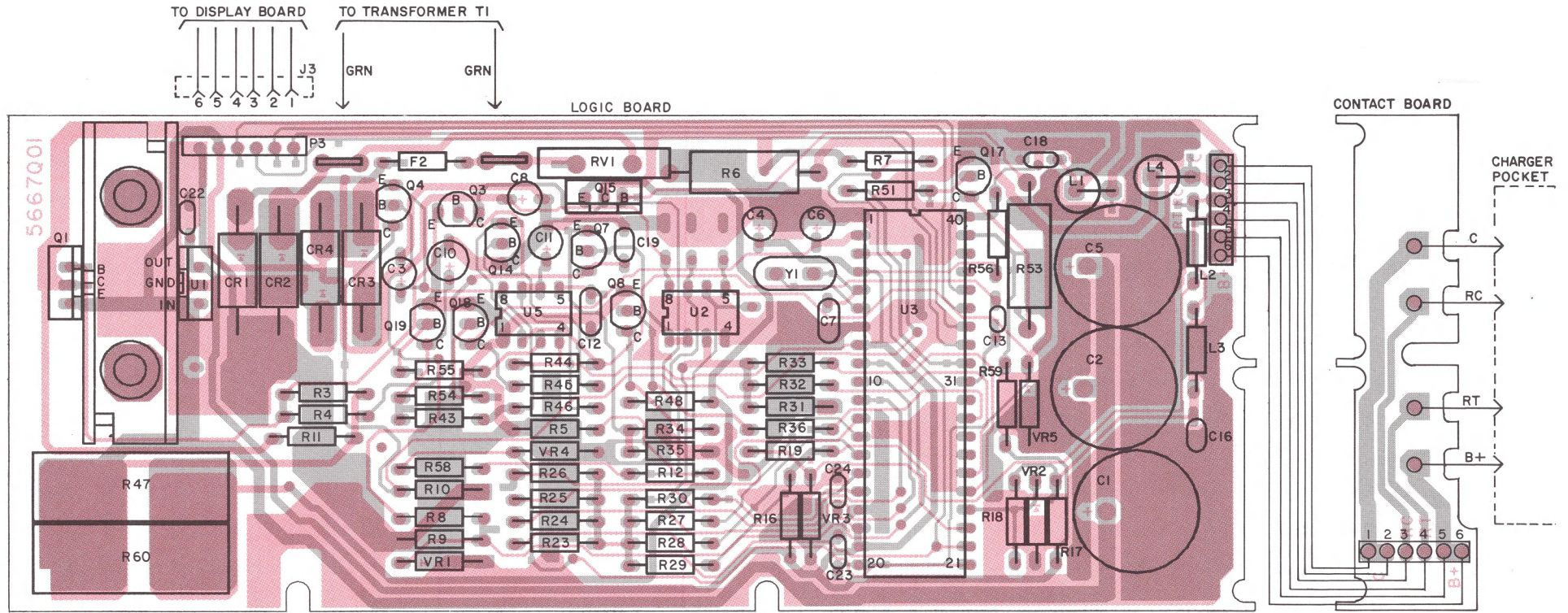
DC VOLTAGE MEASUREMENTS

BATTERY TYPE	BATTERY CONDITION	PIN	B+	Q1		Q7		Q15		U2			U3						CHARGING CURRENT (mA)	
				B	C*	B	E	E	B	5	6	7	2	21	22*	23	24**	29		40
NO BATTERY			17.0	17.0	8.1	0.2	0	17.0	17.0	0	0	0	4.8	0	2.8	4.9	4.9	0	4.9	0
NTN4537A, NTN4592A	RAPID CHARGE		15.5	14.8	10.2	0.7	0.1	15.5	15.5	.32	.32	1.9	4.8	1.94	3.5	0.5	2.7	3.4	4.9	600
NTN4537A, NTN4592A	CHARGE COMPLETE		16.7	16.2	9.1	1.0	0.4	16.7	16.7	.03	.03	0.1	4.8	0.14	3.1	0.2	2.5	0	4.9	50
NTN4538A, NTN4593A, NTN4657A, NTN4671A	RAPID CHARGE		14.7	14.0	10.7	0.8	0.2	14.7	14.7	.64	.64	3.5	4.8	3.55	3.7	1.0	2.8	3.4	4.9	1080
NTN4538A, NTN4593A, NTN4657A, NTN4671A	CHARGE COMPLETE		16.7	16.1	8.7	1.0	0.4	16.7	16.7	.05	.05	0.3	4.8	0.29	3.0	2.8	2.6	0	4.9	90
NTN4539A, NTN4594A	RAPID CHARGE		14.0	13.4	10.5	0.8	0.2	11.1	10.3	.90	.90	5.0	4.8	4.93	3.6	1.6	2.9	3.4	4.9	1500
NTN4539A, NTN4594A	CHARGE COMPLETE		16.6	16.0	8.9	1.0	0.4	16.6	16.6	.07	.07	0.4	4.8	0.36	2.9	0.9	2.6	0	4.9	125

NOTES:

1. ALL VOLTAGES REFERENCED TO CHARGER GROUND.
2. VOLTAGES AT PIN DESIGNATED * WILL VARY WITH THE VOLTAGE OF THE BATTERY.
3. VOLTAGES AT PIN DESIGNATED ** WILL VARY WITH THE TEMPERATURE OF THE BATTERY.

VIEWS FROM COMPONENT SIDE



SS-CEPF-17309-0
CS-CEPF-17310-0
OL-CEPF-17311-0

CIRCUIT BOARD DETAIL

Electrical Parts List

TPLF-3447-A

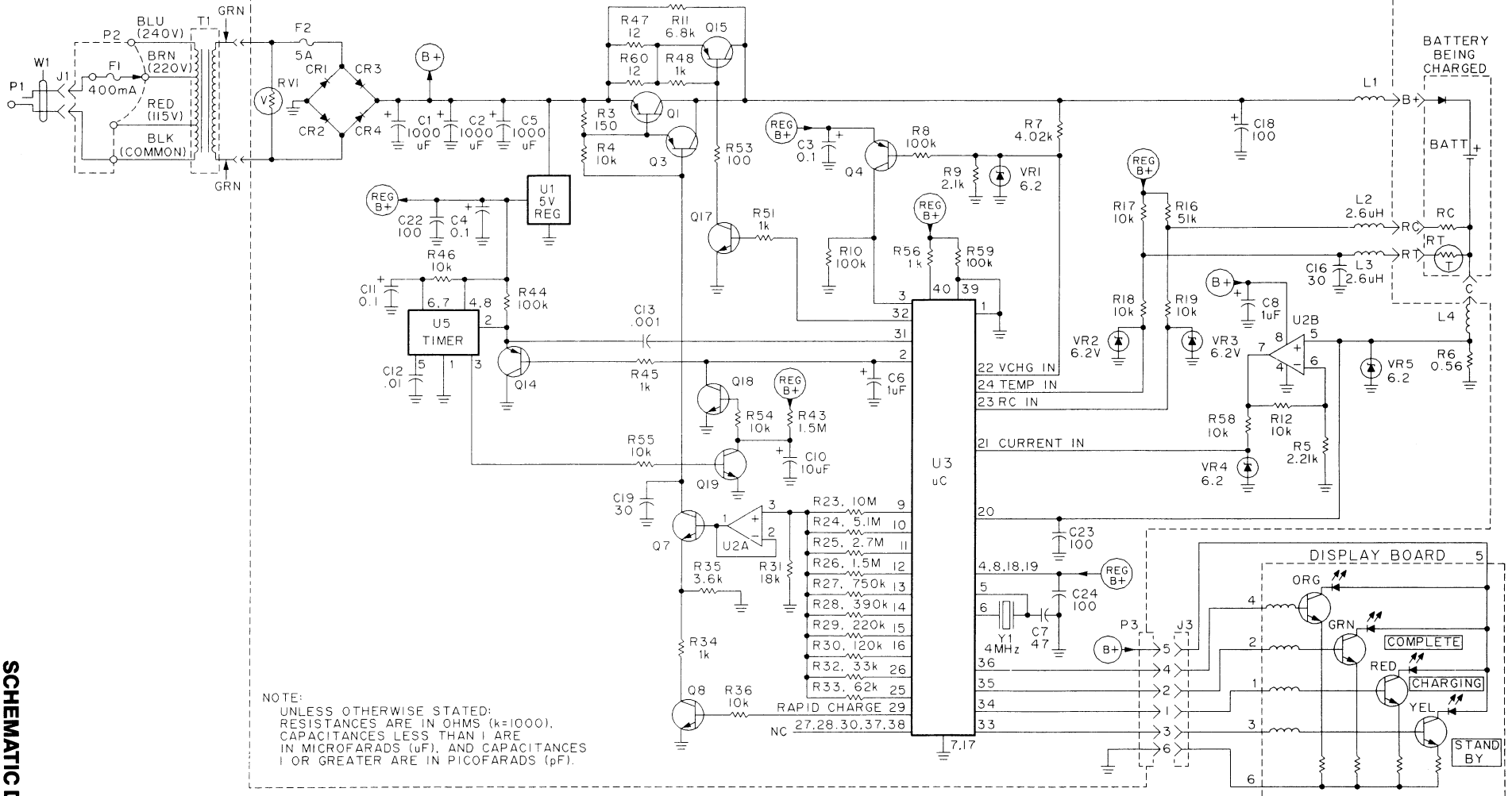
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, Fixed: uF ± 20%; 35V
		unless stated
C1, 2	2360561H19	1000
C3, 4	2383441B20	0.1
C5	2360561H19	1000
C6	2383441B15	1
C7	2105529B11	47pF ± 5%; N150
C8	2383441B15	1
C9	-----	Not Used
C10	2305499G16	10 ± 10%; 16V
C11	2383441B20	0.1
C12	2105457G14	.01 + 30 - 80%; 63V
C13	2105457G09	1000pF; 63V
C14, 15	-----	Not Used
C16	2105454G47	30pF ± 5%; 63V; N150
C17	-----	Not Used
C18	2105455G12	100pF ± 10%; 63V; N750
C19	2105454G47	30pF ± 5%; 63V; N150
C20, 21	-----	Not Used
C22 thru 24	2105455G12	100pF ± 10%; 63V; N750
		DIODE: See Note I
CR1 thru 4	4882525G19	Silicon, 3A; 50PIV
		FUSE:
F1	6505700Q04	400mA
F2	6505214E02	5 Amp
		COIL, RF: unless stated
L1	2483977B02	Choke
L2, 3	2482723H19	2.6uH
L4	2483977B02	Choke
		TRANSISTOR:
Q1	4800869807	PNP; type M9807
Q2	-----	Not Used
Q3, 4	4800869643	PNP; type M9643
Q5, 6	-----	Not Used
Q7, 8	4800869642	NPN; type M9642
Q9 thru 13	-----	Not Used
Q14	4800869643	PNP; type M9643
Q15	4800869807	PNP; type M9807
Q16	-----	Not Used
Q17	4800869706	NPN; type M9706
Q18, 19	4800869642	NPN; type M9642
		RESISTOR, Fixed: Ω ± 5%; 1/4W
		unless stated
R1, 2	-----	Not Used
R3	0611009C29	150
R4	0611009C73	10k
R5	0610621C28	2.21k ± 1%
R6	1782036G18	.56; 2W
R7	0610621C53	4.02k ± 1%
R8	0611009C97	100k
R9	0610621C26	2.1k ± 1%
R10	0611009C97	100k
R11	0611009C69	6.8k
R12	0610621C91	10k ± 1%
R13 thru 15	-----	Not Used
R16	0611009C90	51k
R17	0610621C91	10k ± 1%
R18, 19	0611009C73	10k
R20 thru 22	-----	Not Used
R23	0610164K58	10M
R24	0610164K51	5.1M
R25	0610164K44	2.7M
R26	0610164K38	1.5M
R27	0611009B19	750k
R28	0611009D12	390k
R29	0611009D06	220k
R30	0611009C99	120k
R31	0611009C79	18k
R32	0611009C85	33k
R33	0611009C92	62k
R34	0611009C49	1k
R35	0611009C62	3.6k
R36	0611009C73	10k
R37 thru 42	-----	Not Used
R43	0610164K38	1.5M
R44	0611009C97	100k
R45	0611009C49	1k
R46	0611009C73	10k

R47	1705261K15	12 ± 10%; 5W
R48	0611009C49	1k
R49, 50	-----	Not Used
R51	0611009C49	1k
R52	-----	Not Used
R53	1705530L07	100 ± 10%; 2W
R54, 55	0611009C73	10k
R56	0611009C49	1k
R57	-----	Not Used
R58	0611009C73	10k
R59	0611009C97	100k
R60	1705261K15	12 ± 10%; 5W
		VARISTOR:
RV1	0605220M01	35V
		TRANSFORMER:
T1	2505578Q01	Transformer
		CIRCUIT MODULE: See Note I
U1	5184320A47	5V Regulator
U2	5105469E40	Dual Op Amp
U3	5105849Q01	Microcomputer
U4	-----	Not Used
U5	5184320A35	555 Timer
		DIODE: See Note I
VR1 thru 5	4811034G13	Zener, 6.2V
		CRYSTAL:
Y1	4805664G25	4MHz
NONREFERENCED ITEMS		
	2805546Q02	CONNECTOR, AC
	3005204R01	CORD, Line (115Vac 50/60Hz)
	3005204R03	CORD, Line (220/240Vac 50/60Hz)
	0105959M91	ASSEMBLY, Logic Board
	8460999A40	ASSEMBLY, Display Board

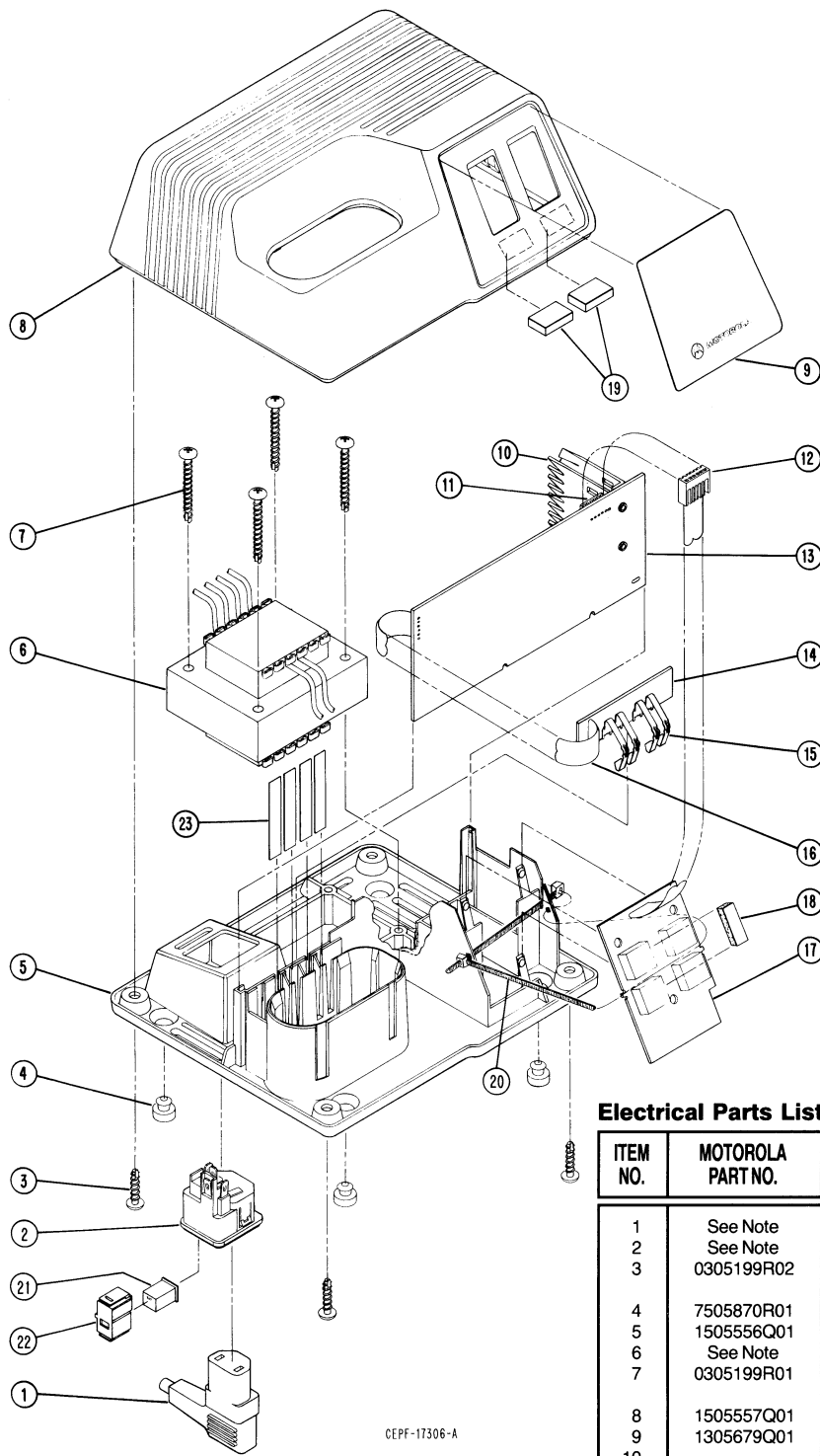
NOTES:

- For optimum performance, order replacement diodes, transistors, and circuit modules by Motorola part number only.

LOGIC BOARD



63C81106C96-A



CEPF-17306-A

Electrical Parts List

TPLF-3448-A

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	See Note	CORD, Line
2	See Note	CONNECTOR, AC
3	0305199R02	SCREW, Cutting, Phil Pan Hd; #10-16 x .625" (4 req'd)
4	7505870R01	FOOT (4 req'd)
5	1505556Q01	BASE
6	See Note	TRANSFORMER (T1)
7	0305199R01	SCREW, Cutting, Phil Pan Hd; #10-16 x 1.625" (4 req'd)
8	1505557Q01	HOUSING
9	1305679Q01	ESCUTCHEON
10	-----	HEAT SINK (part of item 13)
11	-----	CONNECTOR, Header, 6-Position (part of item 13)
12	-----	CONNECTOR, 6-Position (part of item 17)
13	See Note	ASSEMBLY, Logic Board (includes items 10, 11, 14, 15, and 16)
14	-----	PRINTED CIRCUIT BOARD, Contact (part of item 13)
15	-----	CONTACT, (4 req'd) (part of item 13)
16	-----	CABLE, Flexible (part of item 13)
17	See Note	ASSEMBLY, Display Board (includes item 12)
18	7505083E08	PAD
19	7505641N03	PAD (2 req'd)
20	4210217A26	TIE WRAP (2 req'd)
21	-----	INSERT, Voltage (part of item 22)
22	2805245S01	DRAWER, Fuse (includes item 21)
23	1405209L09	INSULATOR (4 req'd)

NOTE: Refer to Electrical Parts List for part number and description.