Series 1300 Morse Code Station Identifier

Instruction Manual

RACOM
PRODUCTS FOR THE COMMUNICATIONS INDUSTRY
[216] 351-1755
5504 State Road • Cleveland, Ohio 44134

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INSPECTION:

After the instrument is unpacked, it should be carefully checked for damages received in transit. If any shipping damage is found, file a claim with the carrier and refer to the Warranty Section of this manual.

Perform an electrical inspection as soon as possible after the equipment is received.

RETURN FOR WARRANTY OR REPAIR:

If the equipment is to be returned to RACOM for service or repair, please follow the procedures listed below:

(1) Contact RACOM for a "RETURN MATERIAL AUTHORIZATION NUMBER" (RMA #)

By writing to: RACOM, INC.
RMA Division
5504 State Road
Cleveland, Ohio 44134

Or telephone: (216) 351-1755

(2) Attach a tag to the equipment. This tag should identify the owner of the unit and give the serial number and the RMA number. *

(3) Carefully repack the unit and mark the box with the RMA number. *

(4) Then ship the unit to:

RACOM, INC.
REPAIR DEPARTMENT
5504 State Road
Cleveland, Ohio 44134

*NOTE:
NO MERCHANDISE WILL BE ACCEPTED BY RACOM, INC. WITHOUT AN RMA NUMBER.

SPECIFICATIONS:

Power Requirements:	10-20V AC-DC 300 mA or 115 VAC ±20% 50/60 Hz 10W
Temperature Range:	-20 degrees C to +80 degrees C
Humidity:	Up to 95% RH
Output Level:	Variable from -25 to -5dbm 1KHz
Output Impedance:	600 Ohm ± 20%
Output Frequency:	Adjustable (500 to 1500 Hz)
Noise:	50 db below rated output
Inhibit Feature:	Two D.C. controlled monitor terminals available on rear chassis terminal strip. Receiver COR monitor and transmitter keying monitor.
Operating Modes:	(1) Identifies after each time period. (2) Identifies after each transmission. (3) Identifies one time period after beginning of a transmission.
Interval Timer:	Adjustable from 3 minutes to 35 minutes.
Receiver Inhibit Monitor:	Controlled by COR monitor inhibit terminal. Standard units are "active low". Option "H" equipped units have selectable "active high" or "active low".
Transmitter Inhibit Monitor:	Active low. Usually controlled by push to talk closure to ground.
Receiver and Transmitter Inhibit Monitor Current:	1 mA maximum at 0 VDC 0 mA for voltages above +5 VDC
Receiver and Transmitter Inhibit Monitor Threshold Levels:	Low is defined as 0 to +1.2 VDC High is defined as +3.5 to +75 VDC
Monitor Release Delay:	Adjustable from .2 seconds to 5 seconds.
Monitor Inhibit After Identification:	.2 seconds

SPECIFICATIONS: (Cont.)

Mounting:	Standard desk top or optional rack mount
Code Character:	Factory programmed into a PROM
Code Speed:	Normally 22.5 wpm (internally adjustable from 10 to 50 wpm)
Solid State Transmitter Keying Switch:	Maximum 200 mA to ground with maximum .6 VDC drop from maximum 200 VDC (or less) source
Color:	Case is Mushroom Brown with brushed aluminum front panels
Case Size:	Desk Model: 8.2" x 1.75" x 5.5" Rack Mount: 19" x 1.75" x 5.5"

NOTE: On standard units, the COR monitor is busied out when it is grounded (active low). Units with Option "H" have a removable jumper jack (JP6). See component layout. When JP6 is removed, the COR monitor is "active low". When JP6 is installed, the COR monitor is "active high".

OPTION LIST:

Option A:	Desktop style
Option C:	19" x 1-3/4" rackmount style
Option H:	Selectable "active high" or "active low" COR monitor package for direct interface with certain GE and RCA installations.
Option T:	115 VAC 60 Hz wall receptacle mounted transformer included with unit.
Option X:	Extra call sign characters beyond eight characters.

F O R W A R D

Racom has manufactured transmitter identifiers for a number of years, and until recently, these have been voice units. In 1978, the FCC changed its regulations to permit morse code identification of stations. This precipitated the influx of new manufacturers of identifier type products to the marketplace, some of which may have been hastily designed and developed. However, Racom, as always, has resisted the temptation to hasten a product from design to manufacture.

The design parameters used in Racom's high quality voice identifiers was applied to the design of our morse code identifiers and again, a high quality and reasonably priced alternative for identification is available from Racom, the leader in transmitter identification.

Since the FCC issuance of a citation for not identifying a station is the most common given, an automatic means of identification becomes an important consideration in new or operating systems. The identifier can assist in recognizing stations creating interference due to technical problems, intermodulation or atmospheric conditions. Without an identifier, these stations become difficult and expensive to locate. Thus, the inexpensive morse code identifier offers solutions to a major problem in communications, and because it can be used over the top of voice traffic, it allows the necessity of identification without the use of valuable air time.

Generally, a station must identify every 15 minutes, except for public safety (police or fire) which identifies every ½ hour. There are other exceptions which are indicated in the FCC rules governing these categories. Other requirements which Racom identifiers satisfy involve variable speed, low modulation and variable audio frequency tone.

Where code identifiers are used, the FCC requires a speed of 20 to 25 words per minute, a tone of 1200 hz. plus or minus 800 hz. and deviation adjusted to at least 40% of maximum. Racom identifiers have the ability to satisfy all of these FCC and most user requirements automatically and without hardship to system use. They are an excellent choice for the present and future requirements of all communications systems.

INTRODUCTION

The Model 1300 offers the greatest possible versatility of morse code identification and includes a pre-programmed PROM which has four separate code channels. This allows for a test channel, one channel used to program the call letters specified with the order and two channels which may be factory programmed at a later date should the original call letters change. The factory programming of the original PROM is at a nominal charge and is considerably less than the complete replacement of the PROM.

Other features such as a single-sided plug-in circuit board with all ICs mounted in sockets, adjustable controls for output level, tone frequency, code speed, interval timer and monitor delay add to the Model 1300's ease of maintenance.

The careful choice of design parameters, quality workmanship and attention to detail assure a reliable, long lasting and rugged unit.

Operation:

The Model 1300 will operate in several different modes as follows:

Mode 1: Identify After a Fixed Time Period

The unit will identify every time period, caused by the adjustment of R28, except when inhibited by a ground on the COR or transmitter monitor inputs. When inhibited, identification will be delayed until a short time after the ground is removed. This time period is adjusted by pot R6 and is usually 3 to 5 seconds.

Mode 2: Identify a Fixed Time Period after the End of a Transmission

The unit will identify after a closure on the transmitter monitor input after a time set by delay pot R6, usually 3 to 5 seconds. Also inhibited by a ground on the COR or transmitter inputs.

Mode 3: Identify a Fixed Time Period after the Beginning of a Transmission

The unit will identify one time period after a ground is applied to the transmit monitor input and will be inhibited by a ground on the transmit or COR monitor inputs.

To simplify hookup, the Model 1300 is shipped in Mode 1. Mode 1 will make the unit identify every time interval around the clock. The inhibit inputs may delay the identification.

To make the 1300 identify only when there is traffic on the system, change the 1300 to Mode 3. When operating in Mode 3, be sure the transmit monitor is connected to the push to talk line or other source of ground when the transmitter is keyed.

Conservation of air time is possible when using a repeater by permitting the 1300 to identify over the voices of the users. This is accomplished by using Mode 3, wiring the transmit monitor input to the line going from the COR to the transmitter control line and removing CR6 in the 1300. The operators may have a problem getting used to this at first but a properly adjusted unit will not interfere with communications.

Some radios may switch 12 volts on the push to talk line instead of ground. In this case, it will be necessary to use a relay or another type of switching device to operate the monitor. Also, on some radios, it is advisable to use a resistor of about 10K ohms between terminal 7 and the audio input of the transmitter. This is explained on page 7 under "Setup".

Mode Selection:

Mode 1: Add JP3; remove JP2; set R28 for desired time.

Mode 2: Add JP2; remove JP3. Set R28 full clockwise (see setup section).

Mode 3: Remove JP2 and JP3; set R28 for desired time. (see setup section).

Setup:

Remove the cover by removing the four sheet metal screws. Code speed (R12) is adjustable but has been factory preset to 22.5 WPM (words per minute). Tone frequency (R33) is adjustable for the most pleasant tone, recommended about 1 Khz. Monitor delay (R6) is adjustable from about ½ second to over 5 seconds and is generally set at 3 seconds. This keeps the unit from functioning for a short time after an inhibit to permit a reply. The last adjustment (R18) Audio Output, is used to set the audio to the transmitter. This should be set for about 40% deviation, about 2 Khz in most systems. Station equipment with a high degree of audio compression may require the addition of a 10K ohm resistor in series with the 1300's audio output to help make this adjustment easier. There are two considerations which the addition of this resistor will help; they are the loading presented by the 1300 to the input circuit and the automatic decrease in compression when an attempt is made to reduce the deviation to the 40% level. If there is a noticeable degradation of high frequency response with the station microphone, it may be necessary to add this resistor to eliminate this.

The frequency of the oscillator for code speed is 1.2 times the code speed; i.e. 22.5 WPM = 27hz.

The frequency of timer oscillator is determined by dividing the time in minutes into 68.27 to get frequency in hertz.

$$\left(F = \frac{68.27}{T}\right) \qquad \text{i.e. 13 minutes} = 5.25 \text{ Hz}$$

Unless requested otherwise, the 1300 is shipped set up to about 13 minutes so that if any inhibits are placed on the unit due to a busy channel, it is still apt to identify before the 15 minute period has elapsed.

Front Panel Controls:

A minimum of front panel controls are used to prevent unauthorized or accidental adjustment that might affect the unit's performance.

Speaker Switch: Lift the switch up; this will enable the internal speaker giving an audible signal that the unit is functioning.

Front Panel Controls: (cont.)

Test Switch: Lifting this switch up will cause the unit to function for test purposes, over-riding any inhibit inputs.

Active Light: LED will light when the unit is identifying.

Rear Terminal Strip:

Terminal No.	Function
1)) 2)	Power Connection (see below)*
3	Ground-connect to chassis ground on transmitter
4	Transistor switch to be wired to PTT line
5	COR monitor inhibit input-requires ground closure (or positive voltage w/Option "H")
6	Transmit monitor inhibit input - requires ground closure
7	Audio output - unbalanced 600 ohms
8	Ground-used for audio ground

*Power Connection: If the wall plug transformer is used, hook it between TB1-1 and TB1-2.

If the unit is operated from a common D.C. power supply, (not to exceed 20V), then TB1-3 connects to the supply's ground or low and TB1-2 connects to the supply's positive terminal.

Circuit Operation:

The key to operation of the circuit is the PROM (programmable read only memory) that has the station call sign programmed into it. This is done by segmenting the message into time periods and storing whether the tone should be on or off during that period of time. The PROM (U6) has a jumper installed next to it in 1 of 4 spots that permits the correct program to be addressed. The addressing is controlled by U7 driven by a clock oscillator consisting of one section each of U2 and U3. The resistors and capacitor C8 determine the speed of the clock with pot R12 providing the adjustment. This oscillator is turned on and off by the control circuit of U8. U8A is controlled by the PROM to turn the tone on or off to the audio stages, which are separate emitter follower amplifiers, Q3 for the speaker and Q4 for the output. The tone oscillator consists of three sections of U4 which are also controlled by U8. Pots R33, R14 and C16 set the frequency of the tone oscillator. The control circuit of U8B, C & D also control the driver Q1 which drives the LED, active light, and the open collector switch Q2.

Circuit Operation: (Cont.)

The control circuits of U8B, C & D are driven when the "stop channel" of U6 goes high, also triggering U2D which resets U7 and the flip-flop U3A & B. This prevents the counter U5 from counting.

A ground on TB1 terminals 5 and 6 will hold a low on U2C preventing U2D from resetting the unit. After removing the ground, R6 and R7 will slowly charge C6, providing a monitor delay. However, pressing the test switch will trigger the unit immediately. The ground on terminal 6 will change the state of flip-flop U3A and B, permitting the counter U5 to run. When it reaches a count of 2048, it will key U3C to stop the oscillator and activate the unit through U2C beginning the cycle over again.

P. C. Board Removal:

Should it be necessary to remove the printed circuit board to change the mode or service the unit, proceed as follows. Remove the two nuts and lockwashers from front edge of unit, one in the left hand corner and one on the tab of U1 regulator. Loosen the screw from the bottom of the chassis under U1. Remove the connector J1 from the left edge of the board. Now lift the front edge of the board slightly to clear the screws and pull forward to disengage the connector from the terminal strip. Reverse the procedure for re-assembly.

CAUTION: THIS CIRCUITRY USES CMOS CIRCUITS AND HAS PROTECTION ON THE GATES BUT EVERY PRECAUTION AGAINST STATIC ELECTRICITY OR CHARGES SHOULD BE FOLLOWED. BE SURE TO USE A GROUNDED SOLDERING IRON WHILE WORKING ON THE CIRCUITS.

Call Letters:

The call letters for the Model 1300 are programmed at the factory as specified on the order. Before the unit is placed in service, the call letters should be carefully monitored and checked against the station license. As previously noted, R12 may be adjusted to reduce the code speed, to aid in checking this function. See Fig. 5 for a Morse Code chart, if necessary, for this determination.

The call letters for the Model 1300 are burned into one of two available channels of PROM U6. Jumper JP1 connects the desired channel to the output. Two of these channels may be used for ending the identification sequence and are not available for call letters. The remaining channel may be used for call letters. Normally, one of these channels is programmed with the call letters specified on the order and JP1 is connected to that channel.

If the call letters need to be changed, then U6 will have to be returned to Racom for programming of an open channel and JP1 will have to be changed to that channel.

W A R R A N T Y

Racom, Inc. warrants the equipment purchased hereunder to be free from defect in material and workmanship under normal use and service, when used for the purpose for which the same is designed, for a period of one year from the date of delivery, provided that notice of such defect is given to Racom within thirty (30) days after discovery thereof and provided that inspection by Racom indicates the parts are defective to Racom's reasonable satisfaction. Racom's obligations under this warranty are limited to the repair or replacement of defective parts and the return of such repaired or replaced parts to the purchaser F.O.B. factory. At Racom's option, any defective part shall be returned to Racom's factory for inspection, properly packed and all expenses prepaid. No parts shall be returned unless the purchaser first obtains a return authorization number, which will be furnished on request. Equipment furnished by Racom, but manufactured by another, bears only the warranty given by such other manufacturer, which will be furnished on request. No warranties other than those set forth in this section are given or are to be implied with respect to the equipment furnished hereunder and Racom shall, in no event, be liable for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of the products, or any inability to use them either separately or in combination with other equipment or materials, or from any other cause.

This warranty is considered void when in the opinion of Racom, Inc. that unit has been altered or tampered with other than factory authorized adjustments as prescribed within this manual. Repairs made on any unauthorized altered units will be charged for according to Racom's standard rates.

CORRESPONDENCE AND PARTS ORDERING

Whenever writing about this unit or ordering parts, always refer to the model and serial number and the approximate date of purchase. Parts should be ordered by the Racom part number.

RETURN OF EQUIPMENT

No equipment or part thereof shall be returned to Racom unless the purchaser first obtains a return merchandise authorization from Racom. This number is to be marked on the shipping container.

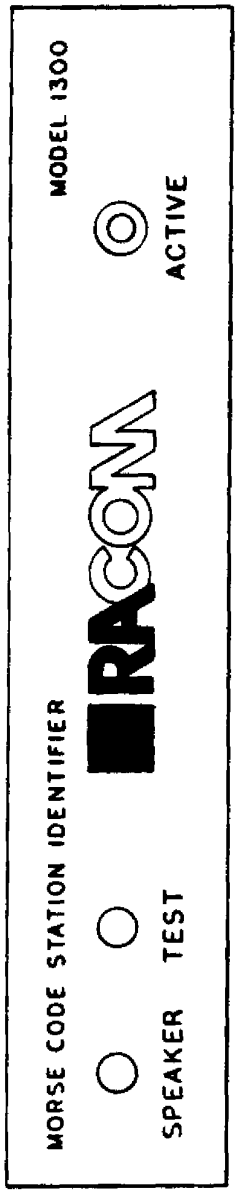


FIG. 1

PIN	DESCRIPTION
# 2	(+) 10 - 20VDC
# 3	(-) DC GROUND
# 4	CW ID ENDS DURING TONE
# 5	PAUSES ID WHEN LOW
# 6	A LOW TRIPS ID LOGIC CKT
# 7	AUDIO OUTPUT
# 8	GROUND

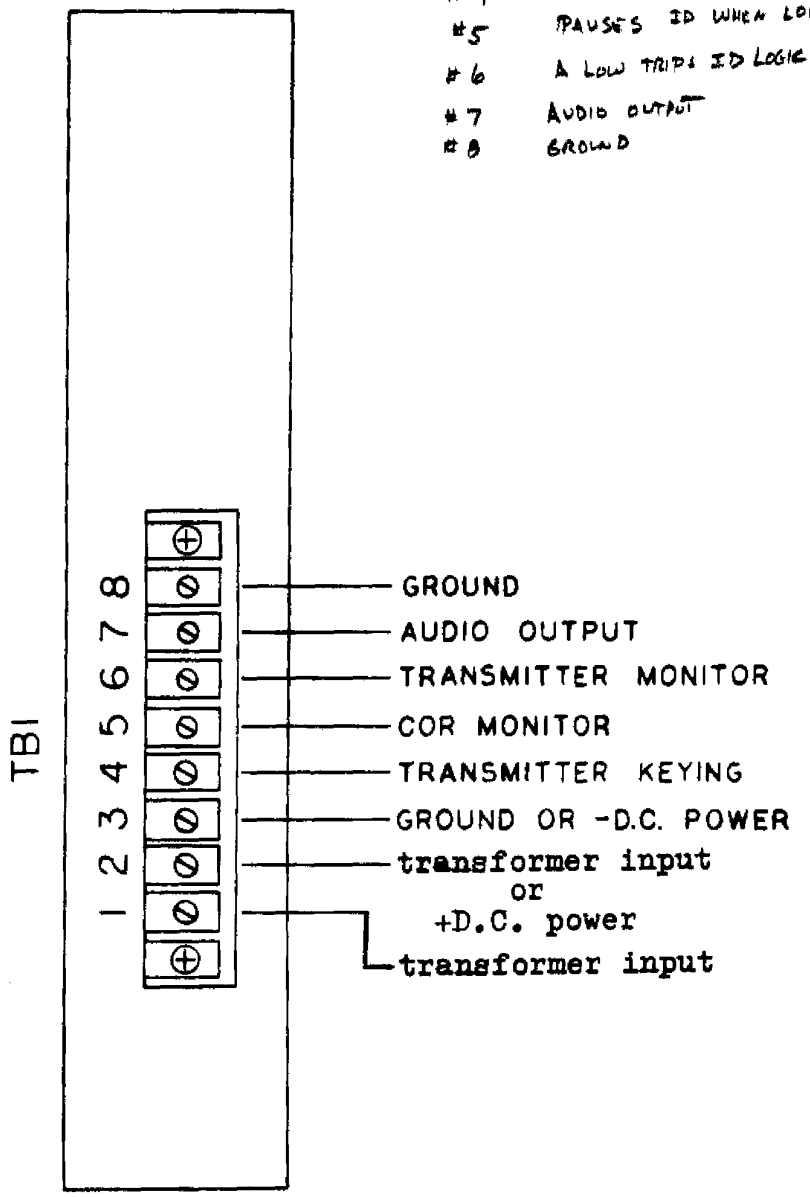
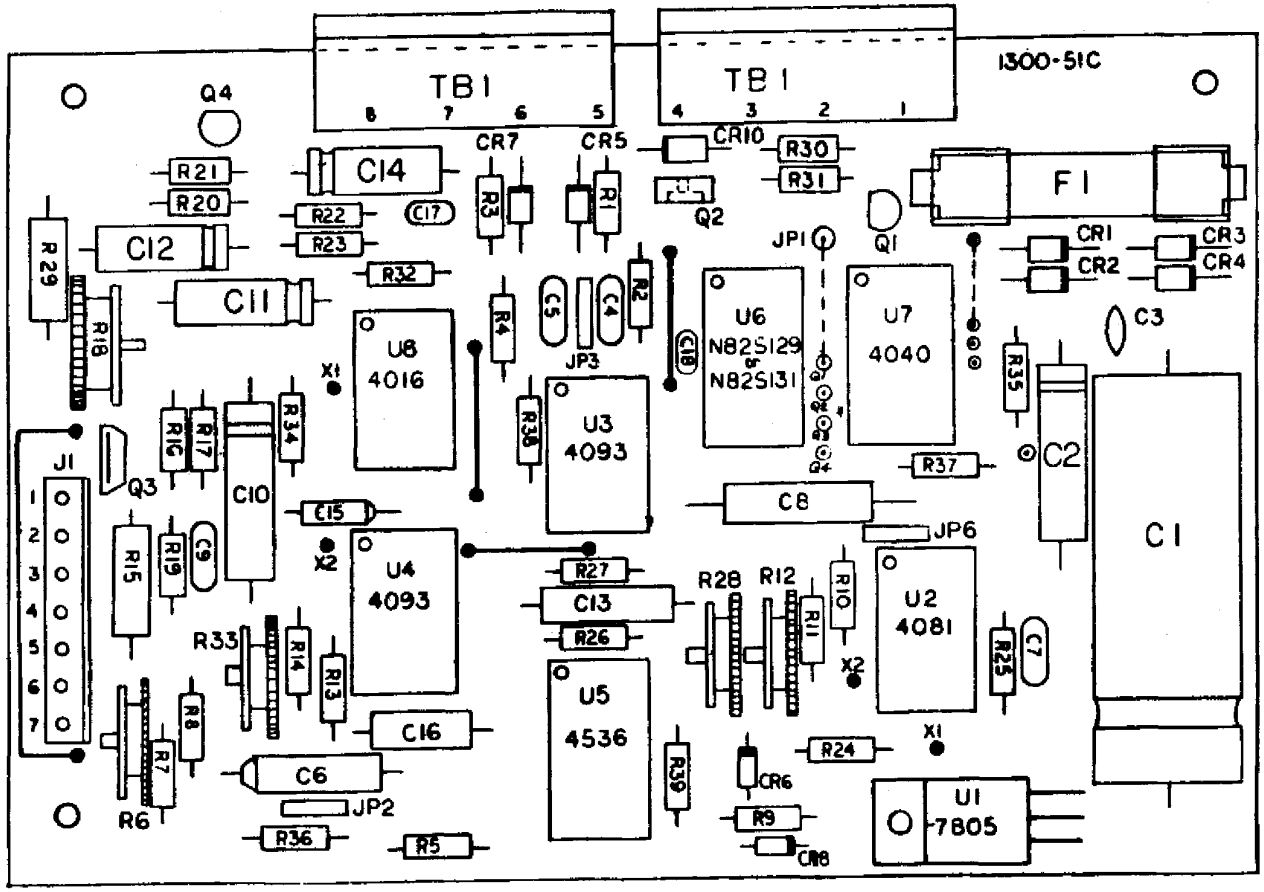


FIG. 2

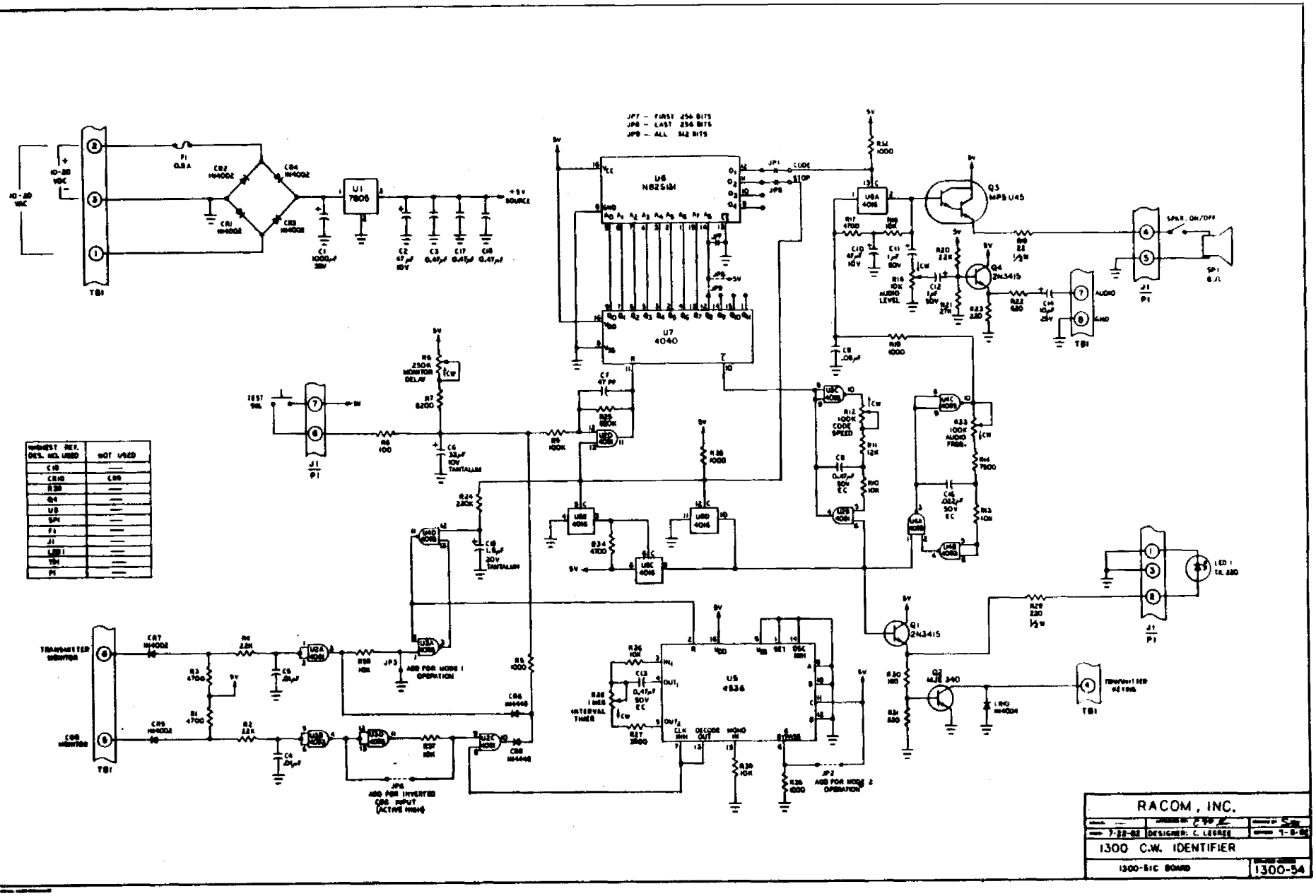


RACOM, INC.

SCALE: 2:1	APPROVED BY	DRAWN BY Stu
DATE: 7-25-82		

1300 COMPONENT LAYOUT

1300-51C	DRAWING NUMBER 1300-52


JP7 – FIRST 256 BITS
JP8 – LAST 256 BITS
JP9 – ALL 512 BITS
U6 N82S141
U7 4040
U1 7805
U5 4536
TBI
J1 P1
RACOM, INC.
7-22-82
DESIGNER: C. LEGREE
1-8-83
1300 C.W. IDENTIFIER
1300-51C BOARD
1300-54

MORSE CODE CHART

0	- - - - -	I	• •
1	• - - - -	J	• - - -
2	• • - - -	K	- • -
3	• • • - -	L	• - • •
4	• • • • -	M	- -
5	• • • • •	N	- •
6	- • • • •	O	- - -
7	- - • • •	P	• - - •
8	- - - • •	Q	- - • -
9	- - - - •	R	• - •
A	• -	S	• • •
B	- • • •	T	-
C	- • - •	U	• • -
D	- • •	V	• • • -
E	•	W	• - -
F	• • - •	X	- • • -
G	- - •	Y	- • - -
H	• • • •	Z	- - • •

Fig. 5