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KB-4900

ASCII, BAUDOT AND MORSE
KEYBOARD

OWNER'S MANUAL

CURTIS

**ELECTRO
DEVICES**

OWNER'S MANUAL

KB-4900

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CURTIS ELECTRO DEVICES, INC., BOX 4090, MOUNTAIN VIEW, CA 94040

******* INTRODUCTION *******

Your KB-4900 is a product of the computer age. Unlike its predecessors the KB-4200 AND KB-4800, this unit does not use discrete dedicated parts to perform its function. Instead, it employs an "all purpose" IC called an integrated microprocessor. This device does nothing itself, however, when provided with a list of instructions, it will carry them out and in so doing, accomplish the objectives of the programmer who devised the set of instructions. The KB-4900 uses a microprocessor called the 8035 (developed by the Intel Corporation). The 8035 contains an 8-bit central processor unit (CPU), 512 bits of random access memory (RAM), 27 input-output lines (I/O) and an 8-bit timer/event counter.

For instructions, we use the 2732 (Ultra-Violet) Erasable Programmable Read-Only Memory (EPROM). It can contain as many as 4,096 individual instructions composed of 32,768 individual bits. The sending buffer and message storage are implemented in another powerful IC, the 2114. This Random-Access Memory (RAM) will store 512 8-bit bytes in its 4,096 read-write storage cells, and last, but not least, the venerable 8044 single chip keyer IC provides the Morse code generation in order to free the processor for more complicated tasks. For those of you interested in statistics, the circuitry in the KB-4900 contains approximately 100,000 individual transistors.

The program for the KB-4900 uses most of the 4,096 instructions possible from the 2732. From a library of 90 individual instructions recognized by the microprocessor, the program is built-up into a sequence that provides the function of the KB-4900. The microprocessor winds its way through the program at the rate of 400,000 instructions per second. And, while it looks as though things are being done all at once, in reality they are being done one-by-one. The processor does everything serially except that it handles all data in groups of eight binary digits called bytes. The processor is unbelievably busy while the unit is operation, executing the prescribed program at the 400 KHZ rate. It is not unlike a juggler keeping many plates spinning at one time. Though we have only one juggler, there is a whole lot of activity going on. In the case of the KB-4900, it may be sending CW, accepting new key inputs, assigning spaces in the sending buffer, unloading the sending buffer at some other point, running the buffer meter, running the speed meter, holding the PTT line down, watching for buffer overflow, keeping track of the time, incrementing the serial number, and scanning the keyboard for new commands....400,000 times a second without mistakes!

The program for the KB-4900 consists of 78 pages of single spaced text. It took nearly six months of writing, testing and debugging to get the program ready. We hope you enjoy using the system as much as we enjoyed designing it. If you have suggestions on how we might improve the unit, don't hesitate to call or drop a line.

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*****
**
**          CURTIS ELECTRO DEVICES, Inc.          **
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**          KB-4900                               **
**
**      Morse, ASCII and Baudot Keyboard         **
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**      Owner's Manual.....Revised 01-23-81     **
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MAJOR FEATURES.....

- *SENDS MORSE FROM KEYBOARD
- *SENDS MORSE FROM PADDLE KEY, MANUAL KEY OR BUG
- *SENDS TRUE RANDOM MORSE FOR CODE PRACTICE
- *SENDS PSEUDO RANDOM MORSE IN 8-1500 CHAR. LISTS OF 5-LETTER GROUPS W/ANSWERS
- *SENDS BAUDOT CODE FROM KEYBOARD
- *SENDS ASCII CODE FROM KEYBOARD

DESCRIPTION.....

Sends Morse code from the keyboard or from an external paddle key at any speed selected by the speed control.

Analog controls (potentiometers) are also provided for weight, sidetone pitch and sidetone volume.

An analog meter readout of buffer status continuously indicates the fullness of the sending buffer which can contain as many as 256 characters. (overflow lamp and pitch change on Morse signals nearly full buffer)

A "BUFFER HOLD" function allows break-in operation. The paddle key is operational during the hold.

An analog meter readout is also provided for Morse code speed readout. This is calibrated from 5 to 80 wpm and is effective for either keyboard, paddle initiated keying or random code practice.

Push-to-talk control is provided for transmitter switching in all modes. PTT release is delayed 0.5 seconds for convenience.

Special prosigns AS,SK,BT,AA,KN, KA plus most European and commercial.

Four programmable message memories (A,B,C & D) are provided. These can consist of one to four messages whose total is 256 characters. Messages are called via the sending buffer. The four memories are soft partitioned, meaning that "B" always starts wherever "A" ends to make maximum use of the memory storage. Memories "C" and "D" follow in the same manner. The memories may be "chained" via the buffer. (Warning lamp for overflow during load is provided)

Automatic built-in messages are provided as follows:

CQ CQ DE (message A) (i.e. "K6KU")
CQ TEST DE (message A)
DE (message A) (This is the "ID" key)
QRZ (message A)

(Note that these are appended by programmable message "A")

Two key lockout operation of keyboard prevents lost characters during "burst" typing.

A "DELETE" key allows correction of errors prior to transmission.

An automatic incrementing serial number from 0 to 9999 is available for insertion into the sending buffer or the message memories for contests which require sequential numbering. Leading zeros are not transmitted.

A repeat function allows repetition of any of the four message memories after a presettable period of from 1 to 99 seconds.

A real-time clock option allows generation of a time transmission (24-hour format, i.e. 21:42) in Morse, Baudot or ASCII. Time can be inserted in the sending buffer or any message memory. Time is sent as 21R24 in Morse, 21:24 in ASCII and Baudot.

BAUDOT CODE:

Baudot (5-level) TTY code is transmitted from the keyboard at 60 wpm standard speed. (45.45 baud)

Both RTTY and CW ID are provided ("ID" key)

High voltage 60mA. loop keying transistors are built into the unit.

Provisions are made for mixing receiver audio and keyer sidetone for convenient monitoring.

Carriage return, line feed and "LTRS" are sent automatically after 63 characters and a space have occurred on a line. After 70 characters, the function is initiated without any space being present. This makes nice looking copy at the receiving end, with the carriage return not breaking words. Also this frees the operator from worrying about the carriage return.

All up and down shift is handled automatically. In addition, a downshift occurs on every space to quickly clear any garbles in reception.

As with Morse transmission, included are the sending buffer, the programmable message memories, the automatic message sequences plus the "DELETE" function and KOS (Key-Operated-Switch) control.

ASCII:

Same as Baudot above except that functions involving up and down shift (FIGS and LTRS) are not required.

Transmission speed is 110 baud.

Both upper and lower case are generated (upper case by shifting)
A "CAPS LOCK" function allows transmission of capital letters only.

MORSE PRACTICE:

Mode 1: Random length groups of random characters are sent in a never repeating sequence at the speed selected by the speed control. Extra spacing between characters can be selected for easier study when trying to make large speed increases.

Mode 2: Psuedo random five character groups are sent, however, unlike the above true random generation, this second mode sequence is always the same and answer lists can be provided. There are eight lists available and are called by placing the number "1" through "8" in message memory "A". If any other character is placed in message memory "A", the mode 1 random Morse will be sent. The sending stops at the end of each list. To restart, use a system reset and restart the program.

With both modes, you can insert extra space between letters by pressing the "CTRL" key followed by the "5" key.

Also, with both modes, you can eliminate numbers and punctuation by placing an "N" after the "R" or number "1" thru "8" in message memory "A".

COMMANDS

*
* (NOTE: "CTRL-X" MEANS PRESS THE "CONTROL" KEY, RELEASE, THEN PRESS "X") *
* (SHIFT/X MEANS HOLD THE SHIFT KEY WHILE DEPRESSING THE "X") *
*

MORSE MODE: CTRL-1 (Automatic after system reset)

Unmarked prosigns:

- A: SH/A
- A: SH/Q
- E': SH/E
- N: SH/N
- O: SH/O
- U: SH/U
- CH: SH/C
- ATTENTION: SH/T
- HYPHEN: SH/H
- UNDERLINE: SH/L
- UNDERSTOOD: SH/K
- SEPARATION: SH/S

BAUDOT MODE: CTRL-2

- CR: SHIFT/.
- LF: SHIFT/,
- LTRS: SHIFT/;
- BELL: SHIFT/AS
- RTTY ID: "ID"
- CW ID: CTRL-"ID"

ASCII MODE: CTRL-3
 CR: SHIFT/.
 LF: SHIFT/,
 BELL: SHIFT/AS
 RTTY ID: "ID"
 CW ID: CTRL-"ID"

RANDOM CODE: CTRL-4 (standard spacing)
 SLOW MODE: CTRL-5 (extended spacing)
 MODE 1: Place any letter other than "1" thru "8" in message "A"
 MODE 2: Place letter "1" through "8" in message memory "A"
 PAUSE: Press SHIFT and hold one second; to release, press SHIFT again

ALL MODES:

LOAD MESSAGES: CTRL-A*, send message, then CTRL again (for message "A")
 (Note: Message "A" normally will consist of your call letters)

 CTRL-B*, send message, then CTRL again (for message "B")

 As above for "C" and "D"

 (Lamp lights two characters before full. In addition,
 the buffer meter indicates the amount of message memory
 storage space used)

 (Message "A" must be programmed before message "B", also
 any change [of length] in "A" will affect message "B").
 The same is true of "C" and "D", i.e. program "A" first, "B"
 next, "C" next and "D" last. Any later change of length
 in a preceding message will disrupt the following messages.

READ SERIAL NR: SHIFT/6 (This does not increment the number) SHIFT/6
 can be inserted in message memories "A" through "D" where
 each use will increment the number.

PRESET SER. NR: CTRL-6 followed by four digits (most significant first).
 Use CTRL-I to increment, CTRL-D to decrement

TRANSMIT TIME: SHIFT/A*

PRESET TIME: CTRL-7 followed by four numbers (MSD first). Clock is
 started at zero seconds as last number (LSD) is entered.

REPEAT MODE: Preset delay interval in number of seconds by pressing
 CTRL--(dash) followed by two digits (MSD first). Messages
 A* through D* will then repeat automatically until the
 SHIFT key is pressed (during delay) to release and reset
 delay to zero. The overflow lamp lights during the delay
 interval for monitoring.

PRELOAD MODE: Type SHIFT/SPACE, then CTRL to release
 (Lamp warning for overflow). Can also use SHIFT/SPACE bar.

MESSAGE "A": "A"*
 MESSAGE "B": "B"*
 MESSAGE "C": "C"*
 MESSAGE "D": "D"*

CQ MESSAGE : (CQ CQ DE [message A]); type SH/"C"*
 CQ TEST MSG: (CQ TEST DE [message A]); type SH/"D"*
 "ID" : "ID" key
 QRZ MESSAGE: SH/"B"*

 PRELOAD BUFFER: SHIFT/SPACE bar (CTRL to release)
 HOLD BUFFER: SHIFT/SPACE bar (CTRL to release)
 DELETE LAST KEY: "DELETE" key
 DELETE LAST WORD: "DELETE" key (from sending buffer only)
 MESSAGE RESET: RESET*
 BUFFER RESET: RESET*
 SET SPEED: Press CTRL-8 and adjust speed pot, any key releases
 TUNE: Press CTRL-9, SHIFT to release (gives continuous dots)

(* Note: Keys followed by an "*" are the WHITE keys.)

SPECIFICATIONS

SPEED:

MORSE RANGE: 5 TO 80 WPM (Upper end user adjustable higher or lower)
 BAUDOT: 45.45 baud (60 wpm). 8 unit code: 1 START, 5 DATA, 2 STOP
 ASCII: 110 baud. 11 unit code: 1 START, 8 DATA, 2 STOP

SENDING BUFFER:
 256 keys

MESSAGE MEMORIES:
 256 keys total, soft partitioned into four sections

FIXED MESSAGES:
 CQ CQ DE (msg "A")
 CQ TEST DE (msg "A")
 DE (msg "A")
 QRZ (msg "A")
 Incrementing serial number
 24-hour time

MONITOR:
 Internal sidetone generator and speaker, volume and pitch adjustable

KEYBOARD:
 54 key alphanumeric plus space bar, punctuation and prosigns (AA,KN,BT,AR,AS,SK,KA plus European A,A,E',O,U,CH AND N. also commercial "ATTENTION", hyphen, underline, "UNDERSTOOD" and "SEPARATION").

Gold inlaid key contacts individually replaceable. Sculptured and tilted two-shot molded keycaps. One character produced per key depression. Debounced and "TWO-KEY LOCKOUT".

MANUAL KEYING:
 With external straight key.

PADDLE KEYING:
 With external paddle key, iambic with dot and dash memories.

(7)

$SH/K = \overline{SN} = UNDERSTOOD$
 $SH/T = \overline{KA} = ATTENTION$

INTEGRATED CIRCUIT COMPLEMENT:

8035, 2732, 2114, 74LS75 (2), 74LS164,
ILD74(3), 8044, 74LS175, 7805
[with real-time clock option MC14518B (3)]

INPUTS:

RECEIVER AUDIO...8 Ohms
PADDLE KEY.....Single or twin lever (optically isolated)
MANUAL KEY.....Telegraph key (optically isolated)
12 Vdc.....10 TO 14 Vdc @ 500 mA.

OUTPUTS:

KEYLINE.....300V, 500mA max. mercury relay
PTT.....300V, 500mA max. mercury relay
LOOP.....300V, 100mA max. (optically isolated)
TTL TTY.....TTL level, sink or source 5 mA
SPEAKER.....8 Ohms or headphones

POWER REQUIREMENTS:

117Vac 50-60 HZ, 10VA OR 12Vdc @ 500 mA.
234Vac 50-60 HZ by special order

SIZE:

12" wide x 8-1/2" deep x 4-1/2" high. (30.48 x 21.95 x 11.43 cm)

WEIGHT:

5.5 lbs. (2.49kg)

FINISH:

Panel is light grey, bottom and side panels are textured black.
(lettering in white, yellow and red)

PANEL CONTROLS:

Speed, weight, pitch and volume controls; tune/self-test
switch, power switch, system reset switch, overflow warn-
ing lamp, illuminated speed and buffer status meters.

REAR PANEL:

Jacks for 12Vdc, TTY loop, TTY TTL level output, paddle key,
manual key, transmitter keyline, transmitter PTT,
receiver audio, and external speaker or headphones.
117 Vac receptacle and fuse.

(SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.)

OPERATION.

Note: Use shielded cable for all interconnections between the KB-4900 and other units including the keys.

*****IMPORTANT*****

Always connect all the transmitter cables before connecting the ac line to the KB-4900. This prevents problems from minute ac leakage from the ac line bypass capacitors in the KB-4900

Also, make sure the unit is equipped for the line voltage you are using, i.e. either 117 OR 234 Vac.

Place the "TUNE/OP/SELF-TEST" switch in "SELF-TEST" until you are ready to go on the air. "SELF-TEST" disables the keyline and PTT relays.

CW KEYBOARD:

Connect the keyline of your transmitter to the jack marked "XMTR" on the rear of the KB-4900. Connect the PTT line of your transmitter to the jack marked "PTT" on the rear of the KB-4900 (or you may use a separate hand or foot switch for PTT as some operators prefer).

Connect a paddle key and a manual key to the respective jacks on the rear of the unit if you plan to use them.

Set the SPEED control at midrange, the WEIGHT control at full CCW, the pitch and volume controls at midrange for start-up unless you have already set them where you like. Use the WEIGHT control very sparingly if at all. It is normally used only at speeds up to about 20 wpm except to compensate for slow acting transmitter keying. Use of more than a very slight weight addition is not a mark of excellent operating practice and Mr. Morse didn't intend it. But it will smooth-up slow speed transmission a bit.

Connect a cable from the 8 ohm audio output of the receiver to the jack marked "RCVR" on the rear of the KB-4900 if you intend to use the "SPKR" jack of the KB-4900 to listen to mixed sidetone and receiver audio. Note that the RCVR and SPKR jacks are simply connected in parallel.

The KB-4900 comes on in the CW mode. To go to the CW mode from either the Baudot or ASCII mode, thpe CTRL-1. If in the random practice modes, press the SYSTEM RESET switch.

Set the desired speed by either sending characters and adjusting as you listen or type CTRL-8 and adjust the SPEED pot until the desired speed is read on the speed meter. Press the SPACE key to release from this mode.

Preset the time and serial number if desired by referring to the GENERAL OPERATION section. Similarly, preload the message memories as described in the GENERAL OPERATION section.

Move the "TUNE/OP/SELF-TEST" switch to "OP" and the transmitter will key in the CW mode. You may tune the transmitter either by typing CTRL-9 or by placing the "TUNE/OP/SELF-TEST" switch in "TUNE". CTRL-9 will give you a string of dots to avoid overheating the transmitter final stage during protracted tuning. The "TUNE" switch holds down both the keyline and the PTT line.

By sending either from the keyboard or the paddle, both the keyline and PTT circuits will be activated, the PTT line will wait about 0.5 seconds before opening for convenience. The PTT line is not activated by the manual key.

BAUDOT KEYBOARD:

Connect a cable from the loop circuit of your printer and TU (Terminal Unit or modulator/demodulator) to the jack marked "LOOP" on the KB-4900. This jack is isolated from the chassis and the internal circuitry of the KB-4900. It will work with either polarity of dc and is rated to key up to 300 Vdc at 100 mA max. Most amateur loops are approximately 190 Vdc at 60 mA. Make sure the TU loop is deactivated during hook-up, otherwise the 190 Vdc will appear at the exposed end of the loop plug causing a potential electrical shock.

Also, connect a cable from the PTT line and keyline of your transmitter to the respective jacks on the rear of the KB-4900 (PTT to "PTT", KEYLINE to "XMTR").

To go to the Baudot mode, type CTRL-2. Now, typing on the keyboard will key the loop circuit. To go on the air, place the "TUNE/OP/SELF-TEST" switch in TUNE before starting transmission. This will close both the keyline and PTT circuits placing your transmitter in the RTTY mode where the characters are transmitted by FSK (Frequency Shift Keying).

Type just as on a normal typewriter, all LTRS and FIGS shifts are done for you automatically in addition to all end-of-line carriage returns and line feeds. At the end of your transmission, return the "TUNE/OP/SELF-TEST" to "OP".

Note that at the beginning and end of your transmission and at ten minute intervals during the transmission, you are required to send your call letter identification. Pressing the "ID" key will send the ID in RTTY, pressing "SHIFT/ID" will send your CW ID over the loop circuit. This assumes you have loaded your call letters into message "A" as described in the GENERAL OPERATION section.

If you experiment with the code speed, you will find a speed (around 13 wpm for Baudot) where the printer will print all O's during the ID.

If you want KOS (Keyboard Operated Switch) carrier control, connect the KB-4900 PTT output to control your transmitter keyline and/or PTT line, a 0.5 second delay on PTT dropout will allow momentary pauses. You will need to "diddle" with the "LTRS" key to prevent dropout otherwise.

TTL TTY Output: If you want to drive your external RTTY equipment with a TTL level instead of the current loop, open the unit by removing the four screws on the bottom and remove the jumper plug from P3 on the keyboard PCB. This puts a good TTL level on the rear jack marked "TTL TTY". This signal will also satisfactorily drive some EIA level receivers. If you don't remove the jumper, the high level at the rear jack will be invalid

ASCII KEYBOARD:

Same as above for Baudot operation except that you can send both upper and lower case after pressing SHIFT/CTRL. The unit comes up in the CAP LOCK mode where all alphabetic characters are transmitted as capital letters. When not in the CAPS LOCK mode, use the SHIFT key for upper case the same as on a typewriter.

CODE PRACTICE:

You have a choice of two general modes of random code practice. The first is true random where the sequence is in groups of random length which never repeat exactly the same way. Call up this mode by placing an "R" in message memory "A" and typing CTRL-4 or CTRL-5 (see below).

The second mode is PSUEDO RANDOM code where the groups are always five characters in length and will repeat exactly every time they are played. There are eight different lists called by placing a number from 1 to 8 in message memory "A" and typing CTRL-4 or CTRL-5 (see below). The eight code lists are available for checking. They run about 1500 characters each.

To halt the code practice (for chow call etc.), press the SHIFT key for one second. To restart where you left off, press the SHIFT key for one second again. (Incidentally, halting code practice stops the real-time clock also.

Practice will stop at the end of each list. For the true random mode, practice will continue indefinitely until you hit the SYSTEM RESET.

For normally spaced practice, use CTRL-4 to commence the code, for code with extended spacing between letters (quasi-"Farnsworth Method"), type CTRL-5 to commence the practice.

If you desire only the alphabetic characters (no numbers or punctuation), load an "N" in message "A" after the "R" or number loaded for true random or psuedo random practice.

The speed of code practice is set by the "SPEED" control and the speed meter indicates the speed of character generation. Note that you're cheating in the extended practice mode so the wpm indication isn't correct though the speed of individual letters is correct.

Use SYSTEM RESET to exit from the practice modes.

GENERAL OPERATION.....

Usually the first step when you begin operation is to load at least message memory "A" since you will use it constantly. Preloading messages "B", "C" AND "D" is at your option. For contest use, the messages to load here will be obvious except perhaps for the serial number which will be inserted in some fashion in memories "A", "B" OR "C" such as "UR NR ----, QSL?" or something equivalent. The serial number will increment by one each time it is used in message "A", "B", "C" OR "D". You may also imbed the time in one of the messages if you like. For example, you might prepare the message "TIME HR IS --R-- GMT 12/24/80". For the other messages, you can load in sequences like "TNX FER RPT - UR SNN IN WEST PODUNK, TX - NAME HR IS TEX - TEX - RIG IS SO AND SO RUNNING FIVE WATTS TO A FOURTEEN ELEMENT YAGI - SO HW? ". You are limited only by your imagination and the 256 characters total you can load in the four memories.

PRELOADING THE MESSAGE MEMORIES:

The procedures for loading each of the message memories "A" through "D" are the same except that you must proceed from "A" to "B" to "C" to "D". The reason for this is that "B" starts at the end of "A", "C" starts at the end of "B" and "D" at the end of "C". This method is used to get maximum utilization of the available memory. If you change "A", "B" or "C" (unless the length stays the same), you must redo the following messages also.

Note that you may have one long message, four shorter ones, one short and one long or any combination of one to four messages the total of which may not exceed 256 characters (keys).

Normally, message "A" will consist only of your call letters. To prepare, type CTRL-A* (the white "A"), type your call letters and then hit the "CTRL" key again to release from the load mode and end the message. You can include any key or shift combination in the message including the time or incrementing serial number. But not including the fixed messages (CQ, CQ TEST, QRZ AND THE ID'S)

Prepare the other message memories "B" through "D" the same way using white keys B, C AND D.

When you have space for only three characters (keys) left in the TOTAL memory, the OVERFLOW lamp will light and you will have to stop accordingly. You may have to redo message "D" if you've stopped at an awkward place. Abort from the load by terminating with a "CTRL" key stroke.

Note that the serial is called by typing SHIFT/6 and the time is called by typing SHIFT/A* (white key). Put a space after the serial and before and after the time.

PRESETTING THE SERIAL NUMBER:

Type CTRL-6 and type four number digits starting with the most significant number, for example type the 3 first if presetting the number 3456 or type the 0 first if presetting 0135. or type three 0's first if presetting 0003 etc. Normally, you will start a contest by presetting 0000. Always type in four numbers. The load terminates on the fourth number. You can check the preset number without incrementing by typing SHIFT/6. This combination also loads the serial number into any of the message memories.

When the serial number is accessed via a message memory, it increments before transmitting. i.e., if you preset to 0000, the first number sent via the message memory will be 1 (0001). If you have a problem during the contest with the numbers getting out of line, you can increment the serial by typing CTRL-I or decrement by typing CTRL-D.

If the serial number gets too far out of line, use the preset to get back on track. Note that the decrement command takes a finite part of a second to finish, the OVERFLOW lamp will light during the decrement as a reminder.

SETTING THE TIME:

If you have the real-time clock option, you will want to set the time after you have turned on the unit. (The clock only runs when the unit is powered, either by ac or 12 Vdc. Because this clock is not as stable as a normal timepiece, it may gain or lose time even if left powered.

To set the clock, type CTRL-7 and type in the time in 24 hour format i.e. 7:00 PM is 19:00. Type the first three numbers starting with the most significant ("1" in the case of 17:00, "0" in the case of 06:15, etc.) Type the fourth number at the 0 seconds time and the clock will be exactly set. This means you will normally wait for the next minute to come up before hitting the last number, You must always type four numbers and the preset terminates automatically on the last number.

To send the time over the air, type SHIFT/A* (white "A"). You may prefix and suffix a space as if it were a single letter in the text, or a more elegant way is to imbed it in a message memory with the PST, EDT, GMT or what have you plus the date. (TIME HR IS 12:45 PST - 12/24/80) You embed the time during the message load by simply typing SHIFT/A* (white "A").

USING THE FIXED MESSAGES:

There are four fixed messages in the KB-4900 which are coupled with message memory "A". These are:

1. CQ CQ DE (message "A") Note that message "A" must be CALL LETTERS in these messages. This message is called by typing SHIFT/C* (white "C")
2. CQ TEST DE (message "A"). Type SHIFT/D*
3. DE (message "A"). Type "ID" (Use SHIFT/ID for CW ID during RTTY operation.
4. QRZ (message "A") Type SHIFT/B* (There is no "DE" in this message for brevity.

PRESETTING THE MESSAGE REPEAT DELAY:

You can repeat the message memories simply by striking the white message key repeatedly or you can use the delay mode for delayed repeats of from 1 to 99 seconds. To load the delay figure in seconds, type CTRL-- (dash) and then type two numbers representing the delay desired (in seconds). Type the most significant number first (the TENS digit). If the number is less than 10 you must type the leading zero. Now when one of the four message memories are called up, it will repeat continuously at the interval preset until aborted by hitting the SHIFT key while the delay is underway. The OVERFLOW lamp lights during the delay period as a convenience.

DELETE FUNCTION:

You can delete the last WORD typed, assuming it hasn't started transmission, by hitting the "DELETE" key. SHIFT/RESET*(WHITE KEY) has the same effect if you prefer. Each time you hit the "DELETE" key, the last word (back to a "space" will be deleted.

If you are loading the message memories, or setting the time or the serial; the "DELETE" key will delete one CHARACTER per depression.

ABORT MESSAGE MEMORY OR BUFFER TRANSMISSION:

Hit the white reset key and the message memory and buffer will be reset. The message memory is saved but buffer contents are lost. SYSTEM RESET would do the same thing but the mode would default to CW.

HOLD TRANSMISSION:

Transmission may be temporarily halted by typing SHIFT/SPACE. This allows the receiving station to break for a repeat etc. You can use the paddle during the hold if you like. The transmission will be continued when you hit the "CTRL" key. This feature can be extremely useful in traffic handling. The "HOLD" is effective in all modes using the sending buffer.

SYSTEM RESET:

When you turn on your KB-4900, the circuits are automatically reset and the unit comes up in the Morse keyboard mode. The time and serial registers plus the message memories will have garbage in them as their contents, by design, are not affected by a reset. When power goes off, their contents are of course lost.

Normally, the only time you have to operate the system reset (except for exit from the code practice modes) is, if for some reason, such as a power transient or severe r.f. interference, the processor goes bananas. If this happens, the keyboard may be locked, or sending the wrong keys or there may be a string of unwanted characters transmitting. In any event, you will feel you have lost control of things. If this happens, hitting the SYSTEM RESET will make everything right again. The time and serial may be scrambled depending how the processor program self destructed during the crash. The program is permanently locked in the EPROM so no permanent change will occur.

OPERATION ON +12 VDC:

Your KB-4800 can be operated from +10 TO +14 Vdc batteries or from a mobile power system. You can also use a +12 Vdc battery continuously connected for battery backup in case of ac power failure. With the battery voltage at or below about 12 V there should be little drain as long as the unit is powered by ac. Connect the battery cable to the KB-4900 before applying power to the other end or you may get a spectacular short if the center pin of the RCA plug hits the (grounded) chassis! In any event, place an inline 1 Ampere fuse in the battery supply line for safety.

You can reduce the battery current drain by half by removing the meter illumination lamps.

CIRCUIT FUNCTIONS:

The KB-4900 consists of an 8035 microprocessor, a 2732 32K bit EPROM for program storage and a 2114 4K bit RAM for sending buffer and message memory storage. An 8044 is used for the keyer section.

A 74LS164 is used for the keyboard "X" matrix scan. Two 74LS75's are used to latch the EPROM and RAM addresses. A 74LS175 serves to latch the lower four bits of port 2. Three ILD-74 dual optical isolators isolate the paddle key, manual key and RTTY loop.

A 74LS30 8-input NAND gate is used to detect a hexadecimal OFFH on the latched address lines. This is NORed with the write signal from the processor to develop a strobe for writing to an external parallel ASCII monitor.

If you have the real-time clock option, three MC14518 dual BCD counters divide the 400kHz ALE frequency to 0.4Hz. This signal, fed to the 8035 port 17, provides the clock reference.

CALIBRATION:

Normally, your KB-4900 will not need calibration over the life of the unit however you may touch up the settings if you desire.

1. Maximum speed limit: This parameter is set by adjusting a trimmer labeled "R1" and located on the small PCB located on the rear panel of the unit. It is the only trimmer on the board and is accessible by simply removing the four screws holding the bottom wrap-around. You can adjust the maximum speed (when the speed pot is full clockwise) by rotating the trimmer until the speed meter reads your desired maximum.
2. Speed meter calibration: A trimmer on the keyboard PCB controls the calibration of the metering circuit. Connect an oscilloscope or pulse measuring counter to pin 14 of the 8044 IC. Set the speed pot to give a reading of 48 ms. for cycle length when the dot key (or CTRL-8) is depressed (dot is 24 ms., space is 24 ms.). Then adjust the trimmer marked "s" on the keyboard PCB. This trimmer is accessible from the top or bottom of the board. When the speed meter reads 50 wpm, the adjustment is correct. (You will NOT HEAR dots during this test if you use CTRL-8. They are muted.)

3. Buffer meter calibration: Another trimmer on the keyboard PCB controls the buffer meter calibration. Press SHIFT/SPACE(bar) to place the unit in a preload position. Then type keys at random until the buffer fills and the OVERFLOW WARNING lamp lights. Hit three more keys to completely fill the buffer, then adjust the trimmer marked "b" on the keyboard PCB until the buffer meter indicates "100". Press the SYSTEM RESET to reset the unit. Note that this trimmer is also accessible from the top or bottom of the PCB.

IN CASE OF DIFFICULTY.....

Field trouble shooting is best accomplished by substitution of IC's based on an educated guess of possibility. Or just blind substitution if no localization can be made. The only component not available in the field is the EPROM which must be ordered from the factory. The 8044 may also be obtained from the factory. Of course, any component may be ordered from us if desired.

If you can't locate the problem, call or write us for help. We'll suggest the best way to proceed, possibly requiring the return of the unit.

LIMITED WARRANTY.....

We will repair any defect caused by components or workmanship without charge for labor or materials for a period of 90 days after you receive the unit. You will be responsible for shipping both ways from our factory.

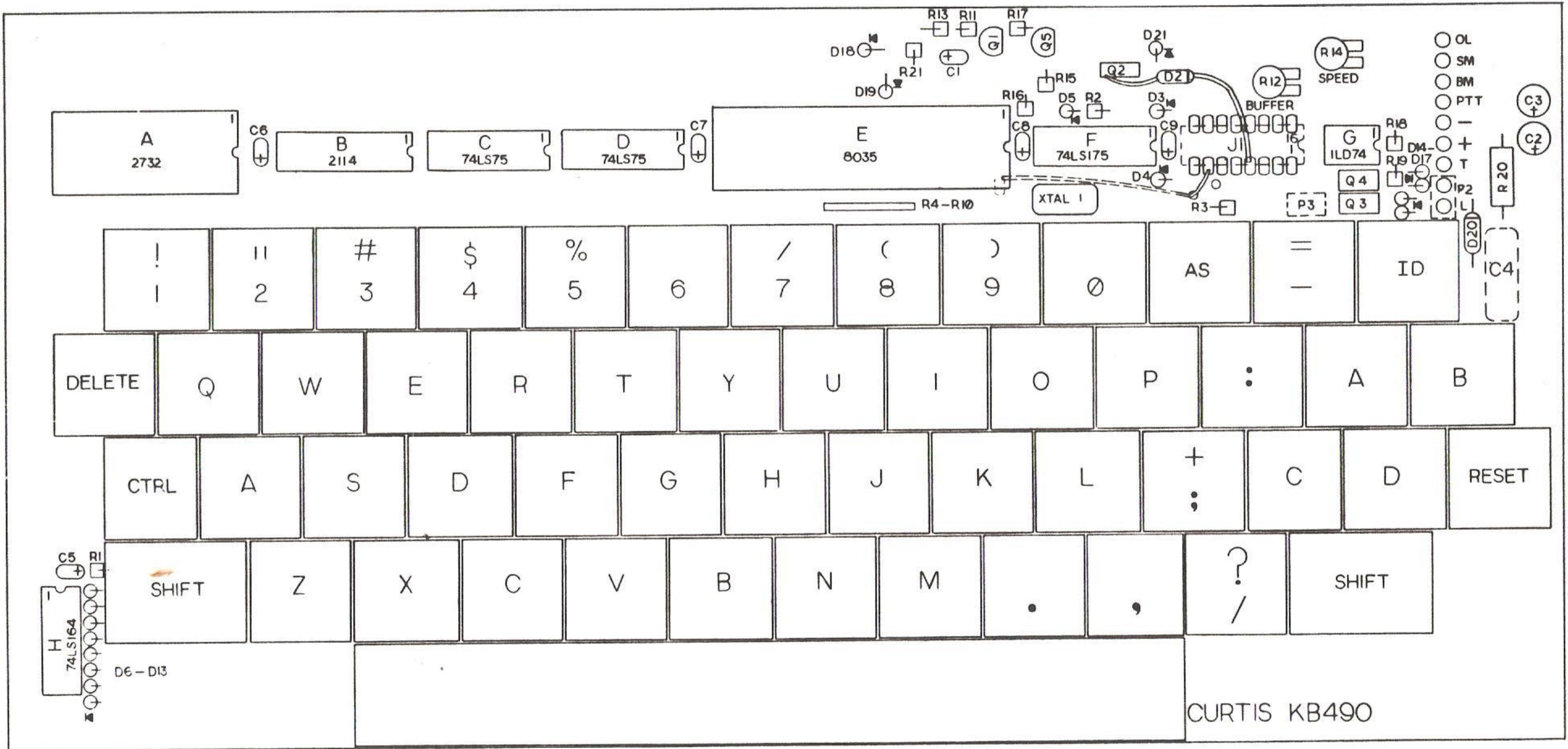
After 90 days, we can quote the estimated repair cost after examining the unit according to prevailing wage and material costs. Although complicated in function, the KB-4900 is quite simple in execution so repairs should not be too difficult. In addition, all IC's are socketed for ease of servicing.

The one event which ruins a lot of amateur equipment is the electrical storm. This sometimes turns part of the circuitry into soot and invariably burns out every semiconductor. If not too severe, we can sometimes repair the unit at an acceptable cost. In any event, see if your homeowner's insurance covers such things so you can easier decide what you can bear. The best insurance against electrical damage is to disconnect the ac power from the station completely (Pull the main plug, don't depend on the switch) and ground and disconnect your antennae from your equipment.

PROGRAM CHANGES AND REVISIONS.....

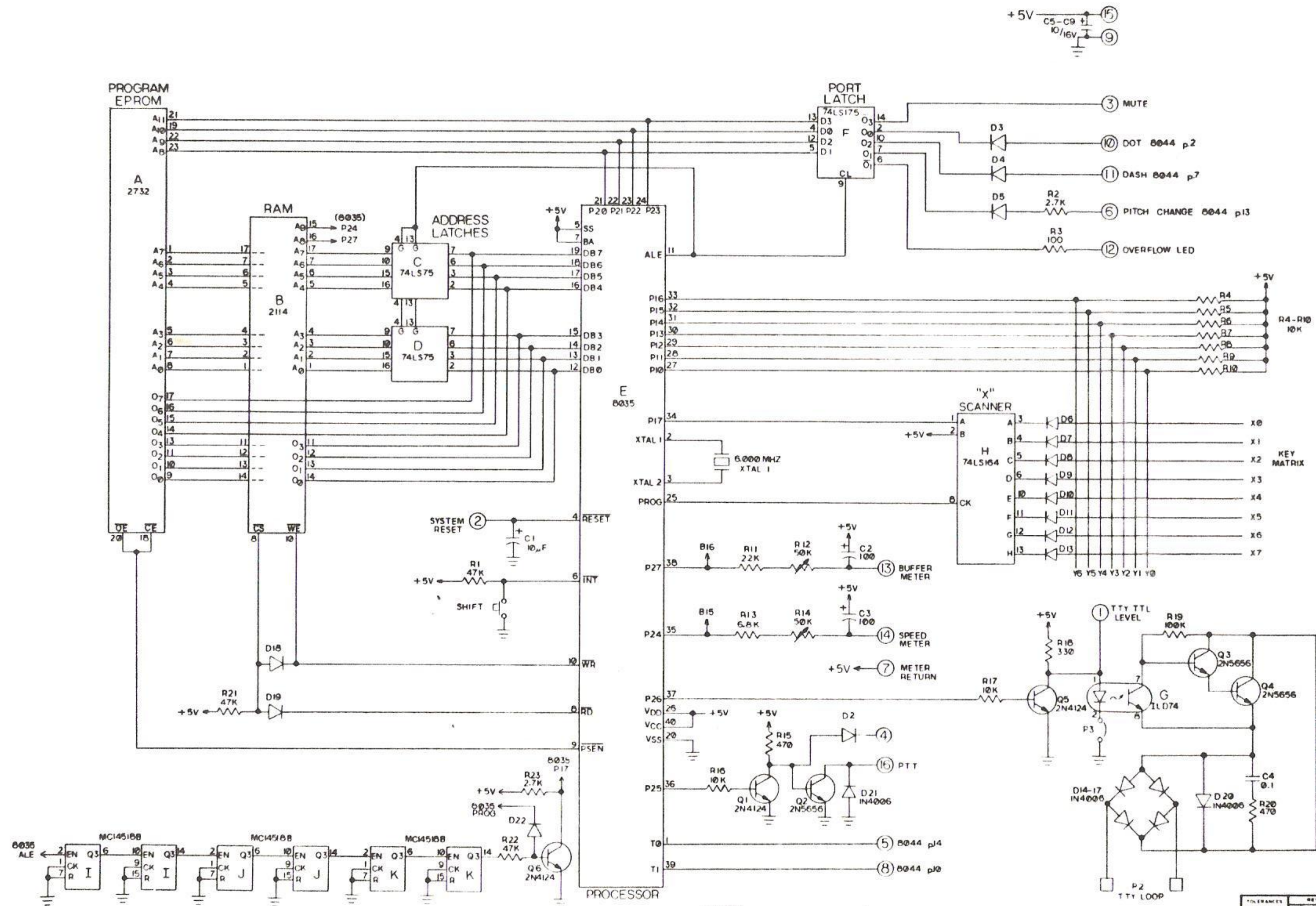
The program in your KB-4900 is contained in an EPROM. This device can be erased with ultra-violet light and reprogrammed quite easily. If we make product updates of the program, we will correspond with you to ascertain if you desire the update. If the update is a correction of a problem, the only cost would normally be a small mailing charge. If the update is a significant improvement, there may be some reasonable charge depending on the nature of the change. You may change the (socketed) EPROM yourself or if you don't feel up to it, you can always have us do it. The only difficulty is inserting the device into the 24 pin socket without mashing the pins. Otherwise, it's a five minute job.

CURTIS ELECTRO DEVICES, Inc., Box 4090, Mountain View, CA 94040
Tele: 415 494 7223 TWX: 910 373 2017 Cable: CURTIS, PALO ALTO, CA
Shipping address: 4140 Transport Ave., Palo Alto, California 94303



CURTIS KB490

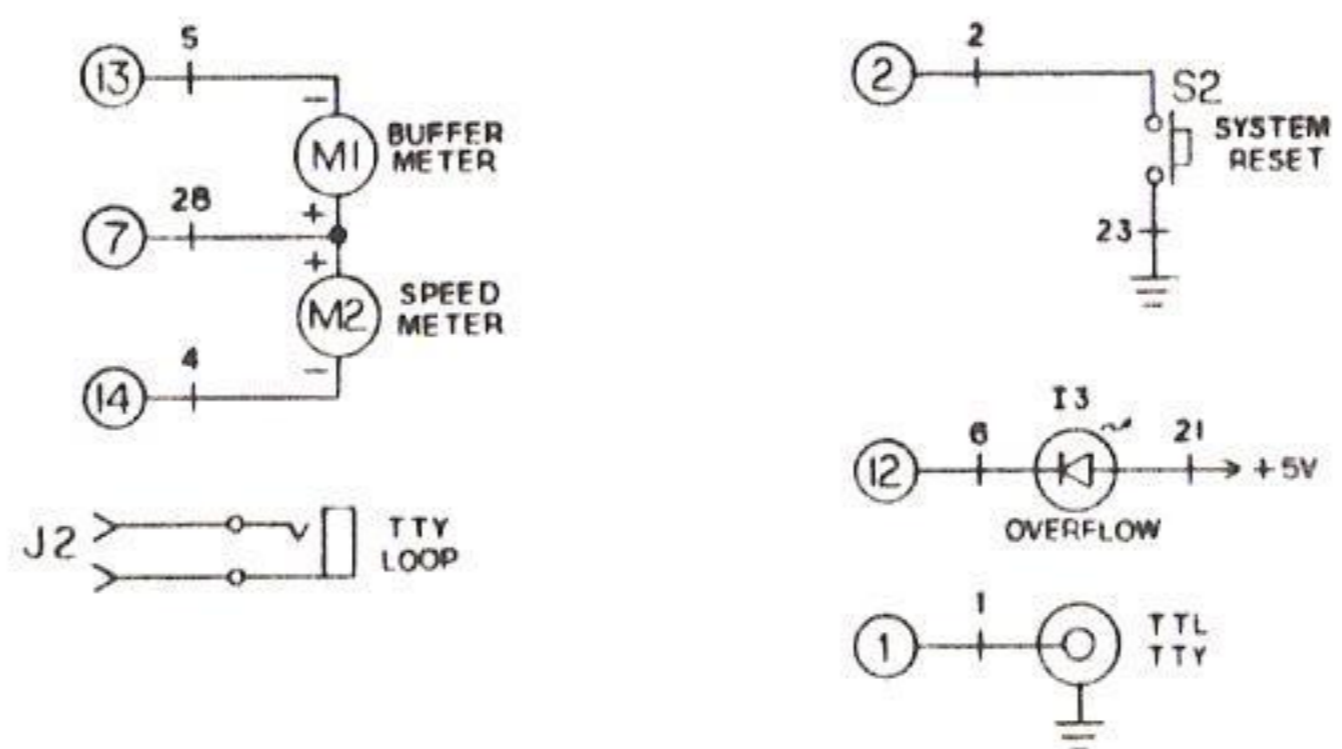
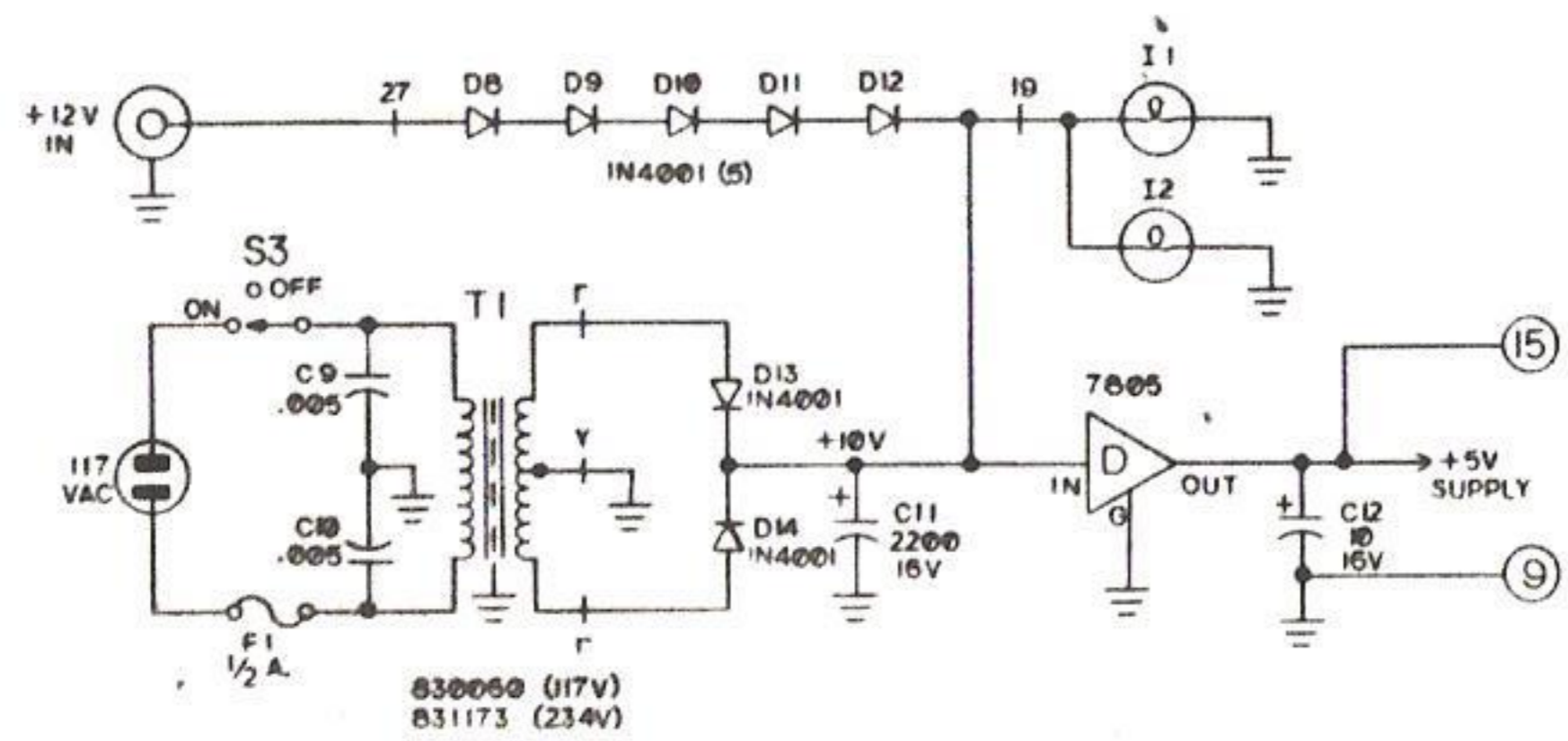
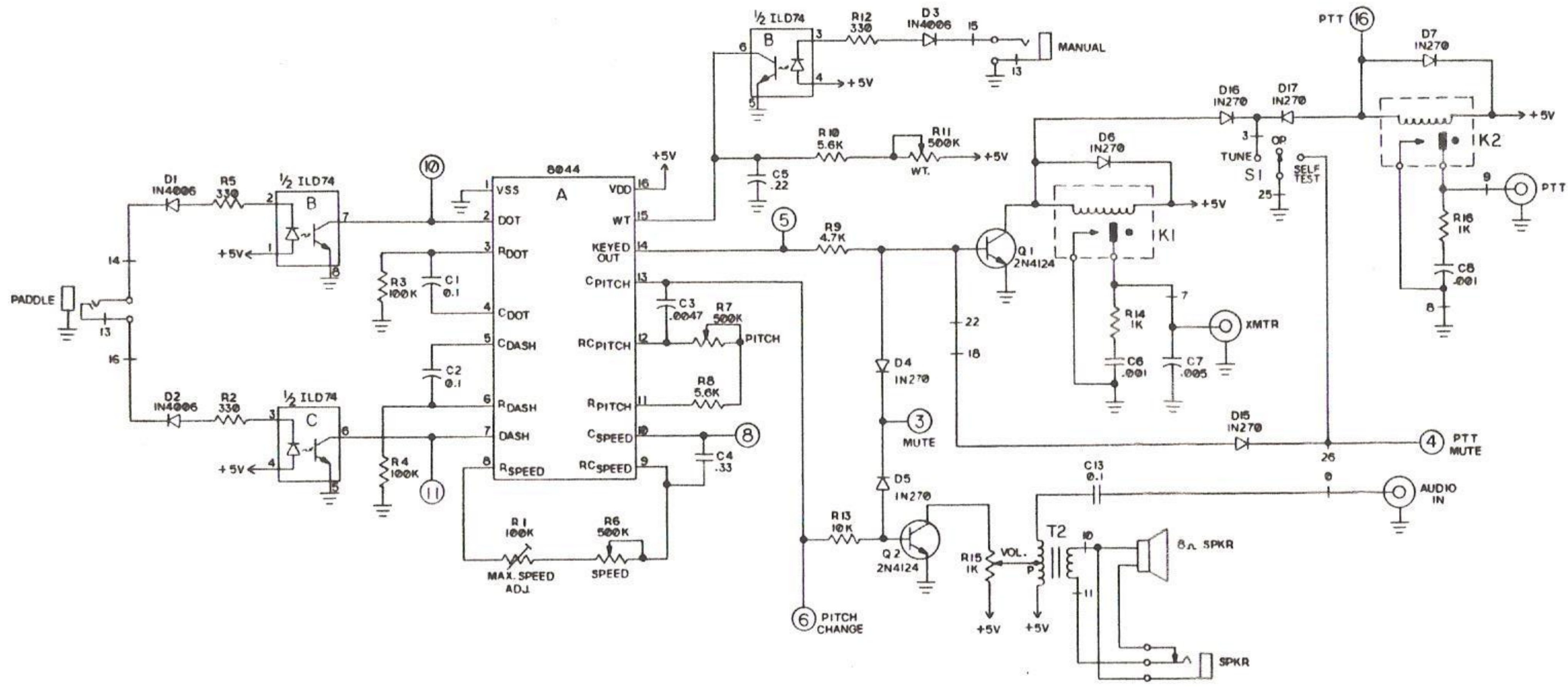
CURTIS ELECTRO DEVICES		
SCALE 2:1	APPROVED BY:	DRAWN BY: J.L. Caplan
DATE 12/2/80		REVISED
PWBA-KB490 KEYBOARD		
		DRAWING NUMBER



NOTES:
 1 ALL DIODES 1N270, UNLESS OTHERWISE STATED.
 2 (X) PINS ON 16 PIN DIP CONNECTOR SOCKET, J1.

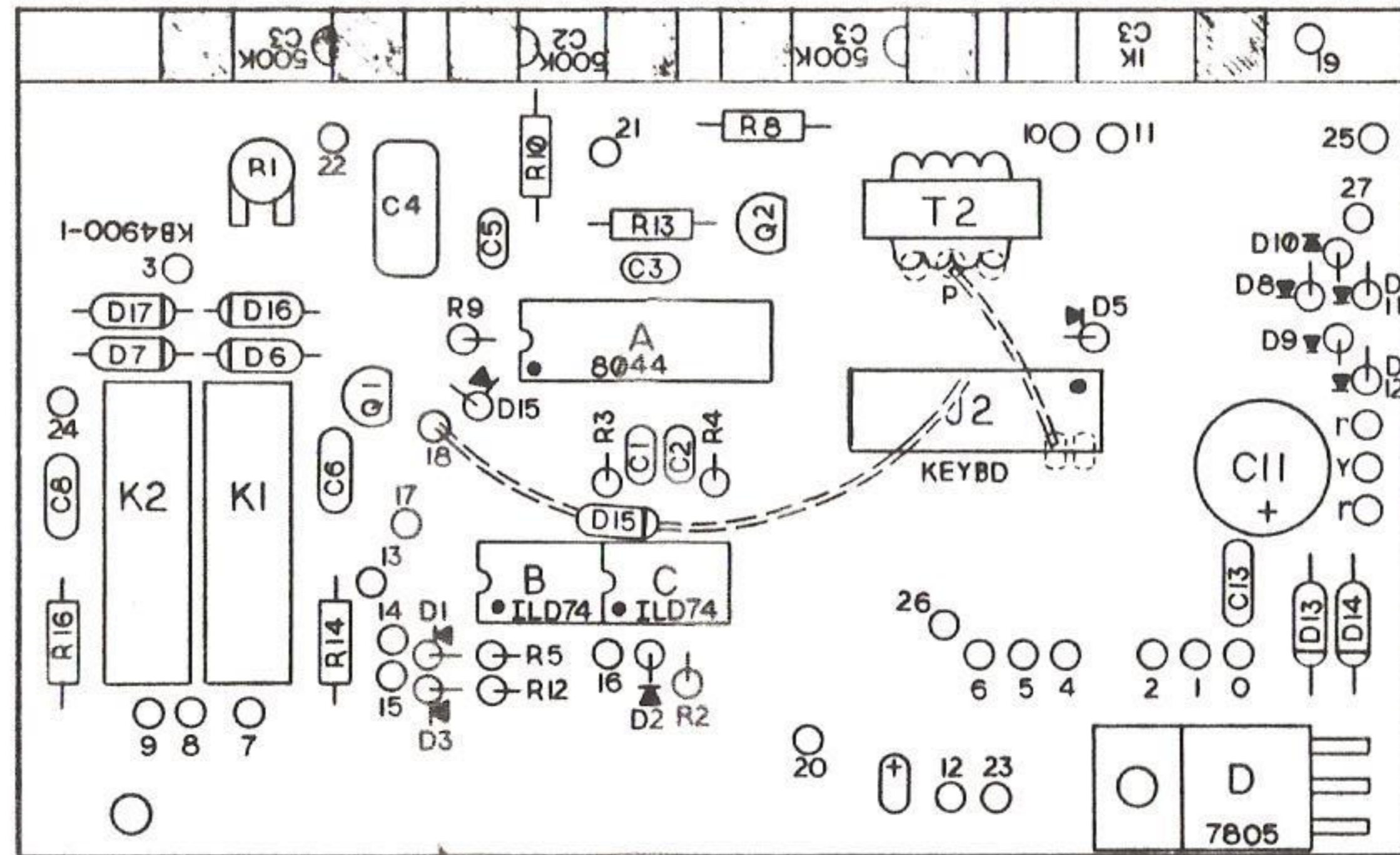
REVISIONS		CURTIS ELECTRO DEVICES	
NO.	DATE	BY	CHKD.

SCHEMATIC, KB-4900
 KEYBOARD SECTION



NOTES:
 1. (X) PINS ON 16 PIN DIP CONNECTOR SOCKET.
 2. X PCB PADS

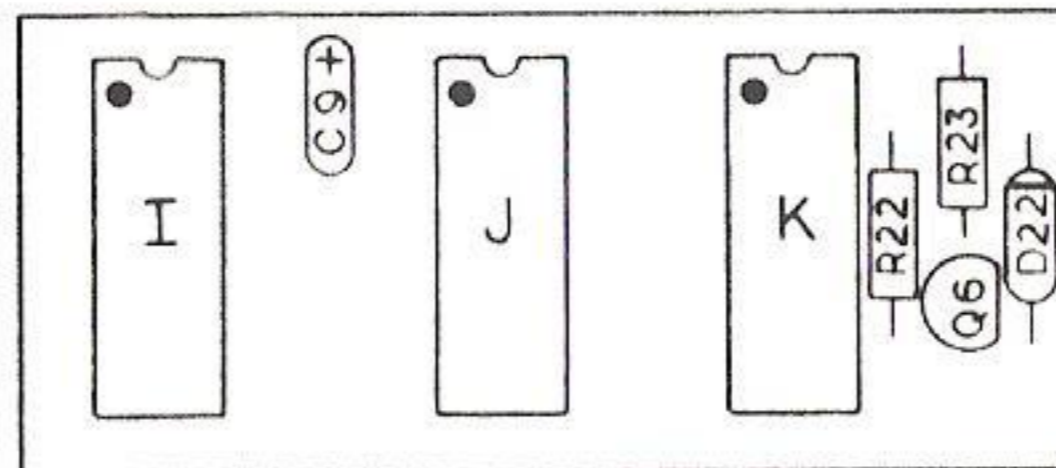
CURTIS ELECTRO DEVICES		
DATE	APPROVED BY	DESIGN BY
12/6/80		
KB-4900 CHASSIS WIRING		
DRAWING NUMBER		



COMPONENT SIDE

KEYER PCB

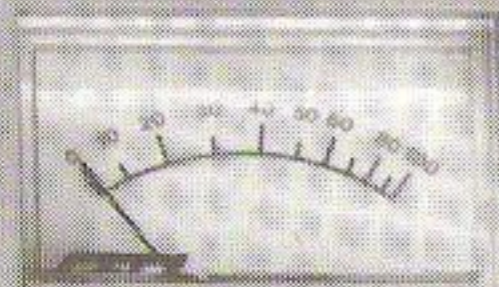
CURTIS ELECTRO DEVICES		
SCALE:	APPROVED BY:	DRAWN BY: <i>[Signature]</i>
DATE: 12/6/80		REVISED:
PWB ASSY KB4900-1		
		DRAWING NUMBER:



IC's are MC14518B

REAL-TIME CLOCK OPTION

CURTIS ELECTRO DEVICES		
SCALE 2:1	APPROVED BY:	DRAWN BY: <i>W. Gorman</i>
DATE 12/9/80		REVISED
PWB ASSY — KB49		
		DRAWING NUMBER



SPEED IN W.P.M.

SYSTEM
RESET



SPEED



WEIGHT



PITCH



VOLUME

TUNE

OP.

SELF-TEST

OVERFLOW WARNING

ON

OFF

POWER



BUFFER FULLNESS

CURTIS ELECTRO
DEVICES

Morse-Baudot-ASCII Keyboard

MODEL **KB-4900**

CODE
PRACTICE

MORSE BAUDOT CW SK ASCII STD. EXP. SERIAL SET SPEED TUNE DOTS CW AA TTY FICS CW KN TTY BELL CW ID

	"	#	\$	%	&	/	()	ø	AS	=	HERE IS	
BACK SPACE	Q	W	E	R	T	Y	U	I	O	P	AR	A B	
CTRL	A	S	D	F	G	H	J	K	L	+	C	D	RESET
SHIFT	Z	X	C	V	B	N	M	;	:	?	SHIFT		

- CW AR
- BAUDOT LTES
- BAUDOT BLANK
- TTY LF
- TTY CR

HOLD

NORMAL

LIST 1:

YTYCA UYCAY KD?UU KDUUU KDIUH D?3DP HU5E? R3DPH U5?R3
 DQ?M0 -E??? -OAE- PNZDM -A,PD OP?-P N?YIO ?JN80 AZQ?F
 ,R0I3 FEUPC P.LOM AC80F 0G,ED M-80F , -Y/9 3DEWF 0E0AZ
 Y0DJF ?Y4F- YH0/3 8Z,UK DLI80 PHDLO HDH0C 1DN80 Y2D08
 DY0EO 0D40- 00TD1 0YY0W D00YY 00D00 Y0KD0 CUAID AJ9GF
 JG0JV H-F8V HFF8V H0FKH 1?IHP PGEXE EIHPY GEVEE IHS6?
 U6X-5 ?V-5Y BYWA1 YHA5B TAHYP Y-AIY J3Y?U 06EBY 65?TE
 60IEX GAF0W 9IABF 6EE6K TMHA5 6ET?Y IHW69 W6DJR AUE??
 SE?M6 ,I40D IFMAW 16E0K HW9KH K4GAH 16EE0 AC94H E4W9C
 90HJ4 EC9HH 4AEC9 /HY4A EC94H E4EC9 OHJ4G GBAH0 ZKKCZ
 KCOZ. K4.K4 .K4MK R-0RK A0LU- XWRKA 0LU.X WRKT0 ?GY-E
 ?.EYA DB.CH ?HKBY ED5CK AP8.C H0?ZI A?FHU KD8HL ?S5W4
 LRU-L BERC/ RBDEU KOLUK BYEUK S5YJR KJCHZ EGU?L ETUYL
 EUTRS 0A3PN AUKRM K/MKJ LNMAU K0K4G JKKJN GYKAJ YK6JK
 KJMKG YKAJM KGJJK J0KGY KAJKK DNK80 V0GSO 69YMY SJYMS
 SJYMJ SPM0E MBOX? ?/EMB 0X??/ EM50Y ?KY?Y ?Y?MH 6YFKE
 PM?HE FMMP6 YFK,E RM?EK ?MH6P YJW?I E/YJW E8XDR Y5H?M
 YYYWL GM?7M IE?VU LEMYY A5YYG MX5L8 ?W8? WAFYE T6ISH
 1.7MP MY5PM BAW3Z N?M0S 5L5JM AY1L5 JMA?M L5JMA AL5AM
 MAAL5 AMMA0 L5AMM AOVH3 M9IYL YLIIY LIEP? IJEP1 IJEP1
 IPPOY 9WPDE -.?,W PDE-0 ?,WP6 9?V9E .?0? EAKU8 2X0PH
 EKUPA PU?0T XIEA? UEAKU 09J?1 U,9AW 4.-HY VEAE0 HKYEA
 E9AXK PHEEA IUEYG WWP89 ME89L ZI-X4 ??K4E ?9LWU 5RIA8
 YEAVP PAEPP D/H03 EA6C1 WEUPC 8AWEZ PBEAW EZPBC CWEPA
 CCWEP A6CWE MPPY. KHP1R 8WAW1 RAW5R MPE1U MP11U MP1AP
 Y?/PH M/0-I /PHM/ 0P-I/ PSUN? .NXE0 ?PE0X CM?6R JB?0P
 0X0M? JPCP? ERJB5 ?RWC? 88W8M 70NZ. ?H?IN .?/J/K E.XYO
 MEWBK NM.?V P0X0W BH?X? L/P6N P6NWD RJ-J? .?VJX .?SNX
 /K8E1 BK9KW B.APA PABYO HHWBU F3J/F PFB6N /PBXB /DPDB
 GF/CP CBGF/ BPBBU F/APA BAYMO P054M /HM/E UAXHF UAHHF
 UABHB AJE5, AKZY, 23,AK ZY,23 ,AT83 ?Y3?2 X0?2X 0?GPE
 UEAD? EAE?0 PAAGP EXEAD E?/G? 4DPEE 3DY?M 33BY, J0YMK
 -CJEP K3AY- .AE?0 M?X., AU3AU 3/H.J /J?Y- YJ?Y- I3?,V
 6JWHD 0BAC8 ANA9M 08EHJ YEAEU 3YIA1 ?YAAA KEYGA GKEYA
 8EYCA CMEP9 AREOS .AYMO AY0GB ?MEGB MMEGB MDBZX E1BMJ
 TRY11 BMJTR Y11B5 61?E1 ?R?9? R?9?K PW?XM A-MBK ?9POM
 BKPW? XMAU- 0,K?J AYHPW MIA9? U0119 1URJP 0G0ZK PYHCI
 C9/YB K?9YH U0?V- Y1B?I C0?IY MOZYU ?98U? 911-I YJ/MH
 B,YH0 DBG0D B11NZ 9YH6P ZA0UB 1?HA0 RB0I? HA0BN IOA0L
 BKIOA 0IBHI 6A0GB FIAMP NBJ

PUNCTUATION AND NUMERALS OMITTED

YTYCA UYCAY KDUUK DUUUK DIUHD DPHUE RDPHU RDQM0 E0AEP
 NZDMA PDOPP NYIOJ NOAZ0 FR0IF EUPCP LOMAC 0F0GE DMOFY
 DEWFO EQAZY DJFYF YH0ZU KDLIO PHDLO HDH0C DNOYD ODY0E
 00D00 0D0YY 0W000 Y000D 00YOK D0CUA DAJGF JGJVH FVHFF
 VH0FK H1IHP PGEXE EIHPY GEVEE IHSUX VYBYW AYHAB TAHYP
 YAYJY UEBYT EQIEY GAFWI ABFEE KTMHA ETYIH WWDJR AUESE
 MIDIF MAWEK HWKHK GAHEE 0ACHE WCOHJ ECHHA ECHYA ECHEE
 COHJG GBAHZ KKCZK COZKK KMKRR KALUX WRKAL UXWRK TGYEE
 YADCH HKBYE DCKAP CHOZI AFHUK DHLSW LRULB ERR0D EUKOL
 UKBYE UKSYJ RKJCH ZEGUL ETUYL EUTRS 0APNA UKRMK MKJLN
 MAUKK GJKKJ NGYKA JYK6J KKJMK GYKAJ MKGJK KJKGY KAJKK
 DNK80 V0GSO GYMYJ JYMSS JYMJS PMOEM BOXEM BOXEM 0YKYY
 YMHYF KPMH EFMP YFKER MEKMH PYJWI EYJWE XDRYH MYYW
 LGMMI EVULE MYYAY YGMXL WXWAF YETIS PMPMY PMBAW ZM0S
 LJMAY LJMAM LJMAA LAMMA ALAMM AGLAM MAOVH MIYLY LIIYL
 IEPIJ EPIIJ EPAIP POYWP DEWPD EWPVE EAKUX PHEKU PAPUT
 XIEAU EAKUJ UAWHY VEAE0 HKYEA EAXKP HEEAU EYGWW PMELZ
 IXKEL WURIA HYEAV PPAEP PDHDE ACIWE UP0AW EZPBE AWEZP
 BCCWE PACCW EPACW EMPY KHP1R WAWRA WRMPE UMPUM PAPYP
 HMOIP HMOPI PSUNN XEPEX CMRJB OPOXM JPCPE RJBRW CBWBM
 ONZHI NJKEX YOMEW BKNMV POXWB HXLPN PNWDR JJVJX SNXKE
 BKKWB APAPA BYOHH WBUFJ FPFBN PBXBD PDBGF CPCBG FBPBB
 UFAPA BAYMO PQMHM EUAXH FUAHH FUABH BAJEA KZYAK ZYATY
 XOXOG PEUEA DEAE0 PAAGP EXEAD EGDPE EDYMB YJYMK CJEPK
 AYAE0 MXAUA UHJJY YJYIV JWHDO BACBA NAMOE HJYEA EUYIA
 IYAAA KEYGA GKEYA EYCAC MEPAE OSAYM 0AYOG BMEGB MMEGB
 MDBZX E1BMJ TRY11 BMJTR Y11BI E1RRK PWXMA MBKPO MBKPW
 XMAUO KJAYH PWMIA UO11I URJPG ZKPYH CICYB KYHUO VY1BI
 CIYMO ZYUUI IYJMH BYHDB GDBIN ZYHPZ AUBIH ARB0I HABNI
 0ALBK IOAIB HIAGB FIAMP NBJ

ALL LISTS REVISED 1-18-81(A)

LIST 2:

NY-AC , , FMG AA?F, YIMGA PH615 QSA5Y 9J,CT OKZYK OIPAO
 S?,R, OBYY9 AMYSF -AZYJ DMD3A YMYKY FY8Q. YXIPC IDPIH
 DADMD KDPDC M?AMQ RYMN7 8OSNQ INKIE NHIGN TYLDE F?TY2
 OF?YC P3YS8 C?AOH ,6NN4 /IFOP CAVYO CUAHC -YFSS YFSS
 YYFSY -Y9A/ YX1YY X18YX 13YU1 E-U9A ZYVIS NPIMI 9GCKT
 TYEAK -YETJ HAKAP UHE6T JUKTG 59MDJ M9HP6 T?TTH 9D97P
 JTEDJ JAUAI MEK2P EK2ME K2E96 6Y7-H PFQA2 2A20A 2MA2P
 A2MA2 PA2GA ?5A67 A36ET 36331 U1P1L 19xAK E-59R ,E-57
 G2IYE 16G?, 01ULY 13SL, R15E, JAFNY 9Y9GG BPGEE TIJEE
 TIJEE TJJYJ -H8J- H4J-H HJFHM FDJ.1 1101Z HYBKF 0577B
 OC07U UKB0C B07KU CJZ5G 05KEN PHZPK PBL?5 00NHE 5CPZU
 YLCHZ ZNFNR AMORA MORAM ORNEL EKAE6 RQR9N RPNRP NRPNR
 PNRKB -EC80 LEBIO UK5IH KHBA8 A0HWH K-UEK 1/EEK QR9K3
 K?5IE 18x7A IIXTE QEUTJ BE189 KKD0K Y0KU1 UKUIU KUUYZ
 5CAZ/ K4Z/K JZ/KO ZKZY5 CHZYA 1A0HD K70E, ELE8Y GKYOE
 8LGYG DOE7Y KGJEL ,E0U1 PMP5P WYK?E YLEIK XEGAK 87WGM
 D1IEC U,ECU ,EBU, EY3YM WX.85 E4EN1 EAIEA 1EP1E P1EOG
 YYWXQ ,7M0Y POOD4 NOM/K V/5C8 YVV1Y ,X04E NH0?1 KA6?E
 N03?W 485ZD H4N50 VH007 08KHG 8KHG8 KG7EG YSYJY 9S7SE
 GMEHN EMHLE IYIUX X4HAL 079X4 XLBHA LHEWB 9VLZI XIUYU
 AAZIA EBPI9 V?UJX KAML? LBIV4 ELZIA HSHWG GIXFG IXGIX
 EI29U ?BDYY XSKX1 HXCHX BHXAH XPHXY HYLH9 J?H6T EAS69
 2,9AJ 3EUYY LYF47 YL.AE T?YSW 3CP2Y ?JAM- X36H- L/J4E
 DHYKS L3EY. KEYE9 C4VML C4VLE ILCIJ BTIJB UIJBN
 IIBHE ILZIM M3MUM BWX0A Y17?? JOMW, E?J?X DOMWK MDONY
 WDR-1 7ANBD RBDP0 .NY?? Z?MNP W?WDR YJX.W DRKIK /KK1-
 KI-HK 1-K00 NG.?2 DHE9J -IO-A K-FK- DK-BK -PK-A 070W0
 NZ.?0 5WBTN 0INN K JHMFA B8WJJ EJE08 WK0?A 1/IF2 QA?JA
 /?HP/ X,A0J UAKET WIAYM MAXFJ YUXFJ YUXFJ YXXRW GRUDR
 UDFRU DIRID PX1WD RUKUH ZFZD? AMEA- ?JEA/ IX5?J --AEA
 /MZYA ,38/A 0/AMO 3DHDA P4Y38 ?-A3P -0/H8 J?Y/H 51,OV
 AJVA0 VA663 KY-RA KKNJ3 ,NHDP MEE0/ E3Y-E YE5Y3 41110
 UOZD4 UJJX0 40LO- M3,0E 06M?Z BK2,? OY2,? IOJ7M KB0ME
 PZM?5 EJ8F- EJ8F- EJ8-? 0/LGA KGAEG AAHA0 ?H0/H GOFOD
 A.?JA KO/-U KCY1? E-U// NKCYF 8NTI4 Y00Y0 A,HHM OH0NP
 J9I4? 01/BH A.0YK 04U?9 YMOBH BIY.. A..E. .CUIV 9ENM3
 Z.HI. 3B.JB .KB.H B.PB. AKX9Y KII9K 9UYH9 ISAAN ,F9SC
 AS.GZ YU?9S .PKCX 9AHI6 4UA?D KOQT- 990T- 3B9U5 PDK.6
 0AMPA ?EU4/ U4/U4 /?00Y WOLNV ULNUO LNNOM NO?MO YMOK,
 9HSH

NYACF MCAAF YMCAD QSAY JCTOK ZYKOP AQSRO BYYAM YSFAZ
 YJDM D AYM K YFYQY XPCID PHDAD MDKDP DCMAM QRYMN OSN0I
 NKIEN HIGNT YLDEF TYOFY CPYSC AOHNN IFOPC AVYOC UAHCY
 FSSYY FSSYY FSYYA YXYYX YXYUE UAZYV ISNPI MGCKT TYEAK
 YETJH AKAPU HETJU KTGMD JMHPT TTHDP JTEDJ JAUAI MEKPE
 KMEKE YHPFQ AAOAM APAMA PAGAA AETUP LXAKE REGIY EIGOI
 ULYSL RIEJA FNYYG GBPGE ETIJE ETIJE ETJYJ JHJHJ HHJFH
 MFDJI ZHYBK FOUBO CUUKB OCBKU CJZGO KENPH ZPKPB LOONH
 ECPZU YLCHZ ZNFNR AMORA MORAM ORNEL EKAER QRNRP NRPNR
 PNRPN RKBEC BOLEB IOUKI HKHBA AHWHK UEKIE EKQRK KIEXA
 IIXTE QEUTJ BEKBD KYKUU KUUKU UYZCA ZKZKJ ZKOZK ZYCHZ
 YAAOH DKOEE LEYK YOELE YGDOE YKGJE LE0UP MPPWY KEYLE
 KXEGA KWGMD ECUEC UE8UE YMWX BEENE AEAEP EPEOG YYWXQ
 M0YPO ODNOM KVCYV VYXOE NHOKA ENQWZ DHNOV H00OK HGKHG
 KGEGY SYJYS SEGME HNEMH LEIYI UXXHA LOXXL BHALH EWBVL
 ZIXIU YAAZI AEBPI VUJXK AMLLB IVELZ IAHSH WGGIX FGIXG
 IXEIU BDYYX SKXHX CHX8H XAHXP HXYHY LHJHT EASAJ EUYYL
 YFYLA ETYSW CPYJA MXHLJ EDHYK SLEYK EYECV MLCVM LCVLE
 ILCIJ BTIJB UIJBN IIBHE ILZIM MMUMB WXQAY JOMWE JXDOM
 WKMD0 NYWDR ANBDR BDP0N YZMNP WWDRY JXWDR KIKKK KHKK0
 QNGDH EJIOA KFKDK BKPKA OWONZ OWBTN 0INN K JHMFA BWJJE
 JEWKA IIFQA JAHPX AJUAK ETWIA YMMAX FJYUX FJYUX FJYXX
 RWGRU DRUDF RUDRD PXWDR UKUHZ FZDME AJEAI XJAEA MZYAA
 AMODH DAPYA PHJYH OVAJV AOVAK YRAKK NJNHD PMEE0 EYEEY
 YOUOZ DUJXJ OLOM0 EQMZB KOYIO JMKB0 MEPZM EJFEJ FEJLG
 AKGAE GAAHA HHGOF ODAJA KOUKC YEUNK CYPNT IY00Y OAHHM
 OHNPJ IOIBH AOYKO UYMOB HBIYA ECUIV ENMZH IBBBK BHBPB
 AKXYK IIKUY HISAA HFSCA SGZYU SPKCX AHUA DK0BT 0TBUP
 DKAMP AEUUU 00YWO LNVOL NUOLN NOMNO MOYMO KHS

LIST 3:

T110/ 2M. 1A U7QJ2 ,HD02 0QA0? .11.0 QVYAY 0PYPC A6PYY
ADPOY ADAYY ADDOY T1YAD UYAD8 YYADF OYWD3 QOV IF FO-AF
D-/F1 -7F5- TF8-E FW-0F E-3FX -6/WF H/PC? 5E1EO -.HHC
60P-H 8YQ18 0300Y YFH7R -85Y8 18030 OYYY8 DYI-C 60U.C
7ZEOU MHHCW 000FA .PHT0 PDD4Y ,1AZY HGA0A IY,RZ 0AIBF
CE6HU 0TKHI YLRP6 BP-5A 3,68. 98JPP 9AFUL P97HP 97HC9
7HH97 H27HG 7H4E7 HE7HI 6E2I. AIEEY CEH,E HEEE4 XE/PE
WIE-U ,EK,2 6EXHX KE/KP G6A04 E436E I6E2A EPVEE 4ED36
EI6E2 AE74H YE3G6 VGGED XKE8K PG/EK EYEBP P56PH HHJJT
HDJK6 KNPRA TED2P RDX0 LG45M KRAXE 2DL0E 2I2TD LYDZ0
PCE7X PEMPE MGNEM KNELK REMKE MJKEM JKE.M RKRRR UUALY
GUKLY IUKLY WUJLY KUJLY -UYLY 0U/LY 0U/LY 8T.UM LTRKX
0S?M? OMY0M 0KYBL Y9J2K SHUKR KRMKJ 0.XWY JJ2KA HUKRK
RMKE0 JM70K IYKY. L2KX0 H?0M4 0M0K, MOMAU DL2A0 EUPKO
MAZKC HZMV3 2MXHR 2HSE? YEWS EPMM? XRYHW PYRRR 5YAW
HPPFK E?PXX ZP5XK ZK3XK ZM1XX EXKZV XKZJX KZAMX YZEYM
E088M W7K8M W738W 78JW7 V8JW7 8AW70 8,W76 8YW76 Y8PW0
?OT?U ?,ZJP P009Y DW7NJ 0IP7M EYMEA A0?/? JJQNP 7MEYM
EAXOJ ZEOR? 09YXR 0?0M? ,ZJPP 00IZ, ZM8HW RBOU8 PMEZL
GMPYY HRKOA L-MER KOKI? 9KXIU PPOA- -9K07 EKEEE 9NMLK
I0PLY 0W-PL ?0DPE ?0DOI ?0DPA ??BX? 0D.?0 DUC?0 DMA?9
DW9AX 0PK04 4AE04 PEI4B EY4ZE Y4UEM 4E04I E4JEL 94PLV
Y?95- F-IU2 PEYN9 HE1U6 C32EA W9AXC CME0? ,EUZ6 C12EA
W9AXC C?9UD X9CEE YN90- EY?9Z -IJ2P EY3IA 4KEDE 76PPK
DBIXB LZIP9 800YC XZXOY MIY-N M.-37 APYC/ VNM.P E0XOW
XUN1. UWMP PWJE, /PW?, HP?,H Y0?,H PN?-D -?,HY ?,HFF
?,HPB ?H/NB -Y20Y JJC.X YJP.X RJDMX 8JD.X 8JF.X JC.XP
J3.XY JU.XX JA.X. A-1HG RAMA3 NK.XA FUFHQ WB/NB -GFPM
P-IXF DUFHQ WB/NB -GF?F H?FWX A3NP/ XA-D1 HURAM AIH1H
CJM.X HMPPM HR?DW DRAN4 9V,JG ?.D-V ,JPHE 3AY/H BAJG,
..3PY 0X0-, /-73H YGP0P AKIY, P-IMP -IMA6 -IMA3 -/A-I
ME-IM EE-IM A-M,3 JR,JJ JGY?A JAY?E JAY?6 JAY?4 JEY?2
JGY?0 JIY?9 JGY?2 ?JBY? M5SYS YAPLB ZMI3M Y?NE8 EP4,3
KEAZ2 3?EAB EK4,3 KE-5E M?5E/ ?MI32 Y-M5H YAPFB ZMRPA
PGJPY -KZOP AAMI- A/HB3 SN.1Z K-H.I ZPMKY IB9YP ODBZK
TIP9P ?9I,I K9K.P OPP.M 18TP. 1ZP01 ZMIZB H,N.1 ZMIZU
1ZCHL ZI1H. ZIZUU K9?MU B9?WU N9?UU 9?SUU 9?RUL 9?PUR
9?NUL 9?0-L UD9-0 AYET7 I70XV DAQIP 9?3U6 2SYHI IH.0C
RYI?U 6SYHI IH.0E UZ-E, ?AQIR JAYEM 70EVD AE00K UP9M,
2PBBZ 00/NY MODI

TOMAU 0JHDO 0AIO0 VYAYP YPCAP YYADP OYADA YYADD OYTYA
DUYAD YYADF OYWD0 OVFFO AFDFE TFEFW FEFXW FHPCE EOHHC
0PHY0 IO00Y YFHRY BIO00 YYYDY IC0UC ZEOUH HCWOO OFAPH
T0PDD YAZYH 0AAY RZAIB FCEHU 0TKHI YLRPB PABBJ PPAFU
LPHPH CHHHH GHEHE HIEIA IEEYC EHEHE EEXEP EWIEU EKGEX
HXKEK PGOAE EIEAE PVEEE DEIEA EHYEG VGGED XKEKP GEKEY
EBPPP HHHJJ THDJK KNPRA TEDPR DFXOL GMKRA XEDLE ITDLY
DZPCE XPEMP EMGNE MKNEL KREMK EMJKE MJKEM RKRRR UUALY
GUKLY IUKLY WUJLY KUJLY UYLYU LY0UL YTUML TRKXS MOMYM
KYBLY JKSHU KRKRM KJXWY JJKAH UKRKR MKEJM KIYKY LKXHO
MMKMO MAUDL AEUPK OMAZK CHZMV MXHRH SEYEW LSEPM MXRYH
WPYRR RYAW E HPPFK EPXKZ PXXKZ XKZMX XEXKZ VXXKZ XKZAM
XYZEY MEMWK MWWJW VJWAW PWYWY PWOOT UZJPP OYDW NJ0IP
MEYME AA0JJ 0NPME YMEAX 0JZEO ROYXR OOMZJ PPOOI ZZMHW
RBOUP MEZLG MPYYH RKOAL MERKO KIKXI UPOA KEKEE ENMLK
IPLYO WPL0D PEODO IODPA BXODO DUCOD MADWA XOPKO AEOPE
IBEYZ EYUEE IEJEL PLVYF IUPEY NHEUC EAWAX CCMEE UZCEA
WAXCC UDXCE EYNEY ZIJPE YIAKE DEPPK DBIXB LZIPO OYCXZ
XOYMY NMAPY CVNMP EXOWX UNUWM RPPWJ EPWHP HY0HP NDHYH
FFHPB HNBYO YJJCX YJYXR JDXJD XJFXJ CXPJX YJUXJ JAXAH
GRAMA NKXAF UFHQW BNBGF PMPIX FDUFH 0WBNB GFFHF WXANP
XADHU RAMAI HHCJM XHMPP MHRDW DRANV JGDVJ PHEAY HBAJG
PYXOH YGPPA KIYPI MPIMA IMAAI MEIME EIMAM JRJJJ GYAJA
YEJAY JAYJE YJGYJ IYJGY JBYMS YSYAP LBZMI MYNEE PKEAZ
EAEKK EEMEM IYMHY APFBZ MRPAP GJPYK ZOPAA MIAHB SNIZK
HIZPM KYIBY PODBZ KTIPP IIKKP OPPMT PZPZM ZBHNZ MZUZC
HLZII HZIZU UKMUB WUNUU SUURU LPURN UL0LU DAYET IXVDA
QIPUS YHIIH 0CRYI USYHI IH0EU ZEAQI RJAYE MEVDA EKUPM
PBBZQ 0NYMO DI

LIST 4:

YGKCT BTGPA D3UCV Y3PYP .IP.M CPCA3 IYHH1 IPULY IIMUL
 Y11KU LY11H ULY11 DULY1 IBULY I1AUL YNIMP CGY11 PCGY1
 IKCXY IIMCX YY9Y1 IDCXY I1HCX Y31FH /1BF0 01D/1 U.04Y
 SFO.3 IKY4Q .31UY UQU.F .EFD. GF1.A FH.YF I.FY. EFI.E
 F5.OF W.NF8 .FX.F FE.MC AEYCA 6YCA1 YCAUY CAY1D MBCGE
 KMJFD KPHIG GIV2. 9IPJ2 YHPAG 0G5IH 7KPAH PFWEA HPFWE
 AHMFW EAHKF WEAAH FWEAH DFWEA HBFWE 3HAAF KEAHP FKEAH
 MF?EA HPF?E 0JEAH HF?EA HKF?E IHPYH E6EHH YH7Y6 J7TEY
 IH09J 6.IHF 9168E JUEHL EHCEO 7E12E 8XE0M E.E/3 E4SE-
 EEWAY 5GWJG JGHJG FJG0J HHADF KKVAJ EKHKV PMRKK R.RYR
 PZR9K P08KP LECRK E0M0K A/KKP /KKP/ KKM/K KK/KK H/KKD
 /KHKB BEOKK AEOKK PE?KK PE?KO ZKKKE ?KKME ?KRKJ 0JKHK
 MMJKE 09ALE UAL2R KYNJY L2RKN E4L2L UAL27 UKL2X UKL2G
 UEL2U HL20U 4L2-U 4L2ZU JL2IU YL2HU JL2IU /L2U/ L287E
 KC/ZK CYZKC KZKCZ KCOZM MBHEO .BZVK V.PKZ EVOEE EPPPO
 0WGEX OPOBS YASYP SYPSY MSYKS YHSYO DYBYP -A-9L M-P-E
 AOUOY YMUZU WOYWX K8MWR EA3UY 9WRES 3UYJW RW8MW R8MWR
 -8WRK 8KWRV 8MWR6 8SWR8 JWR8J WR18A WRO8J WR18Y WRY8,
 WREOG ,OG90 GOGSO G9UZK YCYDY YMYYP ODW.Y 00XML WPIVB
 P2HYP /LWB? 9PEKB DIACK BBIAC KBAIA CKBPI ACKBP IACKB
 MIACK BKIAC 9BHHY ACKBD YACKB AYCKB BYCIW CKBPY CKBPY
 CWBME G8EE9 AFDGB 99B?V 4AEWB MIF9E WB118 9JE4P E04PE
 /4BE0 4MEY4 UEU4T E.4AE H4ZEA 4E94U EH4JE E4IEH XYLII
 YLNIY LBIYL IYLIY FDHMY AFEHA E8P8E P,H/Y AYP-U W/PR.
 LDPRO A0Y0W /D?AM ODHIF ODDIF ODBIF ODAIF ODP1F ODP1F
 ODMIF NDOKE MFODH EMFOD BEYFO DDEYF 5RFOD PEYFO DAEYF
 /DPML DKKNB HLDYL N.?YJ C.X/D AGEN. X/D10 4NU.X .JA.X
 ,JP.X YJD.X YJA.X 7JF.X 8J.XJ .XPJD .XJC. XNJF. XMJU.
 XKJ3. X0?0A W3RAW 3RAWD RAW1R AW5RH OPEME MOK4P 4MP1M
 ,EMJ2 G,PWA PEMPA O/,A- 5BZ,A KHCE, AHHCE ,ADHC E,ABH
 CE,AA HCE,A PHCE, APHCE 1AEMK AE,AK KAE,A DK?E, AHK?E
 EME,A AK?E, ABK?E ,AAZX AM3SM XA85W 3IY-8 JGY-, AC6U3
 LY-,A H6J3F Y-YJC Y-TJA Y-JJA Y-AJB Y-JY- 6JKY- 2JBY-
 0JAY- JGY-1 JEY-U JGY-J IY-E? OM/IM /IM/A M/HM/ ESMEP
 KAUE5 SASUP IZIMA ZR.K. IPO0N PVKA0 9YINE DINMM GINKM
 GINHM GINDM GINBM GINAM GINPM GANKP CINMC INHEI NKEOY
 INBEI NDEIN C-NAC IHIZ- N6EIQ 94UK9 ING8I W9INM JIE99
 UF95U B9UUN 9MU9V US9UV 9RU90 U9KUL 9A0U9 FUL9C UR9K-
 9AYRO AY00A YNOAY MOAYO IZKAC

YGKCT BTGPA DUCVY PYPPM CPCAY HHPUL YMULY KULYH ULYDU
 LYBUL YAULY NMPCG YPCGY KCXYM CXYYY DCXYH CXYFH BFQOD
 UQYSF OKYQU YUQUF EFDGF AFHYF IFYEF IEF0F WNFFX FFEMC
 AEYCA YCAYC AUOCA YDMBC GEKMJ FDKPH IGGIV IPJYH PAGGI
 HKPAH PFWEA HPFWE AHMFW EAHKF WEAAH FWEAH DFWEA HBFWE
 HAAFK EAHPF KEAHM FEHPF FEJEA HHFEA HKFEI HPYHE EHHYH
 YJTEY IHOJI HFFEJ UEHLE HCEOE EXEGM EESE EEWAY GWJGJ
 GHJGF JGJHH ADFKK VAJEK HKVPM RKKRR YRFZR KPBKP LECRK
 EMKAK KPKKP KMKKK KKKKK KDKKK BBEOK KAEOK KPEKK PEKOZ
 KKKEK KMEKR KJJKH KMMJK EALEU ALRKY NJYLR KNELL UALUK
 LXUKL GUELU HL0UL ULZUJ LIUYL HUJLI ULULB EKCKZ CYZKC
 KZKCZ KCOZM MBHEO BZVKV PKZEV OEEEP PPOWG EXOPO BSYAS
 YPSYP SYMSY KSYHS YODYB YPALM PEAOU OYMU ZUWOY WXKMW
 REAUY WRESU YJWRW MWRMW RWRKK WRVMW RSWRJ WRJWR AWROJ
 WRYWR YWREO GOGOG OGSOG UZKYC YDYIM YYPOD WYOXM LWPIV
 BPHYP LWBPE KBDIA CKBBI ACKBA IACKB PIACK BPIAC KBMIA
 CKBKI ACBHH YACKB DYACK BAYCK BBYCI WCKBP YCKBP YCWBM
 EGBEE AFDGB BVAEW BMIFE WBIIJ EPEOP EBEOE EYUEU TEAEH
 ZEAEU EHJEE IEHXY LIIYL NIYLB IYLIY YLIFD HMYAF EHAEP
 EPHYA YPUWP RLDPH OAYWD AMODH FODDF ODBFO DAFOD PFODP
 FODMF NDOKE MFODH EMFOD BEYFO DDEYF RFODP EYFOD AEYFD
 PMLDK KNBHL DYLNJ JCXDA 0ENXD 0NUXJ AXJPX YJDXJ JAXJF
 XJXJX PJDXJ CXNJF XMJUX KJXOA WRWRW AWDRA WRWRW HOPEM
 EMOKP MPIME MJGPW APEMP AOABZ AKHCE AHHCE ADHCE ABHCE
 AAHCE APHCE APHCE AEMKA EAKKA EADKE AHKEE EAAKE ABKEA
 AZXAM SMXAW IYJGY ACULY AHJFY YJCYT JAYJJ AYAJB YJYJK
 YJBYJ AYJGY JEYUJ GYJIY EOMIM IMAMH MESME PKAUE SASUP
 ZIMAZ RKIPO NPVKA YINED INMMG INKMG INHMG INDMG INBMG
 INAMG INPMG ANKPC INMCI NHEIN KEOYI NBEIN DEINC NACIH
 IZNEI QUKIN GIWIN MJIEU FUBUU NMUVU SUVRU OUKUL AUUFU
 LCURK AYROA Y00AY NOAYM OAYOI ZKAC

C 1980 - CED - NBHIN BSNLW JNBMN LMANB MASCA SMLM INBHA
 SMNHD 0/PFD GNCUM PCROY 1/FAP AVKOP A-AF6 -FA03 PA-AA0
 3A03C MJU.Y M4UY M3UY MUUZY MKU0Y YCK0? N78OK 0/PFU9
 AHDPH H4IE1 2EZ14 BE3E9 F5FAF HHD70 M.YJU M.Y4U MYT3U
 M7YU MPU3Y F,P2A HY?-/ 2YPAY PAMYR YEPAY 2AEY? ARHHP
 3.FH N40/F KH/1D 011DP 1WPZ1 DP1WP M1DZM 15FM1 5P1WP
 1IDOM 15P IK H161, 2PHL3 GGAPF 6EJH, EBF8. 04PB/ .B/84
 HPB/. B4HB4 HGAPF YJASF IJAF AJA7F JAMFP FJGME -16EM
 PAEGK H1P5 OYJAU 0A2UD AJ6XK 2UNEY EBYBE OYKHE 9AYJU
 FAIJS FAJIF FAJ7F AFHJ IT2-0 EY,? 7PBJP PJPJ5 MPJ?
 KJEN4 KP01 YKKIJ EYMKY AEHA APAD APAD APAD 3EP3E
 PAPA AEP3E PAMKR RTAK XIKKB AEUKZ KIULP DYYJP DYYDJ
 YJYDJ OPDY DODJ OKBE ZB12 B0M2B 0ZBP0 ZKPMa OUKP0
 BUK5C MKR40 TERJN 7.N-0 7ANJU -V?73 U75UD L7UEL 7MKXB
 EZFB1 Z1BMZ 0B0ZB POZRS 5R59K -8Y1? PBDZP BFPZ UPBYZ
 2BMZX 01JM0 P0E0 OJAJM JJAMJ NNKMN NAN.A ANNAN .AANN
 HANJA HAN.A MNNKA HANPM YBM-0 0VB7M 3RHWP HEAP HJ9HA
 9JAH4 9PHJ9 HA9HA 90ESM 35A6S AOS,P SPSOP ZYN,7 MPD8
 VEGPM B05K6 U3T30 3UTY? IRETR HWEIR KWEPM 25MES A35A6
 S,OSP 59IEY N673? VPAPA PJPJP 2A3OH JPO06 4M,A BNUZU
 ABPU3 1MU31 B3YBE 1B3YB C31MC PACPB 3YBU3 1MCPB 3PP09
 OLVDP /6Y.H DEAI B14OP KMPK UKMNU MKNPK UKKN YHUIU
 IHII HICIN ,ITIH AI01I YA73T EAA0H 4.LP ODEMU FH05H
 Y905H FE.8? 004X5 4KX04 MXPP? EHUU IHII HICIN TI, IH
 PINIO 1UV7J ICYUE I2YPI NIPB IPIJK PIZI? IBI29 KUPEP
 JUTIM D3FGM PGHHA FHHDH 9D5HH DH9DF HHzF2 0MF20 DH9DF
 HHAF2 0DHAF YNYX. HPAY OHEWB RDRJE .PMUA BFMGM F3GPM
 BIPMG MB1MB 1A0R1 GROPI ROY1G ROT15 RO81P 14ABH E5WB
 BPKY WAPYH MSA7E 0.E07 ,0EW4 2,6J? JM.24 JA.2A P-0GR
 B10RP 10GRY 10SRT 10P11 RYH7. EJAF? 7XR? P01RP 0DRPR
 ZVPR 20R-F AMPYA 651PA HEHLR HALOK BOKHO HOKD0
 OP00H OHOKB 00HOB AJ3J? KAJYM EKKKA EJKYR PGCP LLLAI
 LAPAP PLLPA PAME4 HKE2H KE9HK E5HEE DH0HM DFXOE D0MJE
 0/BAY KZTBE U9TU9 ESTJ9 U2S?T J25JF Y2JJB Y2BAE K4HEK
 2HEK9 HEE5H EPHAJ MXZNE EE3E? P4HP4 HPD.P 41?4H 5BE8Z
 P9KEA ANOUP XA0BX 9S9K9 KJ9K9 KJ9HJ 49AJ4 9K9KS 9J49K
 9DBZI Z-0MB U9AMK MYHON WUM9P PKGIP PXWPC 0XCFI NPPXW
 PINFI NAKJM VOK0M 00KMN 00KEM UOKHM PMOAH 029UY HHPFU
 MOYDB ZM5W8 N57NX ESJNR YRT25 YU-TU P9-AU 9-DBY 0KV0J
 MKO00 MKOON MKUOE MKPMN OZU00 2D3XW 2W2VF JKOPJ KOP0A
 YPJRO 2J00Y EDUD0 NBVU

CCEDN BHINB MNLMJ NBMLN MANBM ASCAS MNLMI NBHAS MNHD0
 PFDGN CUMPC OYFAP AVKOP AAF A 0PA0 AOCMJ UYMU MUYM
 UUYMK UUYCK ONOKP FUAHD PHHEE ZEEFF AFHHD OMYJU MYUMY
 YUMYU UMPUY FPAHY YPAY AMYPY EPAYA EYAHN FEHNO FKHD0
 DPWPZ DPWPM DZMIF MIPWP DOMIP KHIIIP HLGGA FEJH EBPB0
 P88BH P88BH HGAPF YJASF IJAF AJAF AMFPF JGME MP8EG
 KHIPP SOYJA UOAUD AJXKU NEYEB YBE0Y KHEAY JUF AI JSFAA
 JIFAJ FAFH JITOE YPBJP PJPJM POUKJ ENKPI IYKKJ EYMKY
 AEHA APAD APAD APAD APAD P88BH P88BH P88BH P88BH
 KBAEU KZKIU LPDYY JPDYY JPDYY DJDJD YDJDJ DJOKB FEZBI
 ZB0MZ B0ZBP ZKPMa OUKPB UKCMK RATEJ NNANJ UVUSU DLUEL
 MKXBE ZFBZ1 BMZ0B 0ZBP0 ZRSRK Y1PBD ZPBPZ PZUPB YZBMZ
 XJMP0 0E00J AJMJ AMJN KMNNA NAANN ANAAN NHANJ AHANA
 MNNA HANPM YBM00 VBMHW PHEAA PHJHA JAHAP HJHAN AOESM
 SASAO SPSPS 0PZYN MPDVP EGPMB OKUTO UYIET HWEIK WEPMM
 ESASA S0SPS IEYNV PAPA JGJA OHJPO MABNU ZUABP UMUBY
 BBYBC MCFAC PBYBU MCFBP POOLV DPHD YEAB IOPKM MPKUK
 MNUMK NPKUK NKNYH UIUIN HIIH1 CIIH1 IYATE AHLR
 PODEM UFHON YOHFE 00KX 0MXPP EHUU IHII HICIN TIHP
 INIOU VJCYU EYPI NIPB IPIJK PIZII BIKUP EPJUT IMDFG
 MPGH AFHHD HDHHD HDFHH ZMFD HDFH AFDA PNYX HPAY
 OHEWB RDRJE PMUAB FMGMP GMBP MGMBM BA0GR OFROY GROTR
 OBRA BHEW BPKJ YWAPY HMSAE OE00E WJMJ AAP0G ROP0
 GRYOR TOPRY HEJAF XRP0R P0DRP RZVFO R0RFA MYAGP AHEHL
 PHALO KBOKH OHOKH OHOKD 0P00 HOHOK B00HO BAJK AJME
 EKKAE JKYP LPAIL APAP LPAR AMEKK EHKEN KEHEE
 DHMD PXOED MJEBA JKZTB EUTUE TJUST JSJY JJB8 AEKHE
 KHEKH EHEP HAJMX ZNEE EPHH PDPIH BEBZP KEAN OUPXA
 OBXSX KJKKJ HJAJK KSJKD BZIZM BUAMK MYHON WUMPP KGIPP
 XWPC0 XCPIN PFXWP INFIN AKJMV OK0MO OKNMO OKEMU OKHMP
 MOAHU YHHP UMOYD BZMWN NXEJN YRTYU TUPAU DBYKV OJMKO
 00MKO ONMKU OEMKP MNOZU ODXWV VPJKO PJKOP OATPJ ROJ00
 YEDUD NBVU

U0.CM HCAEY DED1D EN80H DHD91 9NR0C MGB0C 00GB0 AD/, ?
 YADY, -YD/ FJUEA B,YCM GA4YG J/FPJ 3,E1P NPIPN LIANI
 DAETP H0PCI NR0C? AMHCP PPPP FMGAE Y0IHJ DROY 2D9AM
 YPHFY DIFPP F807D UEUD0 XDUFP YRERD U0KHFP YCPDC A80K0
 .0CA6 YCGPY GAKFW J5AX0 AZHHU 36EPA KH316 EGAKD 9G,6K
 5D9CA YT-JC ART/J 9A,EJ UM4T. JGAKJ JCKU, EPUHT KH232
 HFEUH H5WJ0 F42GB 3816E G2PPG PPPP 0EAKK JE30Z A6EAE
 0HPJA P5EAM 03PPP P6EAF MFAK4 -AFE0 JMAB4 MP0JG PH2G5
 D906E GJGK0 EKBME C/ZEN -PRMK 81UK0 KHAKU KBOHK TOEHG
 A5/ZG 45YZN IUUGZ CJ5YZ KB0CA ZF0G1 UPLG0 SKRIR HRH3A
 A8H8H KKU9L EUOLE KRFP0 820PA 7BEEC /ZBUK EC/ZH BKEC8
 UKLKE C/ZPS 0.RKH AUKK? B0KFP PPPP UB0CM ZMHED UKMKK6
 M5CPZ B0MK0 HPPP UKOU0 J/PZ0 U04JP 0PZKP MRKCE HY2KK
 CZKV PM0PG , 125E UM407 M058M LPLN? M0YK5 05YK 5K5E,
 K5SEJ 353RF LGJE9 0YGEY L38PM L9CE0 P0-KN 6M6KV CORWX
 0R, WX 02P04 520S XG, 48 MG, 05 M648M WMG, 2 IOA01 PIN7M
 02A00 PPPP 08YGA ZPKA5 7MAUZ EGAD0 JYAM9 PPPP 7M, 55
 G55, A Y55Y0 YGYSJ AP000 PZEOG K5AYR M0G90 .0UYH PLY11
 H.RXF PJ6EA EDPW2 W3EAY HAMEY E9AME OCUTI 0TUUI 114EX
 HLUUI YHALB IAX14 PXNUF BV6V2 V9/03 UUYLF B, 4?, 4T?0
 0AEJ- 9P501 H2LI1 J4PL1 IEHPY LJ4PP LIIR1 EYV02 03EAY
 2IBEY PPPP PAHAL BIME ACC8D LBHE JEC22 PPPP ATIKI
 IJIEP IJKJ AEPY PDXYL MEM9E AYLNI YPGA OAEW3 R0KJ-
 PJWBM JAPH WBAOM PAUNM 0PYJG 7RYJ7 GR0JR JU-FW F7RA0
 MWRYM -RJP. -17ED .0.N ,K,H7 FBRWE DTJL. 21J5. 2AY48
 MJJ0, 1030W 3RJJP 0W3RK J0PEW JJP.P 0W3RH MB.A4 04HWB
 A20DM APPP P0J0M WRH0A 5JWBG F6HWD RKMZK GP50P PFPWB
 5JIV1 JIBUJ IK0RZ VZJUB B00RA PH-AW 0PANX BAW3R AE0KM
 EBK/I 02VJS AUYZJ NA.4. 0MEAP M73A0 PAJLL AJKL6 JEJ8/
 0/ELM EA/IE A/EJP Y/AY 41T01 0E2D4 ASJWY -5JEY -MJSD
 ZUJ5 PJTHE -0/IU JAO/I MJEAK /UJAY AO/IV MZMJ4 JOM?4
 HZMPP PPPP EA/HP ABJKE M0/HM ZDKAE 4PPP EJH.H JAGJH
 P.JFD ZPMFM M/OPC 3-M/I MMPVA KDYRO 9BR.2 .1BF9 YH218
 YSY9Y HAKCA 0AIC9 A0MZW 0X0MZ V0X0Z WU4Y0 YUOW0 AKCY0
 OKCYW UP9YN 0YN09 0S0A, 19WS0 AS.YN EU9EU U9AZI HFZ7E
 0J5MK 9YR0F UB9YR 0AZKB YFUB9 B9YR0 .UI0A ASA9Y HAJJK
 APPP P0UKC Y000S JZYHO Z0YKO PAC08 SPPP YHUZM YMZIL
 ZMC00 IYZE IH00A PZ.AY 9A0GI HAY00 A

UCMHC AEYDE DBENO HDHDI NOCMG BOC00 6B0AD YADY YDFJJ
 EAYCM GAYGJ FPJEP NPIPN LIANI NTYEU FYUFY CKHED EPZEU
 MYEY EFDAE YBDM DCAEY EFDAE YBDM DCAEY EFDAE YBDM
 KHPYC PDCAB OK00C AYCGP YGAKF WJAKA HHUFP AKHEG AKDGK
 DCAYT JCATJ AEJUM TJGAK JJCKU EPUHT KHXYU KHEYE GIHMP
 UAXDU FAWJU EHWJA AHFUE HHWJP GBBEG PPGPP PPEA KJJE0
 ZAEAE 0HPJA PEANP PPEA FWF AK AFEJM AMPJG PHGDO EGJGK
 EKAME CZENP RMKIU KKHAU KKBON KTOEH GAZGY ZNIUU GZCJY
 ZKBOC AZF0G IURLG OKRIR HRHAA HHKKU LEUOL EKRRP PABEE
 CZUKE CZHBK ECUKL KECZF SJRKH AUKKB FKPPP PFPUB OCMZM
 HEDUK MKMCP ZBMKO HPPP UKOU0 JPZOU 0JPPZ KPMRK CEHYK
 KCYZK VPMOP GEUM0 MOBML PLNMO YKOY KKEKS EFLG JE0YG
 EYLPW LEC0P OKNMK VCOWX 00SXG MGO MGOMG MWMGI 0A0IP
 INMOA 00PPP PPGYGA ZPKAM AUZEG AD0JY AMPPP PMSG SASSY
 YGYJA POOPZ EOGKA YRM0G OUYHP YLIH RXFPJ EAEDP WPEAY
 HAMEY EAMEO CUTIO TUUI1 IEXHL UUIYH ALBIA XIPXN UFBVV
 VOUUY LFBTY 00AEJ POIHL IJPL IEHP YLJPP LIIRE VY00E
 AYIBE YPPP PPHAL BIMEA CC0LB IHEJE CPPP PEATI KIJJI
 EPIJK JJAEP IYFDX YLMEW EAYLN IYYPG A0AEW RKJJP WBMJA
 P0HWB A0MPA UNMPY JGRYJ GR0JR JUPWF RAOMW RYMRJ PED0N
 KHFBW EDTJL TJAYB MJJOM RJJPM RKJOP EWJJP PWRHM B0HMW
 BA0DM APPP PJOMW RH0AJ WBGFN WDRKM ZKGP0 PFPW BJVJB
 UJKRZ VZJUB BMRAP HAWPA NXBAM RAEKM EBKIO VJSAU YZJNA
 0MEAP MAOPA JLLAJ KLJEU ELMEA IEAEJ PYAY TOIOE DAJY
 JEYMU SDZUJ YPJH EOIJU AOIMJ EAKUJ AYAOI VMZMJ JOMHZ
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 MMOPC MIMWP VAKDY ROBRZ IBFYH ZBYSY YHAKC AAIKA MZWOX
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 EUVAZ IHFZE JMKYR OFUBY ROAZK BYFUB BYROU IAASA YHAJK
 APPP PUKCY 00S JZ YHOZO YKOPA COBSP PPHYH UZMYM ZILZM
 COIYI ZEIH0 APZAY AGIHA Y00A

UAMMU ,SUDO AUFUB P-A18 E04-A 5WXCXV AJA2C A6BK0 2AJ0-
 HARB6I HCENR OIFJB OC0JY CAYCC PHA1H CEN0I FJOCJ YEAYH DK0AK OAK0A IAYMO FYDYA
 EAYHD KOA.K OA.KO A.I7A YMOFY DY9A9 MY2.I ,I0VY AY9UP MYI0 VYAYU FCACU YCPHE CKCHK HICER INEC BYAYA LPLP
 CACUR YC2PH EC3KH C3KH? IC2ER INEC BY9A0 Y9ALP 29GLP PHEAY MYMYE EKHHM EHC8Y GMGFH MEKHH EHEC GUSBU FTFA
 PHEA9 YMOY, M9YTE KHHM1 EHC8Y GMGFH M3EKH HEIEN ECGU\$ BFDBA XSBEF BZON0 FBD00 BBZTO YBDDH BHNSZ DYUGH JGFFP
 BUFTT FA, BF 8D0/B A6X9S /BE2F .BZ00 N0FBD 0450B BZTOY UOGME EAEGR AMBJK HMEBM EBMEB JPEAE NPJT BBJGA FBF6G
 /BRD0 DHB.H N0SSZ D/YUR ,GHJG 2GPP4 U10GM 163E A56EG APXGP GMFGW 0WGDN 0JNWA KWAP MNJAO JTANJ JWPFO PAXOG
 PA9MB JKHME BEB8M EB30J PE229 AENPJ -5T3T 16B.9 BJGAR DKUKA PUWMP OXJAX OXKKG IDFIN DJHOY DNNIY DYDDO YDYHY
 BFF42 2G2AP XG2PG 2MP-5 3G2W3 03WGD 9NOJN W5A-K W5AAP JDDE EYDH OHOYD Y00ID HYVIK CKZKK ABJAE KZAUK HUMEU
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 EDES0 EK280 20K2B 0K2P0 0EIK? 0V16H /KAIC EZ53/ EB05V PZHP ORGZ EAGEA YLORL YAWEH EVFHJ UTXOD 0000 OPOYO
 /EBB0 ZC12B EZB1Z U/P0E P20EK AVFVB 0F0/P 0E-A? 0E-KV ROYOR OONAG MEHYD YOEYD DOGAM LAGPO KAOKO NDOYO POKMO
 KJHE S1HS AJKEJ H313J HY/JE HA9JH SJH9K AJSH AAKMK KOVHK SIUSI HAKIM JMMUK HAHUK AMKZK IAKNM MJIKN ZUKJZ
 JHJME MEH9 9AEJ1 HKJY6 U30G0 00B0J 6KON7 MP8P7 MOPPG MZKKK NNMJH ZM2FG ERARD RAHM 0FKAA PHW0 JCVBA PCWPM RABH
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 LIAEM BK-9M Y1YS YHES7 91AEM .PK-9 M.YY. M117 TIKM1 DPLVE TWEMA MEMKZ E0BMO JFOMF HBADP PDPPD PPEEJ FJEHN
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 RBHMR BHMRI W5WR H-IWJ F3WDR E031W 2KN1. UWMRY JEMM4 NURH0 XPLLA KPJRD PAP0A GIAPP KJEPF XPEMH MBFPW NOHAF
 KR2A? KMA2N MA2BM E0W2 60W9N 3AHW3 WR90K EE0KK MFW3R HAXYW WAYNO AXEAM JU0AO YHSUY HAP0Y K0DBH FVHPV HPAU
 OR203 RX3BM ADOAA HWEIE KMEI3 BMAAO AAEYU P15H PHAF P YOHZ YOYKO AIKRP 00MPF AJYAP EAHAN EAER AOYPO OGPEO
 LP62 32LP9 PGPEI BHPPI PCDHP HFHFL FPHHA CPLAH DUDPL YOHZ YOYKO AIKRP 00MPF AJYAP EAHAN EAER AOYPO OGPEO
 VETWE M/AME 5MKZ4 E20BM 004JF 0M0F0 /HBAD PPDP PPPI / E/EP JJEH/ 0HX0- 1/-03 HYGP0 EAKPP JV6-M 2MZY5 M12M
 2DX5 0/M3U 5P/N1 IMKH/ H0NCO MX50M COMMZ 0/HEH -EH-1 DZBH, Y5BMK M1MZ 1X5ID ZB2C, Y5B2M MEFPH MOMBK PMCEA
 HXPNU RH0XP LLAKP JRDPA P0AGI APPKJ EPEXP EMHMB FPMNO HAFNA XY5W AYNOA XEAMJ U0, A0 9YHSU 9YHAP .9YKO DBH0P
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