AN460

An RDS Decoder using the MC68HC05E0

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INTRODUCTION

The Radio Data System (RDS) adds a digital data capability to the FM VHF transmissions on band II (87.5 to 108 MHz). This capability is in use in the UK and several other European countries, the intention being that most of western Europe will eventually adopt it. The specification is defined in EBU Technical Document 3244 (see reference 1).

To transmit the data, a sub carrier is added at 57 KHz. This sub carrier is amplitude modulated with a shaped bi-phase coded signal. The sub carrier itself is suppressed to avoid data modulated cross-talk in phase-locked loop stereo decoders and to maintain compatibility with the German ARI system which uses the same sub carrier frequency. Information is sent in groups of four 26-bit blocks. Each group of 104 bits is one of several types containing different information. It is up to the broadcaster which features are transmitted. The only constraints are that the specified format must be adhered to and that PI, PTY and TP should always be included. Each group contains a different sub-set of the RDS features; table1 lists all currently defined RDS features.

Feature Information Ы Program identification PTY Program type PS Program service name RT Radiotext CT Clock time and date ΑF Alternative frequencies TA Traffic announcement TP Traffic program MS Music/speech switch

Decoder identification

Programme item number

Enhanced other networks

Transparent data channel

DΙ

PIN

FON

TDC

INH

Table 1. RDS features

The retrieval of data is carried out by a demodulator circuit which generates clock and data signals that can be used by a microprocessor. Suitable demodulators which can perform this function include SAA7579T, TDA7330, LA2231 and RDS hybrids. The block diagram of a typical application is shown in Figure 1. The microprocessor, in this case an MC68HC05E0, decodes the RDS data using the clock and data signals from one of these demodulators and sends selected data to dot-matrix display modules.

In-house data



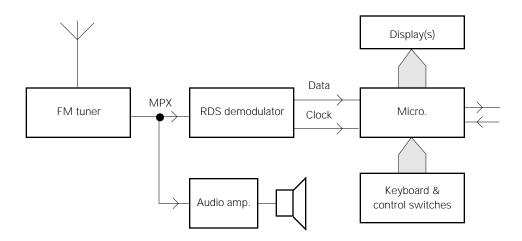


Figure 1. Typical application

This application incorporates an alarm clock which, if permanently powered, can be used to switch on the radio supplying the RDS data, at the required alarm time. There is a second alarm output intended to sound an alarm. This output is cancelled when any key is pressed, leaving the control output active. The control output could be used to switch the power supply of the radio or the audio stage. If an audio mute is used, RDS information can be updated even when the radio is "off". Alternatively the decoder can be used simply to display RDS data with its power being supplied from the radio and manually switched on and off.

RDS FEATURES

This application supports PI, PTY, PS, RT, CT, TP, TA, MS, DI, PIN and EON (see Table 1). These features facilitate permanent display of the 8-digit station name (PS) and time (CT) and, on request, can display program type (PTY), radiotext data (RT) and the status of the other RDS features. EON data can be displayed, but the retuning features associated with AF and EON are not supported as there is no capability to control the tuned frequency. In a car radio EON data would be used to switch the radio to a station which is broadcasting local traffic information and AF data to tune the radio to the strongest signal carrying the selected service.

PI is a two byte number which identifies the country, coverage area and service. It can be used by the control microprocessor but is not normally intended for display. A change in PI code causes the initialisation of all RDS data as it indicates that the radio has been retuned. This application also facilitates the display of the current PI code.

PTY is a 5-bit number which indicates the current program type. At present 16 of these types are defined. Examples include "no programme type", "Current affairs" and "Pop music", although the actual syntax which is displayed is determined by the software of the controlling microprocessor. In this example PTY can be displayed on request. Table 2 shows the display used for each PTY code.

PS is the eight character name of the station and is permanently displayed (except in the standby mode).

RT is radiotext and constitutes a string of up to 64 characters which give additional information regarding the service or programme currently being transmitted. In this application, RT is displayed on request on the 16-digit dot-matrix displays using scrolling.

Table 2. PTY Types

PTY	Display
0	No program type
1	News
2	Current affairs
3	Information
4	Sport
5	Education
6	Drama
7	Culture
8	Science
9	Varied
10	Pop music
11	Rock music
12	Easy listening
13	Light classics
14	Serious classics
15	Other music
16-31	No program type

The data often contains extra spaces to centre the text on a 2x32 character display. As this is not suitable for a 16-character scrolling display the software reduces all sequences of two or more spaces to a single space.

CT data is transmitted every minute on the minute and provides a very accurate clock, traceable to national standards. The (Modified Julian) date and local time variation are also transmitted. Time is permanently displayed. In standby mode (see below) the date is displayed instead of the PS name. The MJD number, which is the form in which the date is received, can also be displayed. The microprocessor converts this number into day-of-week, day-of-month, month and year.

AF would be used by a car radio to retune to the strongest signal carrying the selected service. AF data, along with TDC and INH, is not used in this application.

TA and TP are flags. TP is set if the transmitter normally carries traffic information and TA is set if a traffic announcement is in progress. The combination, TA=1 and TP=0, is used to indicate that EON data is being used to supply information on other networks including traffic announcements. The status of these flags can be displayed and the combination, TA=TP=1, is brought out to a pin and can be used to control a LED or external hardware. An example of this could be to demute the radio or switch from cassette when a traffic announcement is taking place.

MS is a single bit indicating either music or speech and is intended to be used to make a tone or volume adjustment to a radio's audio stage. The MS bit is displayed on request.

Decoder information (DI) constitutes four bits indicating the type of transmission (mono, stereo, binaural, etc.). It is not currently in use in the UK but can be displayed as a number between 0 and 15.

Programme item number or PIN is used to identify the programme currently being broadcast. The format is a 2-byte number which includes the scheduled time and date (day-of-month) of the start of the programme. It can be displayed as four hexadecimal digits or fully decoded to day-of-month and time.

EON (Enhanced Other Networks) replaces the older ON format. If type 14 groups are used to provide EON data then type 3 groups (ON) will not be used (Table 6 shows the currently defined group types). Type 14A groups are used to send information about other networks. The PS name and principal frequency of up to 11 other networks can be displayed. Type 14B groups are intended to be used to switch to traffic announcements in a radio in which the microprocessor can control the tuned frequency.

DECODING

Each 26-bit block contains 16 bits of data and 10 extra bits which are used for synchronisation and error detection. There are no gaps between blocks or groups, the synchronisation being done by looking for specific checkwords in the incoming data. In order to look for a checkword a stream of 26 consecutive data bits has to be multiplied by the fixed 10x26 matrix shown in Figure 2.

The result of this multiplication is a 10-bit word which is compared with allowed values. There are 5 of these 10-bit "syndromes", one for each of the blocks 1, 2 and 4 and two for block 3 (see Table 3). The alternative syndrome for block 3 is used in the B version of a group. In this version the PI code is sent in block 3, replacing what would be sent in the A version of the same group type. This is done to increase the frequency of sending the PI code so that it can be acquired more quickly.

```
10 0000 0000 ($02,$00)
01 0000 0000 ($01,$00)
00 1000 0000 ($00,$80)
00 0100 0000 ($00,$40)
00 0010 0000 ($00,$20)
00 0001 0000 ($00,$10)
00 0000 1000 ($00,$08)
00 0000 0100 ($00,$04)
00 0000 0010 ($00,$02)
00 0000 0001 ($00,$01)
10 1101 1100 ($02,$DC)
01 0110 1110 ($01,$6E)
00 1011 0111 ($00,$B7)
10 1000 0111 ($02,$87)
11 1001 1111 ($03,$9F)
11 0001 0011 ($03,$13)
11 0101 0101 ($03,$55)
11 0111 0110 ($03,$76)
01 1011 1011 ($01,$BB)
10 0000 0001 ($02,$01)
11 1101 1100 ($03,$DC)
01 1110 1110 ($01,$EE)
00 1111 0111 ($00,$F7)
10 1010 0111 ($02,$A7)
11 1000 1111 ($03,$8F)
11 0001 1011 ($03,$1B)
```

Figure 2. 10x26 decoding matrix

Table 3. Syndromes

Block	Syndrome	Binary	Hex
1	А	11 1101 1000	\$03,\$D8
2	В	11 1101 0100	\$03,\$D4
3	С	10 0101 1100	\$02,\$5C
	C'	11 1100 1100	\$03,\$CC
4	D	01 0101 1000	\$01,\$58

This syndrome test has to take place after each bit is received. The test inspects the last 26 bits received, until a valid syndrome is found. In this application, only syndrome A is accepted during the bit-by-bit syndrome check and the data is used only after four valid syndromes have been acquired. A more complex algorithm could allow all syndromes to be accepted during initial synchronisation and require less than four valid syndromes before the data is used. This can reduce the time taken to acquire the PI code, which is also included in block 3 of type B groups, but increases the likelihood that random data, giving a valid syndrome, will be used in error. The bit rate is 1187.5 Hz so the control microprocessor has a lot to do during this initial synchronisation. Once the first valid syndrome has been found, subsequent syndrome checks need be done only after the next 26 bits have been received, as this is when the next valid syndrome would be expected. If it is not found, then the bit-by-bit synchronisation check is re-started. Once consecutive A, B, C (or C') and D syndromes have been detected, a complete group has been acquired and the data can be used.

Four bits in block 2 determine the group type. Block 2 also contains TP and PTY data. The use of the other bits in blocks 2, 3 and 4 depends upon the group type while block 1 always contains the PI code. Table 7 shows the structures of the group types which are handled in this application.

CIRCUIT

Figure 3. shows the circuit diagram. As different demodulator devices can be used, the circuitry for the demodulator is not shown. The clock from the demodulator interrupts the microprocessor on each positive edge. At this time a data bit is available and is read on bit 2 of port B. Both an LCD and a VFD module are shown but normally only one will be used. If the LCD module is not connected, a pull-down resistor should be connected to bit 7 of port C, as the microprocessor uses this bit to check that the controller in the module is ready to receive a command. If this bit is left open circuit, it may cause the software to hang up. Alternatively the LCD drive software could be removed, allowing the use of port C for other purposes.

With more I/O available, additions to the software would allow access to the other control bits intended for controlling external hardware. These include the MS bit, DI data (4 bits) and PIN (match with current time and date). They could be brought out to port pins in a manner similar to that used for the TA=TP=1 signal. The unused port A and D pins could also be used for this purpose but in this application they were used during debug by the E0BUG monitor (reference 2). The application could make use of the port A and D pins, if debugging was done on a development system which did not have this limitation.

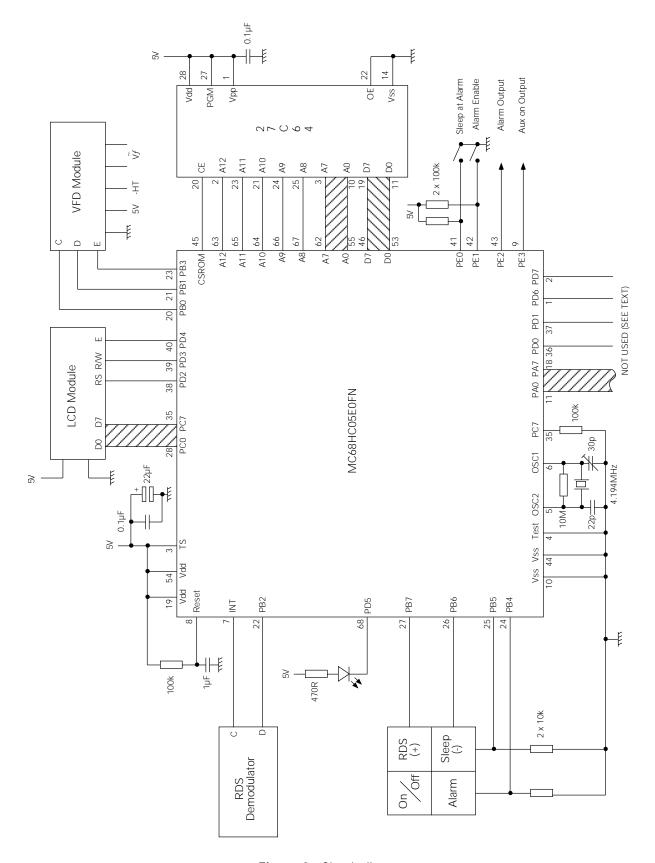


Figure 3. Circuit diagram

SOFTWARE

The complete software is listed. The reset routine (START) sets up the I/O ports including the enabling of some of the special functions available on port D. These signals (A15, A14, R/W and the P02 clock) were used during debug. The pins are not used in the final application. This also applies to all the port A pins which are configured as outputs. External interrupts are enabled on positive edges so that the RDS clock can interrupt the microprocessor when each data bit is available. Timer B runs as a real-time clock with interrupts every 125 ms. Correct operation of this clock in the absence of an RDS signal requires that a 4.194 MHz crystal be used (the trimmer on pin 6 should be adjusted for accurate timekeeping). Timer A's pre-scaler is set up to divide by 64; this causes the idle loop to cycle at 64Hz. The reset routine also initialises the LCD module (the display shows Mon 0 inv 00:00 until a valid group 4A is received), clears the RAM and calls a subroutine (INITD) to initialise the RAM locations used for displaying data.

Lines 114-118 and 193-208 are commented out as they are only relevant when de-bugging using the E0BUG monitor (reference 2).

The idle loop (IDLE) regularly checks the local keyboard for a keypress, compares the current time with the alarm time and performs other time-dependent functions related to the display modules and the sleep timer.

The keyboard software (KBD) scans the 4-key matrix for a keypress every 16ms. If the same key is held pressed for 3 successive scans, it acts on this key function by calling the relevant subroutine (ALARM, ONOFF, SLEEP or RDS). This software also controls the repeat rate of the SLEEP and RDS keys. This rate is set at 6Hz (after an initial 750ms delay) when the keys are used to change the alarm time and 1Hz for their normal function. The other keys do not repeat if held down. Table 4 shows the functions available in each mode.

 Table 4. Key functions

MODE	KEY								
WIODE	On/Off	Sleep	Alarm	RDS					
Standby (Off)	mode normal (On)		mode alarm	_					
Normal (On)	mode stndby (Off)	mode sleep (On)	mode didimi	RT PTY PI TA/TP PIN(h) PIN(d) MJD MS/DI EON 1 : :					
Alarm OFF	mode stridgy (Orr)		mode alarm ON						
Alarm ON	mode alarm set-up		mode alarm OFF						
Alarm SET UP	toggle hr/min	dec. hr/min		inc. hr/min					

The On/Off key uses the subroutine ONOFF to toggle between ON and standby. A port pin (3,PORTE) can be used to control the power to the VHF radio and/or other external hardware. In standby mode, with the alarm disabled, the time and date are displayed. If the alarm is enabled, the alarm time is displayed. In the ON mode the time is displayed along with the current RDS PS-name. Table 5 shows these display formats.

Table 5. Display formats

	Display mode	Format
Standby	Alarm off	Thu 30 Apr 18:05
(Off)	Alarm off, no CT	Mon 0 inv 0:00
	Alarm on	0659 ALARM 18:05
Normal	With RDS PS name	BBC R4 18:05
(On)	Without RDS	18:05
Alarm	Alarm off	Alarm - OFF
	Alarm on	Alarm - 6:59
Sleep		Sleep 60 min.
RDS	RT	BBC Radio 4
	PTY	News
	PI	PI code - C204
	TA & TP	TP - 0 TA - 1
	PIN(hex)	PIN no F480
	PIN(decod)	30th at 18:00
	MJD	MJ day - 48742
	MS & DI	M/S M DI 15
	EON 1	BBC R3 92.10
	2	BBC R.Sc 103.60
	3	BBC Nwcl 96.00
	4	BBC Scot 94.30
	5	BBC Mtme 92.50
	6	BBC Twed 93.50
	7	BBC R5 909kHz
	8	BBC Eng. 100.00
	9	BBC R1 99.50
	10	BBC R2 89.90
	11	

The Alarm key calls the subroutine ALARM which displays the current alarm status. A second press changes the alarm armed status. When the alarm is armed, the alarm time is displayed. In this mode the On/Off key can be used to select either hours or minutes (indicated by flashing) and the Sleep and RDS keys used to increment and decrement the settings. If the alarm has triggered then the first press of any key cancels it. The alarm display has one of the two alarm formats shown in Table 5 according to whether or not the alarm is armed. As all the keys have a special function in the alarm mode the only way to exit this mode is to wait for a timeout. If no keys are pressed for 5 seconds, the mode returns to normal.

The Sleep key controls the sleep timer. If the decoder is in the standby mode the first press of Sleep switches it on and initialises the sleep time to 60 minutes. When the sleep timer is running, this is indicated by a flashing decimal point in the right-most character of the display modules. Subsequent presses of the Sleep key decrement the time remaining by 5 minutes. When the sleep time has elapsed, the decoder returns to standby. In the alarm set-up mode this key decrements the alarm time.

The RDS key uses subroutine RDS to step through the various RDS data which can be displayed. Holding down this key steps through the displays at 1Hz. The displays are RT (scrolling), PTY, PI, TA/TP, PIN (hex), PIN (decoded), MJD, MS/DI and EON (11 networks) as shown in Table 5. In the alarm set-up mode this key increments the alarm time.

The timer interrupt routine (TINTB) updates the RT scrolling pointers (DISP1 and DISP2). These pointers are incremented regularly whether or not an RT display is active. In this way, the software can be easily converted to using a 2-line LCD module in which the top line is the normal display of PS-name and time and the lower line a permanent display of scrolling RT. The timer interrupt also decrements the sleep timer and updates the RAM locations used to store hours, minutes, seconds and eighth-seconds. All RDS data (except date and time) is cleared by this routine if no valid RDS data is detected for a period of 10 seconds.

SYNDROME AND CONFIDENCE

Hardware interrupts are vectored to jump to SDATA where serial data is received from the RDS demodulator. The clock edge causes an interrupt and the first instruction reads the data into the carry bit of the condition code register. The bit is shifted into a 4-byte RAM register and the matrix multiplication performed. The state of flag 0,STAT2, determines if the multiplication is to take place after every bit or only after all 26 bits have arrived. The multiplication is performed using two EOR instructions for every bit (two are required as the 10-bit syndrome requires two bytes). As the top of the matrix (see Figure 2.) is the unity matrix, the first 10 bits are transferred directly into the syndrome RAM locations (SYN). This, the omission of any EOR #\$00 instructions, the reordering of the bits and the use of the index register for temporary storage help to reduce the length of inline code in this routine. The routine could be shortened by using a loop but this would incur an unacceptable penalty in execution time. Microprocessors with two accumulators would find this task a lot simpler and quicker but an MC68HC05E0, at half its maximum speed, can easily perform the calculation in the required time.

After the multiplication has been performed the resultant 10-bit number is compared with the allowed syndromes (see Table 3). The variable LEV records the current block level. It is initially zero but incremented each time a valid syndrome is found. When it is zero only syndrome A is accepted, if this is found then syndrome B is expected 26 bits later so when LEV is one only syndrome B is accepted. If an invalid syndrome is found LEV is cleared, the syndrome confidence level CONF is decremented and the interrupt ended.

When a valid syndrome is found, CONF in increased by 4 and the 16 data bits saved in the relevant bytes of TMPGRP. If the valid syndrome is type D then a complete group has been received and all 8 bytes are transferred to the 8 RAM locations at GROUP. This double buffer means that the data in GROUP can be used while interrupts are overwriting TMPGRP with new data.

The confidence level CONF is used to decide what should be done if the data becomes unreliable due to a poor RF input to the receiver. When the first valid syndrome is found it is initialised to 42. Subsequent valid syndromes increment it by four and invalid ones decrement it by 1. If CONF falls below 41, then it is assumed that synchronisation has been lost and a bit-by-bit re-synchronisation is carried out. If it falls below 10, the signal is deemed unacceptable and the displays are re-initialised. The confidence level is not incremented by the detection of a valid syndrome if it is higher than 56.

GROUPS HANDLED

If a complete group has been received the data can be processed. The buffering used would allow this to be done outside the interrupt but in this case there is sufficient time to do it within the interrupt. The PI code is checked to see if it has changed. If it has changed the displays are initialised. In an application using the AF capability of RDS, more use would be made of the PI code.

Next PTY and TP are updated and the group type identified. Group types 0A, 0B, 1A, 1B, 2A, 4A, 14A and 15B are handled. Table 6 shows the type of information contained in each group and Table 7 shows the detailed structure of the groups actually used.

Group	Features
All	PI, PTY, TP
0	TA, DI, MS, PS, AF
1	PIN
2	RT
3	ON (replaced by EON)
4A	CT
5	TDC
6	INH
14	EON
15B	TA, DI, MS

Table 6. RDS Groups

Group 0 & 15B

As AF data is not handled, there is no difference in the treatment of groups 0A and 0B. PS data is extracted and placed in RAM according to the address bits in block 2 (see Table 7). TA, DI and MS data are then read, DI is sent a single bit at a time and uses the same address bits as the PS name to determine which of the four bits is being updated. Groups of type 15B also contains all this switching information. They are used to increase the repetition rate of this data but contain no PS or AF information.

Group 1

Group types 1A and 1B contain the same data except for the repetition of the PI code in type 1B. The PIN data is recovered and saved in RAM. This is intended for future use to control external hardware, for example a tape recorder. This would facilitate the unattended recording of a pre-selected program. At present this application simply allows the display of PIN data both in its raw hexadecimal form and fully decoded to day-of-month and time. Full use of PIN data would require continuously comparing the PIN day-of-month and time with the current day-of-month and time enabling an I/O pin to be switched when there is a match.

Group 2A

RT data from blocks 3 and 4 is written to RAM according to the address included in block 2. There are four address bits and four ASCII encoded bytes giving the possibility of 64 characters. If the Text A/B flag changes state, the RT area in RAM is cleared, indicating that the message has changed. Group 2B is not handled as it is rarely, if ever, used.

Group 4A

Two of the more complex tasks to be performed are required by the CT calculations for group 4A. These are for the local time difference and the conversion of the MJD number into a recognisable date.

The broadcast time is Universal Coordinated Time (UTC), effectively the same as GMT. Time differences from UTC, including summer (daylight saving) time, are sent as an offset of up to +/- 12 hours in half-hour increments.

The software includes 4-function, 9-digit integral BCD arithmetic which is used to decode the date from the MJD number using the formulae:

Group 14A

This group contains EON data. A large amount of information can be sent using this group, and it can take up to two minutes for all the data to arrive after the radio has been retuned. This application saves the PI code, PS name and principal frequency of up to 11 networks although more networks, each with many frequencies, and other data (e.g. PTY(ON), PIN(ON), TA(ON) etc.) may be sent. Table 5 shows the format of the EON display. All the information shown is real data from the Black Hill transmitter in central Scotland.

Displays

The software drives both a parallel LCD module (based on an HD44780 driver with or without an HD44100) and a serial VFD module (based on an MSC7128 driver) to give a choice of display types. The displays show the same data (within the limitations of their character ROMs).

The display routine (MOD) is executed in the idle loop if flag 3,STAT2 is set. It is set every 125ms by timer B interrupts. If flag 4,STAT2 is set, the display is initialised, indicating no valid RDS data. The LCD module is then updated with new data. Each time anything is written to the module, the subroutine WAIT is used before the write is executed; this checks that the controller in the module is not busy. This is indicated by a low on bit 7, so bit 7 on port C should have a pull-down resistor to satisfy this condition if an LCD module is not being used.

Table 7.

	Blo	ck 1	Block 2		Block 3	ock 3 Block 4		
Group 0 and 15B	PI code	chck A	bit(s) use 15–12: group no. 11: group type 10: TP flag 9–5: PTY code 4: TA flag 3: M/S bit 2: DI bit 1–0: PS/DI address	chck B	AF (PI code in type 0B and 15B)	chck C or C'	PS name (as block 2 for 15B)	chck D
Group 1	PI code	chck A	15–12: 0001 11: group type 10: TP flag 9–5: PTY code 4–0: not used	chck B	not used (PI code in type 1B)	chck C or C'	PIN data 15–11: day-of-month 10–6: hour 5–0: minute	chck D
Group 2A	PI code	chck A	15-12: 0010 11: 0 10: TP flag 9-5: PTY code 4: text A/B flag 3-0: text address	chck B	RT 2 ASCII characters	chck C	RT 2 ASCII characters	chck D
Group 4A	PI code	chck A	15-12: 0100 11: 0 10: TP flag 9-5: PTY code 4-2: not used 1-0: MJD (16-15)	chck B	CT 15–1: MJD (14–0) 0: hour (4)	chck C	CT 15–12: hour (3–0) 11–6: minute (5–0) 5: offset sense 4–0: offset (4–0)	chck D
Group 14A	PI code	chck A	15–12: 1110 11: 0 10: TP flag 9–5: PTY code 4: TP (On) flag 3–0: usage code	chck B	EON information code: 0-3: PS 4: AF 5-9: AF (map) 10-11: not used 12-15: not imp.	chck C	PI (On)	chck D

The listing is shown for use with a divide by 8 multiplexing LCD module. This module will normally contain an HD44780 and an HD44100.

If a divide by 16 module (HD44780 only) is to be used then line 1294 should be replaced by line 1293 and line 1371 commented out to include the execution of the code on lines 1379 to 1392.

The different display formats are selected by checking the various flags and the relevant routine executed. The normal display permanently shows PS name and time. As the locations in RAM used for hours and minutes contain binary numbers they are converted to BCD before being written to the relevant bytes in DISP. Once all 16 bytes in DISP have been loaded, a loop is used to send the data to the LCD module.

The VFD routine sends the same data as is shown on the LCD module to the serial VFD module. The display driver used has a different character set from the standard ASCII set used by the LCD module. The table VTAB is used to convert ASCII data into the required character in the VFD module. The small table INITF is used to send the required initialisation bytes to the VFD module. This module does not require a busy check but does require a delay between successive bytes. This is satisfied by the wait loop within the serial output loop VFDF.

Alarm functions

The alarm time can be entered as described above. If the alarm is enabled (alarm time displayed on first press of the ALARM key, and permanently displayed in standby mode) then, at the alarm time, the auxiliary control line will go high. This can be used to control external hardware, for example to switch on the VHF radio supplying the RDS data. If the auxiliary line is already high (decoder fully on or on via the sleep timer), then it simply stays high. The operation of the sleep timer is not affected if bit 0 of port E is high. If this I/O line is low at the alarm time, then the sleep timer is activated for an hour. This takes place whether the decoder was previously on, off, or running the sleep timer, and has the effect of switching the auxiliary line low an hour after the alarm time, regardless of its condition prior to the alarm.

At the alarm time the alarm output will also be activated (active low) as long as it is enabled by bit 1 of port E being held low. This is intended to drive an alarm sounder. When this output is active, a press of any key cancels it until the next alarm. This cancellation does not affect the auxiliary output.

REFERENCES

- 1 EBU Technical Document 3244, Specifications of the Radio Data System RDS for VHF/FM Sound Broadcasting.
- 2 AN459, A Monitor for the MC68HC05E0.

APPENDIX (listing) follows

0001				******	
0001 0002	*				*
0003	*		HC05E0 RDS	Decoder.	*
0004 0005	* P	. Topping	q	29th February '92	*
0006	*			_	*
0007 0008				*********	* *
0009 0000	PORTA	EQU	\$00 \$01 \$02 \$03 \$04 \$05 \$05 \$06 \$07 \$08 \$09 \$09 \$00 \$08 \$09 \$00 \$09 \$00 \$09 \$09 \$09 \$09 \$09 \$09	PORT A ADDRESS	
0010 0001 0011 0002	PORTB	EQU	\$01	" B "	
0012 0003	PORTD	EQU	\$03	" D "	
0013 0004	PORTE	EQU	\$04	" E "	
0014 0005 0015 0006	PORTAD	EQU	\$05 \$06	PORT A DATA DIRECT:	ION REG.
0016 0007 0017 0008	PORTCD	EQU	\$07	" C " "	
0017 0008	PORTDD	EQU	\$08	" E " "	
0018 0009 0019 000a	TAP	EQU	\$09 \$0A		
0020 000b	TBS	EQU	\$0B	TIMER A PRE-SCALLER TIMER B SCALLER TIMER CONTROL REGIS INTERRUPT CONTROL I PORTD SPECIAL FUNC	•
0021 000c 0022 000e	TCR	EQU	\$0C	TIMER CONTROL REGIS	STER
0023 0012	PORTDSF	EQU	\$12	PORTD SPECIAL FUNCT	TIONS
0024					
0025 0009 0026	ND	EQU	9	No. BCD DIGITS	
0027 0030		ORG	\$0030		
0028	0	DMD	0	Dan wong magnen	2
0029 0030 0030 0039	TMO	RMB	9	BCD WORKING NUMBERS SCRATCH	5
0031 0042	P	RMB	9	WORKING NUMBER 2	
0032 004b 0033 0054	TMP	RMB	9	MULT. OVER. OR DIV WORKING NUMBER 3	. REMAINDER
0033 0054 0034 005d	M.TD	RMB	9	MODIFIED JULIAN DAY	Y NUMBER
0035 0066	YR	RMB	9	YEAR	
0036 006f 0037 0071	MNTH	RMB	2	MONTH	
0037 0071	DOM	RMB	1	DATE DAY OF WEEK	
0039 0074	BMJD	RMB	3	BINARY MJD	
0040 0077 0041 0078	DIST	RMB	1	DISPLAY TRANSIENT T SLEEP TIMER MINUTES	TIMEOUT COUNTER
0042 0079	RDSTO	RMB	1	RDS TIMEOUT COUNTER	R
0043 007a	DAT	RMB	4	SERIAL DATA BUFFER	
0044 007e 0045 0086	GROUP	RMB	8	TEMPORARY GROUP DATE	ΓA
0046 008e 0047 008f	PTY	RMB	1	COMPLETE GROUP DATA PROGRAM-TYPE CODE PROGRAM IDENTIFICAT PROGRAM ITEM NUMBER	(CURRENT)
0047 008f	PI	RMB	2	PROGRAM IDENTIFICAT	TION CODE
0048 0091 0049 0093	LEV	RMB RMB	1	VALID BLOCK LEVEL	K
0050 0094	BIT	RMB	ī	BIT LEVEL	
0051 0095	ITMP1	RMB	1	TEMP BYTE FOR USE	IN IRQ
0052 0096 0053 0098	CONF	RMB	1	SYNDROME SYNDROME CONFIDENCE	₹.
0054 0099	TH8	RMB	1	SYNDROME CONFIDENCE TICS (EIGHTHS OF SE	ECONDS)
0055 009a 0056 009b	SEC	RMB	1	SECONDS MINUTES	
0056 009B	OUR	RMB	1	HOURS	
0058 009d	AMIN	RMB	1	ALARM MINUTES	
0059 009e 0060 009f	AOUR DIGD1	RMB	1	ALARM HOURS RT DISPLAY POINTER	#1
0061 00a0	DISP1	RMB	1	RT DISPLAY POINTER	#2
0062 00al	W1	RMB	1	W	
0063 00a2 0064 00a3	W2 W3	RMB	1	O R	
0065 00a4	W4	RMB	ī	K	
0066 00a5	W5	RMB	1	I	
0067 00a6 0068 00a7	W6 W7	RMB	1	N G	
0069 00a8	W8	RMB	ī		
0070 00a9 0071 00aa	KEY	RMB	1	CODE OF PRESSED KEY KEYBOARD COUNTER	Y
0071 00da 0072 00ab	CARRY	RMB	1	BCD CARRY	
0073 00ac	COUNT	RMB	1	LOOP COUNTER	
0074 00ad 0075 00ae	NUM1	RMB	1	1ST No. POINTER (AI	DD & SUBTRACT)
0076 00af 0077 00b0	RTDIS	RMB	ī	2ND No. POINTER (AI RDS DISPLAY TYPE	DD w DODINGOI,
0077 00b0	DI	RMB	1	DECODER IDENTIFICAT	TION
0078 00bl 0079 00cl	Q TMQ P TMP P TMP R MJD YR MMJD YR MMJD YR MMJD YR MMJD DIST SLEPT DAT TMPGRP GROUP PTY PI LEV BIT LITMP1 SYON FIRE SEC MIN CONF THE CONF THE CONF THE W2 W3 W4 W5 W6 W7 W8 KEY KOUNT KEY KOUNT NUM1 NUM2 RTDISP DISP PSN	RMB	8	LCD MODULE BUFFER PS NAME	
0080					
0081 00c9 0082	STAT2	RMB	1	0: VALID SYNDROME 1: VALID GROUP	
0082	*			2: RT DISPLAY	
0084	*			3: UPDATE DISPLAY	
0085 0086	*			4: CLEAR DISPLAY 5: SPACE FLAG	
0087 00ca	STAT3	RMB	1	0: M/S, 0: M, 1: S	
0088	*			1: TEXTA/TEXTB BIT	(RT)
0089	*			2: TA FLAG 3: TP FLAG	
0091	*			4: KEY REPEATING	
0092	*			5: KEY FUNCTION PER	RFORMED
0093 0094 00cb	STAT4	RMB	1	6: UPDATE DATE 0: DISPLAY TRANSIEN	NT
0095	*		_	1: SLEEP TIMER RUNN	
0096	*			2: SLEEP DISPLAY	
0097 0098	*			3: ALARM DISPLAY 4: ALARM ARMED	
0099	*			4: ALARM ARMED 5: ALARM SET-UP	
0100 0101	*			6: ALARM HOURS (SET 7: RDS DISPLAYS	r-UP)
0101				/· KDS DISPLAIS	
0103 00cc			33	not used	
0104 00ed 0105 00ff	STACK SP		18 1	19 BYTES USED (1 IN AND 7 NESTED SUBROU	
0106	OT.	MIN	-	WAY I MEDIED DORKOL	O T TIMES /
0107 0100		ORG	\$0100		
0108 0109 0100	RT	RMB	69	RADIOTEXT	
0110 0145	EON		176	EON DATA (MAX: 11 h	NETWORKS)

```
0112 e000
                                                                                                          $E000
 0113
0114
                                                                      *STRST
                                                                                                            START
                                                                                                                                                 RESET VECTOR
                                                                                                                                                                                                                   ($0400 DURING DE-BUG)
                                                                                                                                                 IRQ ($0403 DURING DE-BUG)
TIMER A INTERRUPT (NOT USED, $0406 DURING DE-BUG)
TIMER B INTERRUPT ($0409 DURING DE-BUG)
SERIAL INTERRUPT (NOT USED, $040C DURING DE-BUG)
 0115
0116
                                                                     *IRQ
*TIMERA
                                                                                         JMP
                                                                                                            SDATA
                                                                                        JMP
                                                                                                            START
 0117
0118
0119
                                                                     *TIMERB
*SERINT
                                                                                                            TINTB
                                                                                       Reset routine - setup ports.
 0122
0123
 0124
0125
0125

0126 e000 a6 c3

0127 e002 b7 12

0128 e004 a6 45

0129 e006 b7 0e

0130 e008 a6 01

0131 e00a b7 0b

0132 e00c a6 3f

0133 e00e b7 0a

0134
                                                                                                                                              ENABLE PORTD SPECIAL FUNCTIONS
P02, R/W, A14 & A15 (0,1,6,7)
ENABLE POSITIVE EDGE/LEVEL
INTERRUPTS
TIMER B SCALER: /2
125 MS INTERRUPTS (4.194 MHz XTAL)
TIMER A PRE-SCALER: /64
64Hz IDLE LOOP
                                                                                                         #$C3
PORTDSF
#$45
ICR
#1
TBS
                                                                     START
                                                                                       T<sub>1</sub>DA
                                                                                        LDA
                                                                                        STA
                                                                                        T<sub>1</sub>DA
                                                                                                          #63
TAP
                                                                                        STA
0134

0135 e010 3f 00

0136 e012 a6 ff

0137 e014 b7 05

0138 e016 3f 01

0139 e018 a6 cb

0140 e01a b7 06

0141 e01c 3f 02

0142 e01c a6 ff

0143 e020 b7 01

0144 e022 a6 3c

0145 e024 3f 03

0146 e026 b7 08

0147 e028 a6 0c

0148 e02a b7 04

0149
                                                                                       CLR
LDA
STA
CLR
                                                                                                          PORTA
#$FF
PORTAD
PORTB
                                                                                                                                               EOBUG DISPLAY/KEYBOARD I/O
NOT USED IN RDS APPLICATION
0, 1: SERIAL CLOCK AND DATA
2: RDS DATA IN, 3: VFD SELECT
4, 5: KEYBOARD IN, 6, 7: KEYBOARD OUT
                                                                                        LDA
STA
                                                                                                          #$CB
PORTBD
                                                                                                         PORTBD
PORTC
#$FF
PORTCD
#$3C
PORTD
PORTDD
                                                                                       CLR
LDA
STA
LDA
CLR
                                                                                                                                               ALL OUT, LCD DATA BUS
                                                                                                                                              BITS 2, 3 & 4 OUT, LCD
2: RS, 3: R/W, 4: CLOCK, 5: LED (TA=TP=1)
0, 1, 6 & 7 USED DURING DE-BUG
BITD: INPUT, ENABLE SLEEP TIMER AT ALARM TIME
BITI: INPUT, ENABLE ALARM OUTPUT
BIT2: ALARM OUTPUT (ACTIVE LOW)
BIT3: RADIO ON OUTPUT (ACTIVE HIGH)
                                                                                        STA
                                                                                        LDA
STA
                                                                                                          #$0C
PORTE
 0149
0150 e02c b7 09
                                                                                        LDA
                                                                                                          #$0C
PORTED
  0151
 0151
0152
0153
0154
0155
                                                                     ***********
                                                                                       Initialise LCD.
 0156
0157
0157

0158 e02e a6 30

0159 e030 cd eb 65

0160 e033 cd eb e6

0161 e036 cd eb e6

0162 e039 cd eb e6

0163 e03c cd eb e6

0164 e03f a6 30

0165 e041 cd eb 65
                                                                                                         #$30
CLOCK
CLREON
CLREON
CLREON
                                                                                       T-DA
                                                                                                                                               INITIALISE LCD
                                                                                                                                               4 TIMES TO PROVIDE A 5mS DELAY FOR LCD MODULE INITIALISATION
                                                                                        JSR
                                                                                        JSR
                                                                                                          CLREON
                                                                                       LDA
JSR
                                                                                                          #$30
CLOCK
                                                                                                                                              INITIALISE LCD
0166
0167 e044 ae 30
0168 e046 7f
0169 e047 5c
0170 e048 a3 ed
0171 e04a 26 fa
0172 e044 ac 26
  0166
                                                                                       I'DX
                                                                                                          #Q
0,X
                                                                                                                                              INITIALISE RAM
                                                                                       CLR
INCX
CPX
                                                                    CLOOP
                                                                                                                                               PROVIDES A 1mS DELAY FOR LCD
                                                                                                          #STACK
CLOOP
                                                                                        BNE
 0173 e04c a6 30
0174 e04e cd eb 65
                                                                                                          #$30
                                                                                       JSR
                                                                                                          CLOCK
                                                                                                                                               INITIALISE LCD
 0174 e04e cd eb 65
0175
0176 e051 cd eb 6c
0177 e054 a6 30
0178 e056 cd eb 65
0179 e059 cd eb 6c
0180 e05c a6 08
0181 e05c a6 08
0181 e05c de b6c
0182 e061 cd eb 6c
0183 e064 a6 01
0184 e066 cd eb 65
0185 e069 cd eb aa
                                                                                                         WAIT
#$30
CLOCK
WAIT
#$08
CLOCK
                                                                                       JSR
LDA
JSR
JSR
LDA
                                                                                                                                               1-LINE DISPLAY
LATCH IT
                                                                                                                                               SWITCH DISPLAY OFF
                                                                                       JSR
                                                                                                                                               LATCH IT
                                                                                                          WAIT
#$01
CLOCK
INITD
                                                                                       JSR
                                                                                       T.DA
                                                                                                                                               CLEAR DISPLAY
                                                                                       JSR
JSR
                                                                                                                                               LATCH IT
                                                                     ***********
 0188
0189
                                                                                       Vectors for de-bug using EOBUG monitor.
 0190
0191
 0191
0192
0193
0194
0195
0196
                                                                                                                                                 ENABLE EXTERNAL RAM WRITE
                                                                                         STA
                                                                                                            TCR
                                                                                                             #$04
                                                                                          LDA
                                                                                                                                                 VECTORS FOR EO MONITOR
  0197
0198
                                                                                          STA
STA
                                                                                                             $0201
$0204
                                                                                                                                                 USING JUMP TABLE AT $0400
                                                                                          STA
STA
LDA
STA
LDA
  0199
                                                                                                             $0207
                                                                                                             $020A
                                                                                                                                                 (LINES 126-130)
 0201
0202
0203
0204
                                                                                                            #$03
$0202
#$06
$0205
                                                                                                                                                TIMER A ($0406)
                                                                                          STA
  0205
0206
                                                                                          LDA
                                                                                                             #$09
                                                                                                             $0208
                                                                                                                                                TIMER B ($0409)
                                                                                          STA
 0206
0207
0208
0209
0210
0211
0212
                                                                                          LDA
                                                                                                            $020B
                                                                                       Enable interrupts.
                                                                     ***************
  0214
  0215
                                                                                                                                               EDGE SENSITIVE IRQ, TIMERS A & B ENABLED SUB-SYS CLK = 262144 Hz (4.194 \text{ MHz XTAL}) DISSABLE EXTERNAL RAM WRITE
 0216 e06c a6 0b
0217 e06e b7 0c
                                                                                        T-DA
                                                                                                          #$0B
 0218
0219 e070 9a
```

0221	*****	*****	******	*********
0222 0223	*	Idle lo	op.	*
0224 0225	*			*
0226			4 = an .	64.11
0227 e071 09 0e fd 0228 e074 19 0e 0229	IDLE	BRCLR BCLR	4,ICR,* 4,ICR	64 Hz
0230 e076 01 cb 07 0231 e079 b6 77	NO2D	LDA	DIST	DISPLAY TRANSIENT ?
0232 e07b 26 03 0233 e07d cd e8 0a 0234		JSR	NOPS CLTR	YES, TIMED OUT ? YES, CLEAR TRANSIENT DISPLAYS
0235 e080 07 c9 05 0236 e083 cd e6 b6 0237 e086 17 c9	NOPS	BRCLR JSR BCLR	MOD	DISPLAY UPDATE REQUIRED ? YES, DO IT AND CLEAR FLAG
0238 0239 e088 09 cb ld 0240 e08b b6 9e 0241 e08d b1 9c 0242 e08f 26 17 0243 e091 b6 9d 0244 e093 b1 9b 0245 e095 26 11 0246 e097 b6 9a 0247 e099 26 0d 0248 e09b 16 04	SCAN	LDA CMP BNE LDA CMP BNE LDA BNE	CHSLP AMIN MIN CHSLP	ALARM ARMED ? YES, COMPARE ALARM HOURS WITH TIME SAME ? YES, COMPARE ALARM MINUTES WITH TIME SAME ? ONLY ALLOW MAKE-UP IN FIRST SECOND TO PREVENT SWITCH-OFF LOCKOUT YES, SWITCH ON
0250 e09d 02 04 02 0251 e0a0 15 04	FULON2	BCLR	2.PORTE	ALARM ENABLED (SWITCH) ? YES, SOUND ALARM SLEEP TIMER AT ALARM TIME ?
0253 e0a5 cd e2 09 0254		JSR	INSLP	YES, START SLEEP TIMER
0255 e0a8 03 cb 08	CHSLP	BRCLR	1,STAT4,FLN	SLEEP TIMER RUNNING ?
0256 e0ab b6 78 0257 e0ad 26 04		LDA BNE	SLEPT FLN	TIME TO FINISH ?
0258 e0af 13 cb 0259 e0bl 17 04 0260		BCLR BCLR	1,STAT4 3,PORTE	YES, CLEAR FLAG AND SWITCH OFF
0261 e0b3 cd e1 11 0262 e0b6 cd e1 6f	FLN	JSR JSR	KBD KEYP	READ KEYBOARD EXECUTE KEY
0264 e0b9 b6 ca 0265 e0bb a4 0c		LDA	STAT3	
0266 e0bd al 0c		AND CMP	#\$0C #\$0C	TA AND TP BOTH HIGH ?
0267 e0bf 27 07 0268 e0cl 0a 03 09		BEQ	TATP	
0269 e0c4 la 03 0270 e0c6 20 05		BSET	5,PORTD	NO, I/O LINE ALREADY HIGH ? NO, MAKE IT HIGH
0271 e0c8 0b 03 02 0272 e0cb 1b 03	TATP	BRA BRCLR BCLR	IOOK	TA=TP=1, I/O LINE ALREADY LOW ? NO, MAKE IT LOW
0273 0274 e0cd 0d ca 02	IOOK	BRCLR	6,STAT3,IDLEJ	UPDATE DATE ?
0275 e0d0 ad 02 0276 e0d2 20 9d	IDLEJ	BSR	MJDAT IDLE	YES, CONVERT FROM MJD
0277 0278	*****	*****	******	*****
0279 0280	*	Evtroat	MJD and convert	to dogimal *
0281	*			**************************************
0282 0283	*****	******	*****	******
0284 e0d4 b6 76	MJDAT	LDA STA	BMJD+2 YR+2	
0285 e0d6 b7 68 0286 e0d8 b6 75		LDA	BMJD+1	
0287 e0da b7 67 0288 e0dc b6 74		STA LDA	YR+1 BMJD	
0288 e0dc b6 74 0289 e0de b7 66		STA	YR	
0290 e0e0 ae 54 0291 e0e2 bf ad		LDX STX	#R NUM1	CLEAR
0292 e0e4 cd ef 86 0293 e0e7 3c 5c 0294 e0e9 ae 5d		JSR INC	CLRAS R+ND-1	R R <- 1
0294 e0e9 ae 5d		LDX	#MJD	R <- 1
0295 e0eb cd ef 86		JSR LDA	CLRAS #17	CLEAR MJD 17 BITS TO CONVERT
0296 e0ee a6 11 0297 e0f0 b7 a6		STA	W6	I/ BIIS TO CONVERT
	LOOPJ	LSR ROR	YR YR+1	MOVE OUT
0300 e0f6 36 68		ROR	YR+2	FIRST (LS) BIT
0301 e0f8 24 07 0302 e0fa ae 5d		BCC LDX	NXTJ #MJD	ZERO ? ONE, ADD
0303 e0fc bf ae		STX	NUM2	CURRENT VALUE
0304 e0fe cd ee 33 0305 e101 ae 54	NXTI	JSR LDX	ADD	OF R ADD R
0306 e103 bf ae	D.I.YM	STX	#R NUM2	ADD R TO
0306 e103 bf ae 0307 e105 cd ee 33		JSR	ADD	ITSELF
0308 e108 3a a6 0309 e10a 26 e6		DEC BNE	W6 LOOPJ	ALL DONE ?
0310 e10c ld ca		BCLR	6,STAT3	MJD UPDATED
0311 el0e cc ef 95		JMP	MJDC	CONVERT MJD TO DAY, DATE, MONTH & YEAR

0313	*****	*****	******	*****
0314 0315	*	Varibaan	d routine.	*
0316	*			*
0317 0318				******
0319 e111 a6 20	KBD	LDA	#\$20	
0320 e113 ae 02 0321 e115 48	KEY1	LDX LSLA	#2	SELECT ROW BITS 6 & 7 ONLY VFD ENABLE HIGH READ KEYBOARD ANY INPUT LINE HIGH ? NO, TRY NEXT COLUMN LAST COLUMN ?
0322 el16 a4 c0		AND	#\$C0	BITS 6 & 7 ONLY
0323 el18 aa 08 0324 ella b7 01		ORA	#\$08 PORTB	VFD ENABLE HIGH
0325 ellc b6 01	ROW	LDA	PORTB	READ KEYBOARD
0326 elle a5 30 0327 el20 26 07		BIT	#\$30 T.1	ANY INPUT LINE HIGH ?
0328 e122 5a		DECX		NO, TRY NEXT COLUMN
0329 e123 26 f0 0330 e125 3f a9		CLR	KEY1	LAST COLUMN ? YES NO KEY PRESSED
0331 e127 20 Oc		BRA	EXIT	NO, TRY NEXT COLUMN LAST COLUMN ? YES, NO KEY PRESSED
0332 0333 e129 b6 01				READ KEYBOARD
0334 e12b a4 f0		AND	#\$F0	
0335 e12d b1 a9 0336 e12f 27 04		BEQ	EXIT	SAME AS LAST TIME ?
0337 e131 b7 a9 0338 e133 3f aa 0339 e135 3c aa		STA	KEY	NO, SAVE THIS KEY
0338 e133 31 aa 0339 e135 3c aa	EXIT	INC	KOUNT	YES, THE SAME
0340 e137 b6 aa		LDA	KOUNT	DEDUNCTION O
0341 e139 09 ca 04 0342 e13c al 0a		CMP	4,STAT3,NRML #10	NO, 3 THE SAME ? IF NOT DO NOTHING IF 3 THEN PERFORM KEY FUNCTION MORE THAN 3, MORE THAN 48 (750mS) ? TIME TO DO SOMETHING ? NO KEY PRESSED ?
0343 e13e 20 08		BRA	GON2	
0344 e140 a1 03 0345 e142 25 29	NRML	BLO	#3 KCLC	IF NOT DO NOTHING
0346 e144 27 lb 0347 e146 a1 30		BEQ	GOON	IF 3 THEN PERFORM KEY FUNCTION
0347 e146 a1 30 0348 e148 22 06	GON2	BHI	GOON2	TIME TO DO SOMETHING ?
0349 e14a b6 a9		LDA	KEY	NO
0350 e14c 27 19 0351 e14e 98		CLC	RKEY	KEY PRESSED ?
0352 e14f 81 0353		RTS		YES BUT DO NOTHING
0354 e150 b6 a9	GOON2	LDA	KEY #\$50 GOON3 #\$90 DNT2	
0355 e152 a1 50 0356 e154 27 04		CMP	#\$50 GOON3	SLEEP (DEC.)
0357 e156 al 90		CMP	#\$90	RDS (INC.)
0358 e158 26 0f	COOMS	BNE	DNT2 5 STAT4 DNT2	IF NOT A REPEAT KEY, DO NOTHING
0360 e15d 18 ca	GOONS	BSET	4,STAT3	YES, SET REPEAT FLAG
0361 e15f 3f aa	COOM	CLR	KOUNT	
0363 e163 27 02	GOON	BEQ	RKEY	SOMETHING TO DO ?
0364 e165 99 0365 e166 81		SEC		RDS (INC.) IF NOT A REPEAT KEY, DO NOTHING REPEAT KEY, BUT IS MODE ALARM SET-UP ? YES, SET REPEAT FLAG SOMETHING TO DO ? YES, SET C
0366 e167 lb ca	RKEY	BCLR	5,STAT3	NO, CLEAR DONE FLAG
0367 e169 19 ca 0368 e16b 3f aa	DNT2	BCLR	4,STAT3	CLEAR REPEAT FLAG
0368 e16b 3f aa 0369 e16d 98 0370 e16e 81	KCLC	CLC	1100111	YES, SET C NO, CLEAR DONE FLAG CLEAR REPEAT FLAG CLEAR COUNTER
0370 e16e 81 0371				
0372 0373	******	******	******	**********
0374	*	Execute	key function.	*
0375 0376	*	*****	******	*
0377				
0378 e16f 24 26 0379 e171 b6 a9	KEYP KEYP2	BCC LDA	DNT KEY	ANYTHING TO DO ? YES, GET KEY
0360 E1/3 a1 30		CMP	#\$50	YES, GET KEY SLEEP (DEC.)
0381 e175 27 07 0382 e177 a1 90		CMP	#\$90	RDS (INC.)
0383 e179 27 03		CMP BEQ CMP BEQ BRSET	RPT	
0384 e17b 0a ca 19 0385		BRSEI	5,SIAI3,DNI	NOT A REPEAT KEY, DONE FLAG SET ?
0386 e17e 5f 0387 e17f d6 e1 98	RPT	CLRX	5,STAT3,DNT CTAB,X KEY PJ LAST DNT	FETCH KEYCODE
0388 e182 b1 a9	KU	CMP	KEY KEY	THIS ONE ?
0389 e184 27 0b 0390 e186 c1 e1 a4		BEQ	PJ	YES
0390 e186 C1 e1 a4 0391 e189 27 0c		BEQ	DNT	NO, LAST CHANCE ? YES, ABORT
0392 e18b 5c		INCX		NO TROY
0393 e18c 5c 0394 e18d 5c		INCX		TRY THE
0395 e18e 5c		INCX BRA	RJ	NEXT KEY
0396 e18f 20 ee 0397 e191 la ca	PJ			KEY FUNCTION DONE
0398 e193 5c 0399 e194 dd e1 98		INCX JSR	CTAB,X	
0400 e197 81	DNT	RTS	CIAD,A	
0401 0402	*****	******	******	*****
0403	*			*
0404 0405	*		d jump table.	*
0406	*****	******	******	*******
0407 0408 e198 60	CTAB	FCB	\$60	ALARM
0409 e199 cc e1 a8 0410 e19c a0		JMP FCB	ALARM	ON/OFF
0411 e19d cc e1 c7		JMP	ONOFF	
0412 ela0 50 0413 elal cc el fa		FCB JMP	\$50 SLEEP	SLEEP TIMER START
0414 ela4 90	LAST	FCB	\$90	RDS DISPLAYS
0415 ela5 cc e2 26		JMP	RDS	

0417		*****	******	*******	
0418 0419	*	Alarm k	ey.		*
0420 0421	*	*****	******	******	*
0422	ALARM	DDCI D	2, PORTE, ALRG	AT ADM DINCING 2	
0424 elab 07 cb 0b 0425 elae 09 cb 04 0426 elbl 19 cb	ALARM	BRCLR BRCLR BCLR	3,STAT4,ADON 4,STAT4,ALOF	ALARM RINGING ? NO, ALARM DISPLAY ON YES, ALARM ON ? YES, SWITCH OFF	?
0427 e1b3 20 09 0428 e1b5 18 cb	ALOF	BRA BSET	UDCNT 4,STAT4	NO, SWITCH ON	
0430 elb9 cd e8 0a	ADON	BRA JSR	UDCNT CLTR		
0431 elbc 16 cb 0432 elbe 1b cb 0433 elc0 a6 19	UDCNT	BCLR	3,STAT4 5,STAT4 #25	ALARM DISPLAY FLAG CANCEL SET-UP 3 SECOND TIMEOUT	
0434 elc2 b7 77 0435 elc4 10 cb		STA	DIST	SET DISPLAY TRANSIENT	PIAC
0436 elc6 81	ABOA	RTS	U,SIRI4	SEI DISPLAI IRANSIENI	FLAG
0437 0438	*****	*****	******	*******	***
0439 0440	*	On/off	key (alarm set-u	p).	*
0441 0442	******	*****	******	*******	*
0443 0444 elc7 05 04 2d	ONOFF	BRCLR	2, PORTE, ALRG	ALARM RINGING ?	
0445 elca 07 cb 1c 0446 elcd 09 cb 19		BRCLR BRCLR	3,STAT4,NOTALR 4.STAT4.NOTALR	NO, ALARM DISPLAY ? YES. ALARM ARMED ?	
0447 eld0 0a cb 0b		BRSET	5,STAT4,AISM	YES, ALARM ARMED ? YES, ALREADY SET-UP MODE	MODE ?
0448 eld3 la cb 0449 eld5 lc cb		BSET	6,STAT4	WITH HOURS	4
0450 eld7 a6 50 0451 eld9 b7 77 0452 eldb 10 cb	A5SD	LDA STA	#80 DIST	SET DISPLAY TRANSIENT	PIAC
0453 eldd 81	NTB2	RTS			FLAG
0454 0455 elde 0c cb 04 0456 elel 1b cb	AISM	BRSET	6,STAT4,MSM 5,STAT4 A5SD	SET-UP HOURS ? NO, CANCELL SET-UP	
	MSM	BRA BCLP		YES, MAKE IT MINUTES	
0458 ele5 1d cb 0459 ele7 20 ee 0460	HOH	BRA	A5SD	IBO, MAKE II MINOIEO	
0461 0462	******	******	******	*******	***
0463 0464	*	On/off	key (normal func	tion).	*
0465	*****	*****	******	*******	***
0466 0467 ele9 cd e8 0a	NOTALR	JSR	CLTR	CLEAR DISPLAY TRANSIE	ENTS
0468 elec 13 CD		BCLK	3, PORTE, ALRON	CANCEL SLEEP TIMER ON ?	
0471 elf3 81	SODM	RTS		NO, SWITCH ON	
0472 elf4 17 04	ALRON	BCLR RTS	3,PORTE	YES, SWITCH OFF	
0473 elf6 81 0474 elf7 14 04 0475 elf9 81	ALRG	BSET	2,PORTE	CANCEL ALARM	
0476 0477				******	
0478	*				*
0479 0480	*	Sleep k	_		*
0481 0482			******	*******	***
0483 elfa 05 04 fa 0484 elfd 0b cb 03	SLEEP	BRCLR BRCLR	2, PORTE, ALRG 5, STAT4, NOTAL	ALARM RINGING ? NO, ALARM SET-UP ?	
0485 e200 cc e2 79 0486 e203 04 cb 10	NOTAL	JMP BRSET	PDEC	YES NO, ALREADY SLEEP DIS	SPLAY ?
0487 e206 02 cb 06	INSLP	BRSET	1,STAT4,STR2	NO, SLEEP TIMER ALREA NO, INITIALISE SLEEP	ADY RUNNING ?
0488 e209 a6 3c 0489 e20b b7 78 0490 e20d 12 cb	INDLI	STA	SLEPT		
0491 e20f cd e8 0a	STR2	JSR_	1,STAT4 CLTR 2,STAT4	START SLEEP TIMER YES, CLEAR DISPLAY TR	RANSIENTS
0493 e214 20 08		BRA	SLPTOK	SLEEP DISPLAY NO DECREMENT IF FIRST	TIME
0494 e216 b6 78 0495 e218 a0 05	DECS	LDA SUB	SLEPT #5	DECREMENT SLEEP TIMES	2
0496 e21a b7 78 0497 e21c 2b eb		STA BMI	SLEPT	IF UNDERFLOW WRAP ROU	IND TO 60
0498 e21e a6 19 0499 e220 b7 77	SLPTOK		#25 DIST	II ONDERGEON MAIL NO	
0500 e222 10 cb 0501 e224 20 cb		BSET		START DISPLAY TRANSIE	ENT
0502 0503				******	
0504	*				*
0505 0506	*		play key.		*
0507 0508					***
0509 e226 05 04 ce 0510 e229 0a cb 29	RDS	BRCLR BRSET	2,PORTE,ALRG 5,STAT4,PINC	ALARM RINGING ? NO, ALARM SET-UP ?	
0511 e22c 07 04 17 0512 e22f 0e cb 03		BRCLR	3, PORTE, SRT3	NO, STANDBY ?	
0513 e232 05 c9 12	NOMPH	BRCLR	2,STAT2,NORT	ALREADY RDS ? ALREADY RT DISPLAY ? SET RDS DISPLAY FLAG	
0515 e237 b6 af	NOTRT	LDA	7,STAT4 RTDIS	MOVE ON	
0516 e239 4c 0517 e23a al 13		INCA CMP	#19		
0518 e23c 27 09 0519 e23e b7 af		BEQ STA	NORT RTDIS		
0520 e240 a6 64 0521 e242 b7 77		LDA		12 SECOND TIMEOUT	
0522 e244 10 cb	SRT3			RE-START TRANSIENT TO	MEOUT
0524	NORT		CLTR	CLEAR DISPLAY TRANSIE	ENTS
0526 e24a 14 c9	1,01(1	BSET LDA	2,STAT2 #9	SET RT DISPLAY FLAG	
0527 e24c a6 09 0528 e24e b7 9f		STA	DISP1		
0529 e250 a6 01 0530 e252 b7 a0			#1 DISP2		
0531 e254 81		RTS			

0533	*****	*****	******	*****
0534 0535	*	Increme	ent alarm time.	*
0536	*			*
0537 0538				
0539 e255 0c cb 0e 0540 e258 b6 9d	PINC	BRSET LDA	6,STAT4,IHR AMIN	SET-UP HOURS ? NO, MINUTES
0541 e25a al 3b 0542 e25c 24 04		CMP	#59 TOOH	
0543 e25e 3c 9d		INC	AMIN	
0544 e260 20 0c 0545 e262 3f 9d	TOOH	BRA	T5S AMIN	
0546 e264 20 08		BRA	TSS	
0547 e266 b6 9e 0548 e268 al 17	IHR	CMP	#23 HTOH	
0549 e26a 24 09 0550 e26c 3c 9e		BHS	HTOH	
0551 e26e a6 50	T5S	LDA	#80	10 SECOND TIMEOUT
0552 e270 b7 77 0553 e272 10 cb		BSET	0,STAT4	SET DISPLAY TRANSIENT FLAG
0554 e274 81 0555 e275 3f 9e	нтон	RTS	AOUR	
0556 e277 20 f5 0557		BRA	T5S	
0558		*****	*****	*******
0559 0560	*	Decreme	ent alarm time.	*
0561 0562	* * * * * * *	******	*****	*
0563				
0564 e279 0c cb 0e 0565 e27c 3d 9d	PDEC	BRSET	6,STAT4,IHRD AMIN	SET-UP HOURS ? NO, MINUTES
0566 e27e 27 04 0567 e280 3a 9d		BEQ DEC	MZ	
0568 6282 20 00		BRA LDA	T5SD	
0569 e284 a6 3b 0570 e286 b7 9d	MZ	LDA STA	#59 AMIN	
0571 e288 20 06	ממעד	BRA	T5SD	
0572 e28d 3d 9e 0573 e28c 27 09	IND	BEQ	HZ	
0573 e28c 27 09 0574 e28c 3a 9e 0575 e290 a6 50	T5SD	DEC LDA	AOUR #80	10 SECOND TIMEOUT
0576 e292 b7 77 0577 e294 10 cb		STA	DIUI	SET DISPLAY TRANSIENT FLAG
0578 e296 81		RTS		SEI DISPLAI IRANSIENI PLAG
0580 e299 b7 9e	HZ	LDA STA	#23 AOUR	
0581 e29b 20 f3 0582		BRA	T5SD	
0583	*****	******	*****	*********
0584 0585	*	Timer :	interrupt routine	* e. *
0586 0587	* * * * * * *	*****	*****	*
0588 0589 e29d 3c 9f	TINTD	TNC	DISP1	DICDI DICDO DICDIAV
0590 e29f b6 9f	IINID	LDA	DISP1	DISP1 DISP2 DISPLAY 0 - 8 0 PTY 9 - 78 1 - 70 MOVING RT
0591 e2a1 a1 08 0592 e2a3 23 06		BLS	NWR	9 - 78 1 - 70 MOVING RT 78 - 88 70 END OF RT
0593 e2a5 al 4e 0594 e2a7 22 02				END OF PADIOTEYT 2
0595 e2a9 3c a0		INC	DISP2	END OF RADIOTEXT ? NO, MOVE RADIOTEXT ONE CHARACTER 2 SECONDS AT END OF RADIOTEXT
0596 e2ab a1 58 0597 e2ad 25 02	NWR	CMP BLO	#88 NWR2	2 SECONDS AT END OF RADIOTEXT
0598 e2af 15 c9 0599 e2b1 1b 0e	NIMD 2	BCLR	2,STAT2	RETURN TO NORMAL DISPLAY CLEAR TIMER B INTERRUPT FLAG UPDATE DISPLAY UPDATE EIGHTHS OF SECONDS DECREMENT TRANSIENT DISPLAY TIMER
0600 e2b3 16 c9	INWICZ	BSET	3,STAT2	UPDATE DISPLAY
0601 e2b5 3c 99 0602 e2b7 3a 77	CLCK	DEC	TH8 DIST	UPDATE EIGHTHS OF SECONDS DECREMENT TRANSIENT DISPLAY TIMER
0603 e2b9 3c 79 0604 e2bb b6 79		INC	RDSTO RDSTO	
0605 e2bd a1 50		CMP	#80	10S WITHOUT A GROUP 0 OR 15 ?
0606 e2bf 25 10 0607 e2cl 15 ca		BCLR	RDSOK 2,STAT3	YES, CLEAR TA FLAG
0608 e2c3 3f 8e 0609 e2c5 3f 8f	N14B	CLIK	FII	PROGRAM TYPE AND
0610 e2c7 3f 90		CLR	PI+1	PI CODE
0611 e2c9 3f 91 0612 e2cb 3f 92		CLR CLR	PIN PIN+1	AND PIN
0613 e2cd 3f b0 0614 e2cf 11 ca		CLR BCLR		AND DI AND M/S
0615 e2d1 b6 99	RDSOK	LDA	TH8	EIGHTHS OF SECONDS
0616 e2d3 a1 08 0617 e2d5 26 32		CMP BNE	#8 NOTC	PAST 7 ?
0618 e2d7 3f 99 0619 e2d9 3c 9a		CLR INC	TH8 SEC	YES, CLEAR UPDATE SECONDS
0620 e2db b6 9a		LDA	SEC	OF DATE SECONDS
0621 e2dd al 38 0622 e2df 26 02		CMP BNE	#56 NOT5	
0623 e2e1 3a 78 0624 e2e3 a1 3c	NOT5	DEC CMP	SLEPT #60	DECREMENT SLEEP TIMER MINUTES
0625 e2e5 26 22	NOIS	BNE	NOTC	PAST 59 ?
0626 e2e7 3f 9a 0627 e2e9 3c 9b		CLR INC	SEC MIN	YES, CLEAR UPDATE MINUTES
0628 e2eb b6 9b 0629 e2ed al 3c		LDA CMP	MIN #60	
0630 e2ef 26 18		BNE	NOTC	PAST 59 ?
0631 e2f1 3f 9b 0632 e2f3 3c 9c		CLR INC	MIN OUR	YES, CLEAR UPDATE HOURS
0633 e2f5 b6 9c 0634 e2f7 al 18		LDA CMP	OUR #24	
0635 e2f9 26 0e		BNE	NOTC	PAST 23 ?
0636 e2fb 3f 9c 0637 e2fd 3c 76		CLR INC	OUR BMJD+2	YES CLEAR AND ADD A DAY
0638 e2ff 26 06		BNE	NOTD	
0639 e301 3c 75 0640 e303 26 02		BNE	BMJD+1 NOTD	INC BMJD only ever executes once, at midnight
0641 e305 3c 74 0642 e307 1c ca	NOTD		BMJD 6,STAT3	on the night of Thu/Fri 22/23 April 2038. UPDATE DATE
0643 e309 80	NOTC	RTI		

)645 ************************************								
0646 0647	*		ck interrupt (II		*			
0648 0649	*		oit and calculate		*			
0650 0651				*******				
0652 e30a 04 01 00 0653 e30d 39 7d 0654 e30f 39 7c 0655 e311 39 7b 0656 e313 39 7b 0656 e313 39 7a 0657 e315 01 c9 0b 0658 e318 3a 94 0659 e31a 27 03 0660 e31c 17 0e 0661 e31e 80 0662	SDATA	BRSET ROL	2,PORTB,*+3 DAT+3					
0654 e30f 39 7c		ROL	DAT+2					
0656 e313 39 7a		ROL	DAT					
0657 e315 01 c9 0b 0658 e318 3a 94		BRCLR DEC	0,STAT2,TRY2 BIT	NO, WAIT FOR BIT	? 26			
0659 e31a 27 03		BEQ BCLP	TRY1	THIS TIME ? CLEAR IRQ INTERRU	IDT FLAC			
0661 e31e 80		RTI	J, ICK	CDEAR INQ INTERRE	JII I IIAG			
0662 0663 e31f a6 la 0664 e321 b7 94 0665 e323 b6 7a 0666 e325 a4 03 0667 e327 97 0668 e328 b6 7b 0669 e32a b7 97 0670 e32c 01 7d 0a 0671 e32f b6 97 0672 e331 a8 lb 0673 e333 b7 97 0674 e335 9f 0675 e336 a8 03 0676 e338 97	TRY1	LDA	#26					
0664 e321 b7 94 0665 e323 b6 7a	TRY2	STA	BIT	MSB (2 BITS)				
0666 e325 a4 03		AND	#3	(= ====,				
0668 e328 b6 7b		LDA	DAT+1					
0669 e32a b7 97 0670 e32c 01 7d 0a	S03	STA BRCLR	SYN+1 0,DAT+3,S13	LSB				
0671 e32f b6 97		LDA	SYN+1 #\$1R					
0673 e333 b7 97		STA	SYN+1					
0674 e335 91 0675 e336 a8 03		EOR	#\$03					
0676 e338 97 0677 e339 03 7d 0a	S13	TAX	1.DAT+3.S23					
0678 e33c b6 97		LDA	SYN+1					
0680 e340 b7 97		STA	SYN+1					
0681 e342 9f 0682 e343 a8 03		TXA EOR	#\$03					
0683 e345 97 0684 e346 05 7d 0a	S23	TAX	2.DAT+3.S43					
0685 e349 b6 97		LDA	SYN+1					
0687 e34d b7 97		STA	SYN+1					
0688 e34f 9f 0689 e350 a8 02		TXA EOR	#\$02					
0690 e352 97 0691 e353 09 7d 0a	S43	TAX	4 DAT+3 S53					
0692 e356 b6 97	013	LDA	SYN+1					
0693 e358 a8 ee 0694 e35a b7 97		STA	#SEE SYN+1					
0695 e35c 9f 0696 e35d a8 01		TXA EOR	#\$01					
0675 e336 a8 03 0676 e338 97 0677 e339 03 7d 0a 0678 e332 b6 97 0679 e332 a8 8f 0680 e340 b7 97 0681 e342 9f 0682 e343 a8 03 0683 e345 97 0684 e346 05 7d 0a 0685 e349 b6 97 0686 e34b a8 a7 0687 e34d b7 97 0688 e34f 9f 0699 e350 a8 02 0690 e352 97 0691 e353 09 7d 0a 0692 e355 b6 97 0693 e355 a8 02 0690 e355 97 0693 e355 a8 02 0690 e365 e37 0697 e356 07 0698 e360 0b 7d 0a 0699 e363 b6 97 0700 e365 a8 dc 0701 e367 b7 97 0702 e366 9f 0703 e36a a8 03	953	TAX	5 DAT+3 963					
0699 e363 b6 97	555	LDA	SYN+1					
0700 e365 a8 dc 0701 e367 b7 97		STA	#\$DC SYN+1					
0702 e369 9f 0703 e36a a8 03		TXA	#\$03					
0704 e36c 97	062	TAX	6 DATE+2 C72					
0704 e36c 97 0705 e36d 0d 7d 0a 0706 e370 b6 97 0707 e372 a8 01	303	LDA	SYN+1					
0707 e372 a8 01 0708 e374 b7 97		EOR STA	#\$01 SYN+1					
0709 e376 9f 0710 e377 a8 02		TXA	#\$02					
0711 e379 97	072	TAX	5,DAT+3,S/3 SYN+1 #\$01 SYN+1 #\$02 7,DAT+3,S02 SYN+1					
0714 e37f a8 bb 0715 e381 b7 97		EOR STA	#\$BB SYN+1					
0716 e383 9f 0717 e384 a8 01		STA TXA EOR	#\$01					
0718 e386 97		TAX	0,DAT+2,S12					
0720 e38a b6 97		LDA	SYN+1					
0721 e38c a8 76 0722 e38e b7 97		EOR STA	#\$76 SYN+1					
0723 e390 9f 0724 e391 a8 03		TXA EOR	#\$03					
0725 e393 97	010	TAX						
0726 e394 03 7c 0a 0727 e397 b6 97		LDA						
0728 e399 a8 55 0729 e39b b7 97		EOR STA	#\$55 SYN+1					
0730 e39d 9f 0731 e39e a8 03		TXA EOR	#\$03					
0732 e3a0 97	S22	TAX	2,DAT+2,S32					
0734 e3a4 b6 97		LDA	SYN+1	0754	e3c8 0d 7c 0a	S62		6,DAT+2,S72
0735 e3a6 a8 13 0736 e3a8 b7 97		EOR STA	#\$13 SYN+1	0/55 6	e3cb b6 97 e3cd a8 6e		LDA EOR	SYN+1 #\$6E
0737 e3aa 9f 0738 e3ab a8 03		TXA EOR	#\$03	0757 €	e3cf b7 97 e3dl 9f		STA TXA	SYN+1
0739 e3ad 97	~~~	TAX		0759 €	3d2 a8 01		EOR	#\$01
0741 e3b1 b6 97		LDA	3,DAT+2,S42 SYN+1	0760 e 0761 e	≘3d4 97 ≘3d5 0f 7c 09	S72		7,DAT+2,S33
0742 e3b3 a8 9f 0743 e3b5 b7 97		EOR STA	#\$9F SYN+1	0762 €	≘3d8 b6 97 ≘3da a8 dc		LDA EOR	
0744 e3b7 9f 0745 e3b8 a8 03		TXA EOR	#\$03	0764	e3dc b7 97 e3de 9f		STA TXA	SYN+1
0746 e3ba 97	0.40	TAX		0766		222	EOR	#\$02
0748 e3be b6 97		LDA	4,DAT+2,S62 SYN+1	0768 €		S33	STA LDA	SYN SYN+1
0749 e3c0 a8 87 0750 e3c2 b7 97		EOR STA	#\$87 SYN+1		e3e5 07 7d 02 e3e8 a8 f7		BRCLR EOR	3,DAT+3,S52 #\$F7
0751 e3c4 9f 0752 e3c5 a8 02		TXA EOR	#\$02	0771 €	e3ea 0b 7c 02 e3ed a8 b7	S52 FIN	BRCLR EOR	
0753 e3c7 97		TAX	11 7 0 2		e3ef b7 97	FIN	STA	SYN+1

0775	*****	******	******	*****
0776 0777	*	Check fo	or syndromes A,	* B (& C ' *
0778 0779	*		_	********
0780			2	
0781 e3f1 17 0e 0782				CLEAR IRQ INTERRUPT FLAG
0783 e3f3 b6 93 0784 e3f5 al 03		CMP	LEV #3	
0785 e3f7 27 5d 0786 e3f9 al 02			TRYD #2	
0787 e3fb 27 22		DEO	TRYC #1	
0788 e3fd al 01 0789 e3ff 27 10		PEQ	IKID	
0790 e401 3f 93 0791			LEV	
0791 0792 e403 b6 97 0793 e405 al d8 0794 e407 26 31	TRYA	LDA CMP	SYN+1 #\$D8	BLOCK 1
0794 e407 26 31 0795 e409 b6 96		BNE LDA	NOTV SYN	
0796 e40b al 03		CMP BNE		
0797 e40d 26 2b 0798 e40f 20 53		BRA	VALID	
	TRYB	LDA CMP	SYN+1	BLOCK 2
0801 e413 a1 d4 0802 e415 26 23		BNE	NOTV	
0803 e417 b6 96 0804 e419 al 03		LDA CMP BNE BRA	SYN #¢03	
0805 e41b 26 1d		BNE	NOTV	
0806 e41d 20 45 0807				
0808 e41f 06 80 0c 0809 e422 b6 97	TRYC	BRSET LDA	3,TMPGRP+2,TRYC SYN+1	D BLOCK 3 TYPE A
0810 e424 al 5c 0811 e426 26 12		CMP	#\$5C NOTV	
0812 e428 b6 96 0813 e42a al 02		LDA CMP BRA	SYN #\$02	
0814 e42c 20 0a		BRA	VC VC	
	TRYCD	LDA	SYN+1 #\$CC	BLOCK 3 TYPE B
0817 e430 a1 cc 0818 e432 26 06		BNE	NOTV	
0819 e434 b6 96 0820 e436 al 03		T.DA	SYN #\$03	
0821 e438 27 2a	VC	BEQ	VALID	
0822 0823		*****	******	*****
0824 0825	*	Invalid	syndrome handli	ng, check for *
0826 0827	*	block 4	and save group	data if valid. *
0828 0829	*****	******	******	*****
0830 e43a 3f 93	NOTV	CLR		RESTART AT BLOCK 1
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e al 29		LDA	CONF	RESTART AT BLOCK 1 CONFIDENCE 41 OR GREATER ?
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e		LDA CMP BHS BCLR	CONF #41 DECC 0 STAT2	CONFIDENCE 41 OR GREATER ?
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e 0834 e442 11 c9 0835 e444 a1 0a		LDA CMP BHS BCLR	CONF #41 DECC 0 STAT2	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e 0834 e442 11 c9 0835 e444 a1 0a 0836 e444 a3 0b 0837 e448 3a 94		LDA CMP BHS BCLR CMP BLS DEC	CONF #41 DECC 0,STAT2 #10 SKPDC BIT	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ?
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e 0834 e442 11 c9 0835 e444 a1 0a 0836 e444 a3 0b 0837 e448 3a 94		LDA CMP BHS BCLR CMP BLS DEC	CONF #41 DECC 0,STAT2 #10 SKPDC BIT	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ? USE BIT COUNTER TO SLOW CONFIDENCE DROP DURING BIT BY BIT ATTEMPT TO
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e 0834 e442 11 c9 0835 e444 a1 0a 0836 e444 a3 0b 0837 e448 3a 94		LDA CMP BHS BCLR CMP BLS DEC	CONF #41 DECC 0,STAT2 #10 SKPDC BIT	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ?
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e 0834 e442 11 c9 0835 e444 a1 0a 0836 e444 a3 0b 0837 e448 3a 94		LDA CMP BHS BCLR CMP BLS DEC	CONF #41 DECC 0,STAT2 #10 SKPDC BIT	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ? USE BIT COUNTER TO SLOW CONFIDENCE DROP DURING BIT BY BIT ATTEMPT TO
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e 0835 e442 11 c9 0835 e444 a1 0a 0836 e446 23 0b 0837 e448 3a 94 0838 e44c a6 1a 0840 e44e b7 94 0841 e450 3a 98 0842 e452 80 0843 e453 18 c9 0844 e455 80	DECC NNOW SKPDC NOT4	LDA CMP BHS BCLR CMP BLS DEC BNE LDA STA DEC RTI BSET RTI	CONF #41 DECC 0,STAT2 #10 SKPDC BIT	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ? USE BIT COUNTER TO SLOW CONFIDENCE DROP DURING BIT BY BIT ATTEMPT TO RE-SYNCRONISE
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e 0834 e442 11 c9 0835 e444 a1 0a 0837 e448 3a 94 0838 e44a 26 06 0839 e44c a6 1a 0840 e44e b7 94 0841 e450 3a 98 0842 e452 80 0843 e453 18 c9 0844 e455 80 0845	DECC NNOW SKPDC NOT4 TRYD	LDA CMP BHS BCLR CMP BLS DEC BNE LDA STA DEC RTI BSET RTI LDA	CONF #41 DECC 0,STAT2 #10 SKPDC BIT NNOW #26 BIT CONF 4,STAT2	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ? USE BIT COUNTER TO SLOW CONFIDENCE DROP DURING BIT BY BIT ATTEMPT TO RE-SYNCRONISE
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e 0835 e444 11 0a 0836 e444 a1 0a 0837 e448 3a 94 0838 e44a 26 06 0839 e44c a6 1a 0840 e44e b7 94 0841 e450 3a 98 0842 e452 80 0843 e453 18 c9 0844 e455 80 0845 e456 b6 97 0847 e458 a1 58 0848 e45a 26 de	DECC NNOW SKPDC NOT4 TRYD	LDA CMP BHS BCLR CMP BLS DEC BNE LDA STA DEC RTI BSET RTI LDA CMP BNE	CONF #41 DECC 0,STAT2 #10 SKPDC BIT NNOW #26 BIT CONF 4,STAT2 SYN+1 #\$58 NOTV	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ? USE BIT COUNTER TO SLOW CONFIDENCE DROP DURING BIT BY BIT ATTEMPT TO RE-SYNCRONISE
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e 0833 e440 24 0e 0835 e444 a1 0a 0836 e444 a1 0a 0837 e448 3a 94 0838 e444 a6 1a 0840 e44e b7 94 0841 e450 3a 98 0842 e452 80 0843 e453 18 c9 0844 e455 80 0845 e458 66 97 0847 e458 a1 58 0848 e45a 26 de 0849 e45c b6 96 0849 e45c b6 96	DECC NNOW SKPDC NOT4 TRYD	LDA CMP BHS BCLR CMP BLS DEC BNE LDA STA DEC RTI BSET RTI LDA CMP BNE LDA	CONF #41 DECC 0,STAT2 #10 SKPDC BIT NNOW #26 BIT CONF 4,STAT2	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ? USE BIT COUNTER TO SLOW CONFIDENCE DROP DURING BIT BY BIT ATTEMPT TO RE-SYNCRONISE
0830 e43a 3f 93 0831 e43c b6 98 0832 e42e a1 29 0833 e440 24 0e 0834 e442 11 c9 0835 e444 a1 0a 0836 e446 23 0b 0837 e448 3a 94 0838 e44c a6 1a 0840 e44e b7 94 0841 e450 3a 98 0842 e452 80 0843 e456 b6 97 0847 e458 a1 58 0846 e456 b6 96	DECC NNOW SKPDC NOT4 TRYD	LDA CMP BHS BCLR CMP BLS DEC BNE LDA STA DEC RTI BSET RTI LDA CMP BNE LDA	CONF #41 DECC 0,STAT2 #10 SKPDC BIT NNOW #26 BIT CONF 4,STAT2	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ? USE BIT COUNTER TO SLOW CONFIDENCE DROP DURING BIT BY BIT ATTEMPT TO RE-SYNCRONISE 10 OR LESS, INITIALISE DISPLAY
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e 0835 e444 1 0e 0835 e444 a1 0a 0837 e448 3a 94 0838 e446 23 0b 0837 e448 3a 94 0841 e450 3a 98 0842 e452 80 0843 e455 80 0845 0846 e456 b6 97 0847 e458 a1 58 0848 e45a 26 de 0849 e45c b6 96 0850 e45e a1 02 0851 e460 26 d8 0852 e462 12 c9	DECC NNOW SKPDC NOT4 TRYD	LDA CMP BHS BCLR CMP BLS BCLR CMP BLS DEC BNE LDA DEC LDA DEC RTI BSET RTI LDA CMP BNE LDA CMP BNE LDA CMP BNE BSET	CONF #41 DECC 0,STAT2 #10 SKPDC BIT NNOW #26 BIT CONF 4,STAT2 SYN+1 #558 NOTV SYN #\$02 NOTV 1,STAT2	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ? USE BIT COUNTER TO SLOW CONFIDENCE DROP DURING BIT BY BIT ATTEMPT TO RE-SYNCRONISE 10 OR LESS, INITIALISE DISPLAY GROUP COMPLETE
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e 0834 e442 11 c9 0835 e444 a1 0a 0836 e444 a1 0a 0837 e448 3a 94 0838 e44a 26 06 0839 e44c a6 1a 0840 e44e b7 94 0841 e450 3a 98 0842 e452 80 0843 e453 18 c9 0844 e455 80 0845 e465 66 97 0847 e458 a1 58 0848 e45a 26 de 0849 e45c b6 96 0849 e45c b6 96 0850 e45e a1 02 0851 e460 26 d8 0852 e462 12 c9 0853 0854 e464 00 c9 06	DECC NNOW SKPDC NOT4 TRYD	LDA CMP BHS BCLR CMP BLS CMP BLS DEC ENDE ENDE ENDE ENDE ENDE ENDE ENDE	CONF #41 DECC 0,STAT2 #10 SKPDC BIT NNOW #26 BIT CONF 4,STAT2 SYN+1 #558 NOTV SYN #802 NOTV 1,STAT2	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ? USE BIT COUNTER TO SLOW CONFIDENCE DROP DURING BIT BY BIT ATTEMPT TO RE-SYNCRONISE 10 OR LESS, INITIALISE DISPLAY GROUP COMPLETE VALID SYNDROME FLAG ALREADY SET ? NO,
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e 0835 e444 a1 0a 0836 e444 a1 0a 0837 e448 3a 94 0838 e44a 26 06 0839 e44c a6 1a 0840 e44e b7 94 0841 e450 3a 98 0842 e452 80 0844 e455 80 0845 e465 66 97 0847 e458 a1 58 0846 e456 b6 97 0847 e458 a1 58 0848 e45a 26 de 0849 e45c b6 96 0850 e45e a1 02 0851 e460 26 d8 0852 e462 12 c9 0853 0854 e464 00 c9 0855 e467 a6 26 0856 e469 b7 98 0857 e466 10 c9	DECC NNOW SKPDC NOT4 TRYD	LDA CMP BHS BCLR CMP BLS CMP BLS CMP BLS CMP BLS CMP BNE LDA CMP ENE LDA CMP BNE BSET	CONF #41 DECC 0,STAT2 #10 SKPDC BIT NNOW #26 BIT CONF 4,STAT2 SYN+1 #558 NOTV SYN #502 NOTV 1,STAT2 0,STAT2,VLD #38 CONF	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ? USE BIT COUNTER TO SLOW CONFIDENCE DROP DURING BIT BY BIT ATTEMPT TO RE-SYNCRONISE 10 OR LESS, INITIALISE DISPLAY GROUP COMPLETE VALID SYNDROME FLAG ALREADY SET ?
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e 0835 e444 a1 0a 0836 e444 a1 0a 0837 e448 3a 94 0838 e444 a6 1a 0840 e44e b7 94 0841 e450 3a 98 0842 e452 80 0843 e453 18 c9 0844 e455 80 0844 e455 80 0845 e466 66 97 0847 e458 a1 58 0846 e456 66 97 0847 e458 a1 02 0851 e460 26 d8 0850 e45e a1 02 0851 e460 26 d8 0852 e462 12 c9 0853 0854 e464 00 c9 0858 e466 66 97 0856 e469 b7 98 0857 e466 10 c9 0858 e466 10 c9 0858 e466 66 98	DECC NNOW SKPDC NOT4 TRYD	LDA CMP BHS BCLR CMP BHS BCLR CMP BLS DEC BNE BNE CMP BSET RTI LDA CMP BNE CMP BNE BSET LDA CMP BNE BSET LDA LDA CMP BNE BSET LDA CMP BNE BSET LDA CMP BSET LDA CMP BSET LDA CMP BSET LDA CMP SSTA	CONF #41 DECC 0,STAT2 #10 SKPDC BIT NNOW #26 BIT CONF 4,STAT2 SYN+1 #\$58 NOTV SYN #\$02 NOTV 1,STAT2 0,STAT2,VLD #38 CONF	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ? USE BIT COUNTER TO SLOW CONFIDENCE DROP DURING BIT BY BIT ATTEMPT TO RE-SYNCRONISE 10 OR LESS, INITIALISE DISPLAY GROUP COMPLETE VALID SYNDROME FLAG ALREADY SET ? NO, INITIALISE CONFIDENCE (38+4=42)
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e 0834 e442 11 c9 0835 e444 a1 0a 0837 e448 3a 94 0838 e44e 26 06 0839 e44c a6 1a 0840 e44e b7 94 0841 e450 3a 98 0844 e455 80 0843 e458 66 e56 0845 e464 67 97 0847 e458 a1 58 0848 e45a 26 de 0849 e45c b6 96 0850 e45e a1 02 0851 e460 26 d8 0852 e462 12 c9 0855 e467 a6 26 0855 e467 a6 26 0855 e467 a6 26 0855 e469 b7 98 0857 e46b 10 c9 0858 e466 b6 98 0859 e46f a1 38 0858 e467 a1 38	DECC NNOW SKPDC NOT4 TRYD	LDA CMP BHS BCLR CMP BHS BCLR CMP BLS DEC BLDA DEC BNE BSET RTI LDA CMP BNE BSET LDA BSET LDA BSET LDA CMP BSET LDA BSET LDA BSET LDA BSET LDA BBET LDA CMP BBHI	CONF #41 DECC 0,STAT2 #10 SKPDC BIT NNOW #26 BIT CONF 4,STAT2 SYN+1 #558 NOTV SYN #802 NOTV SYN #802 0,STAT2,VLD #38 CONF 0,STAT2,VLD #38 CONF 0,STAT2 CONF 1,STAT2 CONF 1,STAT2 CONF #56 NMR	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ? USE BIT COUNTER TO SLOW CONFIDENCE DROP DURING BIT BY BIT ATTEMPT TO RE-SYNCRONISE 10 OR LESS, INITIALISE DISPLAY GROUP COMPLETE VALID SYNDROME FLAG ALREADY SET ? NO, INITIALISE CONFIDENCE (38+4=42)
0830 e43a 3f 93 0831 e43c b6 98 0832 e42e a1 29 0833 e440 24 0e 0834 e442 11 c9 0835 e444 a1 0a 0837 e448 3a 94 0838 e44c a6 1a 0840 e44e b7 94 0841 e450 3a 98 0842 e452 80 0843 e456 b6 97 0845 e456 b6 97 0846 e456 b6 96 0859 e466 1a 02 0845 e466 06 0859 e466 10 0855 e677 a6 26 0856 e469 b7 98 0857 e46b 10 c9 0858 e46d b6 98 0859 e46f a1 38 0850 e471 22 04 0861 e473 ab 04	DECC NNOW SKPDC NOT4 TRYD	LDA CMP BHS BCLR CMP BLS DEC CMP BLS DEC CMP BLS DEC CMP BLS DEC RTI LDA CMP BNE LDA CMP BNE LDA CMP BNE BSET LDA CMP BNE BSET LDA CMP BNE BSET LDA CMP BNE BSET LDA STA ADD STA ADD STA STA	CONF #411 DECC 0,STAT2 #10 SKPDC BIT NNOW #26 BIT CONF 4,STAT2 \$YN+1 #558 NOTV SYN #\$02 NOTV 1,STAT2 0,STAT2,VLD #38 CONF 0,STAT2,VLD #36 DIT CONF 10,STAT2 CONF 10,STAT2 CONF 10,STAT2 CONF 10,STAT2 CONF 156 NMR #4 CONF 100	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ? USE BIT COUNTER TO SLOW CONFIDENCE DROP DURING BIT BY BIT ATTEMPT TO RE-SYNCRONISE 10 OR LESS, INITIALISE DISPLAY GROUP COMPLETE VALID SYNDROME FLAG ALREADY SET ? NO, INITIALISE CONFIDENCE (38+4=42)
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0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e 0835 e444 11 c9 0835 e444 a1 0a 0837 e448 3a 94 0837 e448 3a 94 0838 e444 a6 1a 0840 e44e b7 94 0841 e450 3a 98 0842 e452 80 0844 e455 80 0844 e455 80 0845 e464 67 e96 0850 e45e a1 02 0853 e464 a1 02 0865 e467 a6 26 0859 e46f a1 38 0864 e479 59 0858 e464 69 97 0858 e464 69 97 0858 e464 69 97 0859 e466 10 00 09 0859 e466 10 00 09 0859 e467 e79 0859 e467 e79 0859 e466 a1 38 0856 e479 e79 0857 e468 b1 00 09 0856 e479 a79 0857 e468 67 c79 0866 e477 a6 93 0866 e477 a6 1a 0867 e47e b7 94 0866 e489 67 c70 0875 e488 36 7c 0876 e488 36 7c 0877 e488 36 7c 0877 e488 36 7c 0877 e488 36 7c 0877 e488 67 7c 0875 e488 67 7c	DECC NNOW SKPDC NOT4 TRYD VALID VLD	LDA CMP BHS BCLR CMP BHS BCLR CMP BLS DEC BNE BLS DEC BNE LDA CET RTI LDA CMP BNE LDA STA ROR ROR ROR ROR ROR ROR ROR ROR ROR RO	CONF #41 DECC 0,STAT2 #10 SKPDC BIT NNOW #26 BIT CONF 4,STAT2 4,STAT2 SYN+1 #558 NOTV SYN #802 NOTV 1,STAT2,VLD #38 CONF 0,STAT2,VLD #38 CONF 0,STAT2 LEV #26 BIT DAT DAT+1 DAT+2 DAT+1 DAT+2 DAT+1 DAT+2 DAT+1 DAT+2 TMPGRP,X 1,STAT2,NOT4	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ? USE BIT COUNTER TO SLOW CONFIDENCE DROP DURING BIT BY BIT ATTEMPT TO RE-SYNCRONISE 10 OR LESS, INITIALISE DISPLAY GROUP COMPLETE VALID SYNDROME FLAG ALREADY SET ? NO, INITIALISE CONFIDENCE (38+4=42)
0830 e43a 3f 93 0831 e43c b6 98 0832 e43e a1 29 0833 e440 24 0e 0834 e442 11 c9 0835 e444 a1 0a 0837 e448 3a 94 0838 e444 a2 06 0839 e44c a6 1a 0840 e44e b7 94 0841 e455 80 0844 e455 80 0845 e452 80 0846 e456 b6 97 0847 e458 a1 58 0848 e45a 26 de 0859 e45e a1 02 0851 e460 26 d8 0852 e462 12 c9 0853 0854 e464 00 c9 0855 e467 a6 26 0855 e467 a6 26 0850 e45e a1 02 0853 0864 e479 b7 0866 e47c a6 1a 0867 e47e b7 98 0863 e480 36 7a 0866 e480 36 7a 0866 e482 36 7b 0870 e488 36 7c 0871 e486 36 7c 0875 e48e e7 7f 0877 e490 b6 7c 0876 e48e b7 7c 0876 e48e b7 7c 0877 e490 b6 7c 0877 e490 b6 7c 0877 e490 b6 7c 0878 e489 67 7d 0878 e499 03 c9 be 0879 e497 a 08	DECC NNOW SKPDC NOT4 TRYD	LDA CMP BHS BCLR CMP BHS BCLR CMP BLS DEC BNE BLS DEC BNE CMP BNE LDA STA LDA LDA STA LDA LDA LDA LDA LDA LDA LDA LDA LDA LD	CONF #41 DECC 0,STAT2 #10 SKPDC BIT NNOW #26 BIT CONF 4,STAT2 4,STAT2 4,STAT2 4,STAT2 5YN+1 #558 NOTV SYN #502 NOTV 1,STAT2,VLD #38 CONF 0,STAT2,VLD #38 CONF 0,STAT2 CONF 1,STAT2 LEV #26 BIT DAT DAT+1 DAT+2 DAT+1 DAT+2 DAT+1 DAT+2 DAT+1 TMPGRP,X 1,STAT2,NOT4 #8	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ? USE BIT COUNTER TO SLOW CONFIDENCE DROP DURING BIT BY BIT ATTEMPT TO RE-SYNCRONISE 10 OR LESS, INITIALISE DISPLAY GROUP COMPLETE VALID SYNDROME FLAG ALREADY SET ? NO, INITIALISE CONFIDENCE (38+4=42) AND SET FLAG
0830 e43a 3f 93 0831 e43c b6 98 0832 e42e a1 29 0833 e440 24 0e 0835 e444 a1 0a 0835 e444 a1 0a 0837 e448 3a 94 0838 e44c a6 1a 0840 e44e b7 94 0841 e450 3a 98 0842 e452 80 0843 e455 80 0847 e458 a1 58 0846 e456 b6 97 0845 e466 026 d8 0859 e46c 1a 0849 e45c b6 96 0850 e45e 1 02 0851 e466 026 d8 0852 e462 12 c9 0863 e476 b6 0850 e45e 1 02 0855 e476 a6 26 0856 e469 b7 98 0858 e466 66 98 0859 e46f 61 38 0860 e471 22 04 0861 e473 ab 04 0861 e473 ab 04 0862 e475 b7 98 0863 e477 b9 93 0866 e479 59 0865 e478 59 99 0865 e478 3c 93 0866 e479 b7 98 0867 e48e 86 7c 0871 e48e 67 7c 0873 e48e 67 7c 0873 e48e 67 7c 0876 e490 b6 7b 0877 e492 e7 7e 0878 e494 03 c9 be	DECC NINOW SKPDC NOT4 TRYD VALID VLD NMR	LDA CMP BHS BCLR CMP BHS BCLR CMP BLS CMP BLS STA LDA CMP BNE LDA CMP BNE LDA STA LDA CMP BNE LDA STA LDA CMP BNE LDA CMP BNE LDA CMP BNE LDA STA LDA LDA LDA STA LDA LDA LDA LDA LDA STA LDA LDA LDA LDA LDA LDA LDA LDA LDA LD	CONF #41 DECC 0,STAT2 #10 SKPDC BIT NNOW #26 BIT CONF 4,STAT2 4,STAT2 SYN+1 #\$58 NOTV SYN #\$02 NOTV 1,STAT2,VLD #38 CONF 0,STAT2,VLD #38 CONF LEV #26 BIT CONF #56 NMR #4 CONF LEV #26 BIT LEV #26 BIT CONF #37 LEV #38 LEV	CONFIDENCE 41 OR GREATER ? BIT BY BIT SYNDROME CHECK CONFIDENCE 10 OR LESS ? USE BIT COUNTER TO SLOW CONFIDENCE DROP DURING BIT BY BIT ATTEMPT TO RE-SYNCRONISE 10 OR LESS, INITIALISE DISPLAY GROUP COMPLETE VALID SYNDROME FLAG ALREADY SET ? NO, INITIALISE CONFIDENCE (38+4=42) AND SET FLAG

0885					*****	*****	******	******	
0886 0887					*	********	ST3- ::-1-1-1	*	
0888					*	All bloo	PI code, initial ck ls used, bloc	k 3s not used. *	
0889					*			*	
0890 0891					*****	*****	******	*****	
0892 0893	e4a0 e4a2	b1	8f		PROC	CMP	GROUP PI	COMPARE PI WITH PREVIOUS	
0895	e4a4 e4a6 e4a8	b6	87			LDA	DNDX GROUP+1 PT+1		
0897	e4aa	27	10			BEQ	PTYL		
0898	e4ac e4ae	b6	86		DNDX	LDA STA	GROUP PT	DIFFERENT, SAVE NEW PI	
	e4b0						GROUP+1		
0901	e4b2	b7	90	_			PI+1		
0902	e4b4 e4b7	cd	eB e8	0a		JSR JSR	CLREON CLTR	CLEAR EON, TRANSIENTS	
0904	e4ba					BSET	4,STAT2	AND INITIALISE DISPLAY DATA	A
0905 0906					*****	*****	******	******	
0907					*			*	
0908					*		PTY and TP. ck 2s used, not 1	block 4 (grp 15B). *	
0910					*			******	
0911 0912					*****	*****	******	*****	
0913	e4bc				PTYL		GROUP+2		
	e4be e4c0			0.4		STA BRCLR	ITMP1 2,ITMP1,TPL1	TP HIGH ?	
0916	e4c3	16	ca	0.1		BSET	3,STAT3	YES, FLAG HIGH	
0917	e4c5 e4c7	20	02		TPL1	BRA BCLR	TPL 3,STAT3	NO, FLAG LOW	
0919	e4c9	b6	89		TPL	LDA	GROUP+3	NO, PEAG EOW	
	e4cb		95			ROR	ITMP1		
0922	e4cd e4ce	44				RORA LSRA			
0923	e4cf	44				LSRA			
0924	e4d0 e4d1	44				LSRA LSRA			
0926	e4d2		8e			STA	PTY		
0927 0928					*****	*****	******	*****	
0929					*			*	
0930 0931					*	Groups 1	nandled.	*	
0932					*	All	PI, PTY & T TA, PS, DI	P *	
0933					*	0 A & B 1 A & B	TA, PS, DI	& M/S *	
0935					*	2 A	RT	*	
0936					*	4 A 14 A	CT EON	*	
0937						14 A 15 B	TA, DI & M/	s *	
0939					*			*	
0940 0941 0942								*****	
0943					*	_		*	
0944 0945					*	Process	groups 0 & 15B	(PS & TA). *	
0946					*****	*****	******	*****	
0947 0948	e4d4	b6	88			LDA	GROUP+2		
0949	e4d6 e4d8	a4	f8			AND	#\$F8		
0950	e4d8 e4da	27 a1	0a ng				GRP0 #\$08	GROUP OA GROUP OB	
0952	e4dc						GRP0	61.001 02	
0953	e4de	a1	f8		TGRP15	CMP	#\$F8	GROUP 15B	
0955	e4e0	27	10			BEQ	TACK		
0956 0957	e4e2	20	57			BRA	PROC1		
0958	e4e4	b6	89		GRP0			GROUP 0 - PS & TA	
	e4e6		03			AND	#\$03		
0961	e4e8 e4e9	97				LSLA TAX			
	e4ea						GROUP+6		
0963	e4ec e4ee	b6	8q			STA LDA	PSN,X GROUP+7		
0965	e4f0					STA	PSN+1,X		
0966 0967	e4f2	3f	79		TACK	CLR	RDSTO	RDS OK, RESET TIME-OUT	
0968	e4f4	08	89	04		BRSET	4,GROUP+3,TAH	TA HIGH ?	
0969 0970	e4f7 e4f9	15 20	02			BCLR BRA	2,STAT3 NTD	NO, TA FLAG LOW	
0971	e4fb	14	ca		TAH	BSET	2,STAT3	YES, TA FLAG HIGH	

0973					*****	*****	*******	******	******
0974 0975					*	Process	group 0 & 15B (DI & M/S).	*
0976 0977					*		******		*
0978									
0979 0980 0981	e4fd e4ff e501	b6 a4 97	03		NTD		GROUP+3 #3	DI	
0982 0983	e502 e504	b6 a4	89			LDA AND	GROUP+3 #\$40		
0985	e506 e507	26	07				NOT0		
0986	e509 e50b	11	b0			BCLR TSTA	0,DI		
0988	e50c	27	02			BEQ	NOT0		
0990	e50e e510	a3	01		NOT0	CPX	0,DI #1		
0991	e512 e514	26 13	07 b0			BNE BCLR	NOT1 1,DI		
0993	e516 e517	4d	02			TSTA			
0995	e519	12	b0			BSET	NOT1 1,DI #2		
0996 0997	e51b e51d	a3 26	02		NOT1		#2 NOT2		
0998	e51f	15 4d	b0			BCLR TSTA	2,DI		
	e521 e522					BEQ	NOT2		
1002	e524 e526	a3	03		NOT2	BSET CPX	2,DI #3		
	e528 e52a					CPX BNE BCLR	NOT3 3,DI		
1005	e52c e52d	4d				TSTA	NOT3		
1007	e52f	16	b0				3,DI		
1008 1009	e531	11	ca		NOT3	BCLR	0,STAT3	M/S	
1010 1011	e533 e536	07 10	89 ca	02		BRCLR BSET	3,GROUP+3,MSZ 0,STAT3 OUT1		
1012 1013	e538	CC	е6	18	MSZ	JMP	OUT1		
1014 1015					******	******	**********	******	********
1016					*	Process	group 1 (PIN).		*
1017 1018					*****	*****	*******	******	******
1019 1020	e53b e53d	al	10		PROC1	CMP	#\$10	GROUP 1A	
1021	e53d e53f	27 a1	04 18			BEQ CMP	#\$10 GRP1 #\$18	GROUP 1B	
1023 1024	e541	26	0b			BNE	PROC2		
1025	e543 e545	b6	8c		GRP1	LDA	GROUP+6 PIN		
1027	e547	b6	8d			LDA	GROUP+7		
1028 1029	e549	b7	92			STA	PIN+1		
1030 1031	e54b	CC	е6	18			OUT1		
1032 1033					******	******	**********	******	*******
1034 1035					*	Process	group 2A (RT). 3 not handled.		*
1036					*	-	*********		*
1037 1038									*******
1039 1040 1041	e54e e550	a1 26	20 30		PROC2	CMP BNE	#\$20 PROC4	GROUP 2A	
1042	e552	80	89	07	GRP2	BRSET	4,GROUP+3,TEXTE	3	
1043	e555 e558 e55a	12	ca	UC	TEXTA	BRSET BRA	1,STAT3,NCH 1,STAT3		
1045	e55a e55c	03	05 ca	05	TEXTB	BRA BRCLR	LCDINI 1,STAT3,NCH		
1047	e55c e55f e561	13 cd	ca eh	aa	LCDINI	BCLR	1,STAT3,NCH 1,STAT3 INITD		
1049	e564						GROUP+3	CDOUD 23	DIT
1051	e566	a4	0f		NCII	AND	#\$0F	GROOF ZA	- KI
1053	e568 e569	48				LSLA LSLA			
1054 1055	e56a e56b	97 b6	8a			TAX LDA	GROUP+4		
	e56b e56d			05		STA	RT+5,X GROUP+5		
1058	e570 e572	d7	01	06		STA	RT+6,X		
1060	e575 e577	d7	01	07		STA	GROUP+6 RT+7,X		
1061 1062	e57a	b6	8d			LDA	GROUP+7 RT+8,X		
	e57c	a /							

1065	*****	******	******	******
1066 1067	*	Process	s group 4A (CT).	*
1068 1069	*	*****	*****	* ******
1070 1071 e582 al 40 1072 e584 27 03 1073 e586 cc e6 1b	PROC4	CMP BEQ JMP	#\$40 GRP4 PROC14	GROUP 4A - CT
1074 1075 e589 b6 89 1076 e58b 46 1077 e58c a4 01	CPD4	T.DA	CPOTTP+3	
1078 e58e b7 74 1079 e590 b6 8a 1080 e592 46		STA LDA	#\$01 BMJD GROUP+4 BMJD+1	MJD MS BIT
1081 e593 b7 75 1082				MJD MSD
1083 e595 b6 8c 1084 e597 36 8b 1085 e599 46 1086 e59a 44 1087 e59b 44 1088 e59c 44 1089 e59d b7 9c		RORA LSRA LSRA LSRA STA	OUR	GROUP 4 3210xxxx 4 43210xxx x -43210xx x43210x x43210 x
1090 1091 e59f b6 8b 1092 e5al b7 76 1093		LDA STA	GROUP+5 BMJD+2	MJD LSD
1093 1094 e5a3 b6 8c 1095 e5a5 38 8d 1096 e5a7 49		LDA LSL	GROUP+6 GROUP+7 GROUP+7 #\$3F MIN SEC TH8	xxxx5432 x xxxx5432 1
1097 e5a8 38 8d		ROLA LSL	GROUP+7	xxx54321 x xxx54321 0
1098 e5aa 49 1099 e5ab a4 3f 1100 e5ad b7 9b		AND STA	#\$3F MIN	xx543210 x 543210 x
1101 e5af 3f 9a 1102 e5b1 3f 99 1103 e5b3 1c ca		CLR CLR BSET	SEC TH8 6,STAT3	UPDATE MJD
1104 1105	*****	******	*****	******
1106 1107		Local 1	time difference a	adjustment. *
1108 1109	*****	******	*****	******
1110 1111 e5b5 b6 8d 1112 e5b7 48 1113 e5b8 27 5e	LOCAL	LDA LSLA	GROUP+7 OUT1 POS	AD THOUMPAUT O
1113 e5b8 27 5e 1114 e5ba 24 32 1115		BCC	POS	YES, POSITIVE ?
1116 e5bc 44 1117 e5bd 44 1118 e5be 44 1119 e5bf 44	NEG	LSRA LSRA LSRA LSRA		NO, NEGATIVE
1120 e5c0 97 1121 e5c1 24 0c 1122 e5c3 b6 9b 1123 e5c5 a0 1e 1124 e5c7 2a 04		TAX BCC LDA SUB BPL	NOTHN MIN #30 LT60	HOURS IN X 1/2 HOUR? YES SUBTRACT 30 MINUTES UNDERFLOW? YES, ADD 60 MINUTES AND SUBTRACT 1 HOUR
1125 e5c9 ab 3c 1126 e5cb 3a 9c 1127 e5cd b7 9b	LT60	ADD DEC STA	#60 OUR MIN	YES, ADD 60 MINUTES AND SUBTRACT 1 HOUR
1129 e5cf 9f 1130 e5d0 b0 9c 1131 e5d2 43	NOTHN	TXA SUB	OUR	NEGATIVE HOUR OFFSET MINUS UTC HOURS WRONG WAY ROUND SO COMPLEMENT AND INCREMENT
1132 e5d3 4c 1133 e5d4 2a 14 1134 e5d6 ab 18 1135 e5d8 b7 9c 1136			ZOM #24 OUR	UNDERFLOW ? YES, ADD 24 HOURS
1137 e5da 3d 76 1138 e5dc 26 08 1139 e5de 3d 75		TST BNE TST	BMJD+2 TT2 BMJD+1	AND SUBTRACT A DAY LSB WILL UNDERFLOW ? YES
1139 e5de 3d 75 1140 e5e0 26 02 1141 e5e2 3a 74 1142 e5e4 3a 75 1143 e5e6 3a 76 1144 e5e8 20 2e	TT1 TT2	DEC DEC DEC BRA	BMJD BMJD+1 BMJD+2 OUT1	AND SUBTRACT A DAY LSB WILL UNDERFLOW ? YES MSB WILL UNDERFLOW ? YES DECREMENT MS BIT DECREMENT MSB DECREMENT MSB DECREMENT LSB
1145 1146 e5ea b7 9c 1147 e5ec 20 2a	ZOM	STA BRA	OUR OUT1	
1148 1149 e5ee 44 1150 e5ef 44 1151 e5f0 44 1152 e5f1 44	POS	LSRA LSRA LSRA		POSITIVE ADJUSTMENT
1153 e5f2 97 1154 e5f3 24 0e 1155 e5f5 a6 le 1156 e5f7 bb 9b 1157 e5f9 a1 3b		TAX BCC LDA ADD CMP	NOTHP #30 MIN #59	HOURS IN X HALF HOUR ? YES, ADD 30 MINUTES
1158 e5fb 23 04 1159 e5fd a0 3c 1160 e5ff 3c 9c 1161 e601 b7 9b	HDON	SITE	HDON #60 OUR MIN	OVERFLOW ? YES, SUBTRACT 60 MINUTES AND ADD AN HOUR
	NOTHP	ADD CMP BLS SUB INC	OUR #23 ADDON #24 BMJD+2	HOUR OFFSET ADD UTC HOURS OVERFLOW? YES, SUBTRACT 24 HOURS AND ADD A DAY
1169 e60e 26 06 1170 e610 3c 75 1171 e612 26 02	ADDON OUT1	INC BNE INC	BMJD+1 ADDON BMJD	GROUP HANDLED, CLEAR FLAG

1177		*****	*****	******	******
1178		*	Process	group 14 (EON).	*
1180 1181 1182			*****	******	*****
1183 1184 1185	e61d 27 03 e61f cc e6 b3		JMP	#\$E0 GRP14A OUT2	
1187 1188 1189 1190 1191 1192 1193 1194 1195	e622 3f 95 e624 be 95 e626 d6 01 45 e629 b1 8c e62b 26 69 e62d d6 01 46 e630 b1 8d e630 26 62	GRP14A LPIL	CLR LDX LDA CMP BNE LDA CMP BNE	ITMP1 ITMP1 EON, X GROUP+6 NOTH EON+1, X GROUP+7 NOTH	LOOK FOR PI CODE IN TABLE
1196 1197 1198 1199		* * *	LDA AND LDX STA		TP (ON), NOT USED
1202 1203 1204 1205 1206 1207 1208 1209 1210 1211 1212	e634 b6 89 e636 a4 0f e638 a1 04 e63a 24 10 e63c 48 e63d bb 95 e63f 97 e640 b6 8a e642 d7 01 47 e645 b6 8b e647 d7 01 48 e64a 20 cc		ADD	ITMP1 GROUP+4	PI CODE FOUND PS ? YES SAVE 2 PS-NAME CHARACTERS
1213 1214 1215	e64c al 04 e64e 26 34	NPS	CMP BNE	#4 TRYPIN	AF ?
1216 1217	e650 b6 8a		LDA	GROUP+4	YES, METHOD A
1220 1221 1222 1223 1224 1225 1226	e652 al fa e654 26 la e656 d6 01 51 e659 al ff e65b 27 56 e65d d6 01 53 e660 al ff e662 26 4f e664 a6 fa e666 d7 01 53 e669 b6 8b e669 b6 8b		CMP BNE LDA CMP BEQ LDA CMP BNE LDA STA LDA STA BRA	#250 NMLW EON+12,X #\$FF OUT2 EON+14,X #\$FF OUT2 #250 EON+14,X GROUP+5 EON+15,X	MEDIUM OR LONG WAVE ? YES FIRST 2 BYTES ALREADY IN ? IF NOT, DO NOTHING YES M/L FREQUENCY ALREADY IN ? IF SO, DO NOTHING NO, STORE FIRST FREQUENCY AFTER ARRIVAL OF INITIAL BYTES
1233 1234 1235 1236 1237 1238 1239 1240 1241	e670 a1 e0 e672 25 0e e674 a1 f9 e676 22 0a e678 be 95 e67a d7 01 51 e67d b6 8b e67f d7 01 52 e682 20 2f	NMLW TOOLS	CMP BLO CMP BHI LDX STA LDA STA BRA	#224 TOOLS #249 TOOLS ITMP1 EON+12,X GROUP+5 EON+13,X OUT2	FM LEGAL ? (No. OF FREQUENCIES) YES, SAVE No. OF FREQUENCIES AND FIRST FREQUENCY
1242 1243 1244 1245 1246 1247 1248 1249 1250 1251		*TRYPTY * * * * * * * * *	CMP BNE LDA LSRA LSRA LSRA LDX STA	#\$OD TRYPIN GROUP+4 ITMP1 EON+10,X OUT2	PTY (EON), NOT USED
1254 1255 1256 1257 1258 1259 1260	e684 al 0e e686 26 2b e688 be 95 e68a b6 8a e68c d7 01 4f e68f b6 8b e691 d7 01 50 e694 20 1d	TRYPIN	STA LDA STA	#\$0E OUT2 ITMP1 GROUP+4 EON+10,X GROUP+5 EON+11,X OUT2	PIN
1264 1265 1266 1267	e696 al ff e698 26 0c e69a b6 8c e69c d7 01 45 e69f b6 8d e6al d7 01 46 e6a4 20 0d	NOTH	LDA STA LDA STA	NOTH1 GROUP+6 EON,X	END OF PI LIST ? YES, ADD THIS PI CODE TO EON TABLE
1270 1271 1272 1273 1274 1275	e6a6 b6 95 e6a8 ab 10 e6aa b7 95 e6ac a1 b0 e6ae 27 03 e6b0 cc e6 24	NOTH1	ADD STA CMP BEQ	#16 ITMP1	NOT END, TRY NEXT ENTRY END OF TABLE (11 ENTRIES) ?
	e6b3 13 c9 e6b5 80	OUT2	BCLR RTI	1,STAT2	GROUP HANDLED, CLEAR FLAG

1280	*****	******	******	*******
1281 1282 1283	*	Display	type selection.	
	*****	******	*******	******
1285 1286 e6b6 09 c9 05 1287 e6b9 cd eb aa 1288 e6bc 19 c9	MOD	BRCLR JSR BCLR	4,STAT2,NOCL INITD 4,STAT2	SHOULD DISPALY BE INITIALISED ? YES, DO IT AND CLEAR FLAG SWITCH DISPLAY ON LATCH IT /16 DISPLAY /8 DISPLAY LATCH IT ADDRESS DISPLAY RAM LATCH IT STANDBY ? YES, SLEEP DISPLAY ? NO, ALARM DISPLAY ? NO, NORMAL STANDBY DISPLAY
1289 e6be cd eb 6c 1290 e6c1 a6 0c 1291 e6c3 cd eb 65	NOCL	JSR LDA JSR	WAIT #\$0C CLOCK	SWITCH DISPLAY ON LATCH IT
1292 e606 cd eb 60 1293	*	LDA	#\$38 #\$30	/16 DISPLAY
1294 e669 a6 30 1295 e6cb cd eb 65		JSR	CLOCK	LATCH IT
1296 e6ce cd eb 6c 1297 e6d1 a6 80 1298 e6d3 cd eb 65		LDA JSR	#\$80 CLOCK	ADDRESS DISPLAY RAM LATCH IT
1300 e6d6 06 04 0b		BRSET	3, PORTE, TRYRT	STANDBY ?
1302 e6dc 06 cb 66		BRSET	3,STAT4,ALRMJ	NO, ALARM DISPLAY ?
1304 e6e2 20 64 1305		BRA	ROW1	NO, NOIGHAL STANDEL BISTEAN
1305 1306 e6e4 0f cb 46 1307 e6e7 b6 af 1308 e6e9 al 01 1309 e6eb 26 05 1310 e6ed cd e8 19 1311 e6f0 20 56	TRYRT	BRCLR	7,STAT4,RTITS	RDS DISPLAYS ?
1307 e667 b6 ar 1308 e6e9 al 01		CMP	#1	
1309 e6eb 26 05 1310 e6ed cd e8 19		JSR	NPTY PTYD	PTY
1311 e6f0 20 56 1312		BRA	ROW1	
1313 e6f2 al 02 1314 e6f4 26 05	NPTY	CMP BNE	#2 NPI	
1312 1313 e6f2 al 02 1314 e6f4 26 05 1315 e6f6 cd e8 fa 1316 e6f9 20 4d		JSR BRA	DIPI ROW1	PI
1317 1318 e6fb at 03	NDT			
1319 e6fd 26 05	141 1	BNE	NTAP	ma c mp
1317 1318 e6fb al 03 1319 e6fd 26 05 1320 e6ff cd e9 5a 1321 e702 20 44		BRA	#3 NTAP DITAP ROW1	IA & IP
1322 1323 e704 al 04 1324 e706 26 05 1325 e708 cd e9 72 1326 e70b 20 3b	NTAP	CMP	#4	
1324 e706 26 05 1325 e708 cd e9 72		BNE JSR	NPIN1 DPIN1	PIN - HEX
1326 e70b 20 3b 1327		BRA	ROW1	
1327 1328 e70d al 05 1329 e70f 26 05 1330 e711 cd e9 92 1331 e714 20 32	NPIN1	CMP BNE	#5 NPIN2	
1330 e711 cd e9 92 1331 e714 20 32		JSR BRA	DPIN2 ROW1	PIN - DAY AND TIME
1332 1333 e716 al 06	NPTN2	CMP	#6	
1334 e718 26 05	111 1112	BNE	NMJD DMJD	MTD
1332 1333 e716 al 06 1334 e718 26 05 1335 e71a cd e9 f6 1336 e71d 20 29 1337		BRA	ROW1	MJD
1337 1338 e71f al 07 1339 e72l 26 05 1340 e723 cd eb 03 1341 e726 20 20	NMJD	CMP	#7	
1339 e721 26 05 1340 e723 cd eb 03		BNE JSR	NMSD DMSD	M/S & DI
1342 1343 e728 cd ea 25 1344 e72b 20 1b	NMSD	JSR BRA	DEON ROW1	
1345 1346 e72d 05 c9 05 1347 e730 cd e8 4a 1348 e733 20 13	RTITS	BRCLR	2,STAT2,SLPD	RT DISPLAY ?
1347 e730 cd e8 4a 1348 e733 20 13		BRA	ROW1	
1350 e735 05 cb 05 1351 e738 cd ea ee 1352 e73b 20 0b		JSR BRA	SLEEPD ROW1	
1252				
1354 e73d 06 cb 05 1355 e740 cd e7 cc 1356 e743 20 03		JSR BRA	NORMD ROW1	
1357		JSR		
1359	ROW1	CLRX		
1361 e749 cd eb 6c 1362 e74c 14 03	LCD		WAIT	MDITTE DATA
1363 e74e e6 b1		LDA	DISP,X	GET A BYTE
1364 e750 al ff 1365 e752 26 02		BNE	COK	
1366 e754 a6 2d 1367 e756 cd eb 65	COK	LDA JSR INCX	#\$2D CLOCK	WRITE DATA GET A BYTE SEND IT TO MODULE
1368 e759 5c 1369 e75a a3 10		CPX	#16	DONE ?
1370 e75c 26 eb 1371 e75e 20 1e			LCD VFD	REMOVE FOR /16 LCDs
1372 1373	*****			******
1374 1375	*	Additio	onal bits for /16	* * * *
1376 1377	*			********
1378				
1379 e760 cd eb 6c 1380 e763 a6 a8	LCD401	LDA	#\$A8	TO 40
1381 e765 cd eb 65 1382 e768 5f		CT.PY		SEND IT TO MODULE
1383 e769 cd eb 6c 1384 e76c 14 03	LCD41	JSR BSET	WAIT 2,PORTD	WRITE DATA
1385 e76e e6 b9 1386 e770 al ff		LDA	2,PORTD DISP+8,X #\$FF	GET A BYTE
1387 e772 26 02 1388 e774 a6 2d		BNE LDA		
1389 e776 cd eb 65 1390 e779 5c	COK2	JSR INCX	CLOCK	SEND IT TO MODULE
1391 e77a a3 08		CPX	#8 LCD41	DONE ?
1392 e77c 26 eb		DIVE	TUTAT	

1394		******	*****	*******
1395 1396	*	VFD.		*
1397 1398	*		*****	*
1400 e77e 13 01 1401 e780 10 01	VFD	BCLR BSET	1,PORTB 0,PORTB	DATA LOW ? CLOCK HIGH ?
1402 e782 17 01 1403		BCLR	3,PURIB	ENABLE LOW
1404 e784 5f		CLRX	INITF,X W7 VFDL	SEND VFD SET-UP BYTES
1405 e785 d6 e7 c5 1406 e788 bf a7	DIS5	LDA	INITF,X W7	SAVE INDEX
1407 e78a ad 20 1408 e78c a3 07		BSR	VFDL	
1409 e78e 26 f5		BNE	VFDL #7 DIS5	LAST BYTE ?
1410 1411 e790 5f				SEND 16 CHARACTER BYTES
1411 e790 5f 1412 e791 bf a7 1413 e793 e6 b1	VFD3	STX	W7	SAVE INDEX ASCII
1414 e795 al ff		CMP	#\$FF	ASCII
1415 e797 26 02 1416 e799 a6 2d		BNE LDA	W7 DISP,X #\$FF NOTFF #\$2D #\$7F	REPLACE \$FF WITH "-"
1417 e79b a4 7f 1418 e79d 97	NOTFF	AND TAX	#\$7F	IGNORE BIT 7
1419 e79e d6 ed ae		LDA	VTAB,X	CONVERT TO VFD CHARACTER SET
1420 e7al ad 09 1421 e7a3 a3 10		CPX	#16	
1422 e7a5 26 ea 1423		BNE	VFD3	LAST BYTE ?
1424 e7a7 16 01		BSET	3,PORTB 0,PORTB	ENABLE HIGH
1425 e7a9 11 01 1426 e7ab 81				CLOCK LOW ?
1427 1428 e7ac ae 08	VEDI.	T.DY	#8	
1429 e7ae 44	DIS3	LSRA	n=0.4	GET A BIT
1430 e7af 24 02 1431 e7bl 12 01		BSET	1,PORTB	DATA HIGH CLOCK
1432 e7b3 11 01 1433 e7b5 10 01	DIS4	BCLR	0,PORTB	CLOCK IT
1434 e7b7 13 01		BCLR	#8 DIS4 1,PORTB 0,PORTB 0,PORTB 1,PORTB	CLEAR DATA
1435 e7b9 5a 1436 e7ba 26 f2		BNE	DIS3	COMPLETE ? NO
1436 e7ba 26 f2 1437 e7bc ae 40 1438 e7be 5a	DEI.	LDX	#64	WAIT 200uS
1439 e7bf 26 fd 1440 e7c1 be a7		BNE	DEL	RESTORE INDEX
1440 e761 be a7 1441 e763 5c		INCX	W /	RESTORE INDEX
1442 e764 81 1443		RTS		
1444 e7c5 a0 0f b0 00 80 00 90	INITF	FCB	\$A0,\$0F,\$B0,\$0	0,\$80,\$00,\$90
1445 1446				******
1447	*			*
1448 1449	*	Normal	display (PS and	* * *
1450 1451	*****	******	******	******
	NORMD	TDA	#420	
	IVOICHD	LIDA	π φ 2 0	
1453 e7ce b7 b1 1454 e7d0 b7 ba	NORPID	STA STA	DISP DISP+9	
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0	NORTH	STA STA STA	DISP DISP+9 DISP+15	
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05	NORME	STA STA STA LDA BRCLR	#\$20 DISP DISP+9 DISP+15 #\$2E 1,STAT4,TYP1	. TO INDICATE SLEEP TIMER RUNNING
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0		BRCLR BRCLR STA	1,STAT4,TYP1 2,TH8,TYP1 DTSP+15	. DP TO INDICATE SLEEP TIMER RUNNING FLASH IT
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0		BRCLR BRCLR STA	1,STAT4,TYP1 2,TH8,TYP1 DTSP+15	. DP TO INDICATE SLEEP TIMER RUNNING FLASH IT
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1460 e7de 5f 1462 e7df e6 cl	TYP1	BRCLR BRCLR STA CLRX	1,STAT4,TYP1 2,TH8,TYP1 DTSP+15	. DP TO INDICATE SLEEP TIMER RUNNING FLASH IT GET PS NAME
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7e1 e7 b2 1464 e73 5c	TYP1	BRCLR BRCLR STA CLRX LDA STA INCX	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X	
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7e1 e7 b2 1464 e7e3 5c 1465 e7e4 a3 07	TYP1	BRCLR BRCLR STA CLRX LDA STA INCX	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X	
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 cl 1463 e7e1 e7 b2 1464 e7e3 5c 1465 e7e4 a3 07 1466 e7e6 23 f7	TYP1 MPS SCNG	BRCLR BRCLR STA CLRX LDA STA INCX CPX BLS	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS	GET PS NAME
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7e1 e7 b2 1464 e7e3 5c 1465 e7e4 a3 07 1466 e7e6 23 f7 1468 e7e8 b6 9c 1469 e7ea cd eb 84	TYP1 MPS SCNG	BRCLR BRCLR STA CLRX LDA STA INCX CPX BLS	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS	GET PS NAME
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7e1 e7 b2 1464 e7e3 5c 1465 e7e4 a3 07 1466 e7e6 23 f7 1467 1468 e7e8 b6 9c 1469 e7ea cd eb 84 1470 e7ed a3 30	TYP1 MPS SCNG	BRCLR BRCLR STA CLRX LDA STA INCX	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS	GET PS NAME
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7e1 e7 b2 1464 e7e3 5c 1465 e7e4 a3 07 1466 e7e6 23 f7 1467 1468 e7e8 b6 9c 1469 e7ea cd eb 84 1470 e7ed a3 30 1471 e7ef 26 02	TYP1 MPS SCNG	BRCLR BRCLR STA LDA STA INCX CPX BLS LDA JSR CPX BNE	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS OUR CBCD #\$30 TNZ	GET PS NAME
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d5 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7e1 e7 b2 1464 e7e3 5c 1465 e7e4 a3 07 1466 e7e6 23 f7 1467 1468 e7e8 b6 9c 1469 e7ea cd eb 1470 e7ed a3 30 1471 e7ef 26 02 1472 e7f1 ae 20 1473 e7f3 bf bb 1474 e7f5 b7 bc	TYP1 MPS SCNG	BRCLR BRCLR STA LDA STA INCX CPX BLS LDA JSR CPX BNE LDX STX	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS OUR CBCD #\$30 TNZ #\$20 DISP+10	GET PS NAME GET TIME LEADING ZERO ?
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d5 03 cb 05 1458 e7d5 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 cl 1463 e7el e7 b2 1464 e7e3 5c 1465 e7e4 a3 07 1466 e7e6 23 f7 1467 1458 e7e8 cb 9c 1469 e7ea cd eb 84 1470 e7ed a3 30 1471 e7ef 26 02 1473 e7f1 ae 20 1474 e7f5 b7 bc 1475 e7f7 b6 9b 1476 e7f9 cd eb 84	TYP1 MPS SCNG	BRCLR BRCLR STA LDA STA INCX CPX BLS LDA JSR CPX BNE LDX STX	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS OUR CBCD #\$30 TNZ #\$20 DISP+10	GET PS NAME GET TIME LEADING ZERO ?
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7e1 e7 b2 1464 e7e3 5c 1466 e7e4 a3 07 1466 e7e6 23 f7 1467 1468 e7e8 b6 9c 1469 e7ea cd eb 84 1470 e7ef1 ae 20 1473 e7f5 bf bc 1475 e7f7 b6 9b 1476 e7f9 cd eb 84	TYP1 MPS SCNG	BRCLR BRCLR STA LDA STA INCX CPX BLS LDA JSR CPX BNE LDX STX	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS OUR CBCD #\$30 TNZ #\$20 DISP+10	GET PS NAME GET TIME LEADING ZERO ?
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7el e7 b2 1464 e7e3 5c 1465 e7e4 a3 07 1466 e7e6 23 f7 1467 1468 e7e8 b6 9c 1469 e7ea cd eb 84 1470 e7e1 a3 00 1471 e7e1 26 02 1472 e7f1 ae 20 1474 e7f5 b7 bc 1475 e7f7 b6 9b 1476 e7f9 cd eb 84 1477 e7fc bf be 1478 e7fe b7 bf 1479 e7e0 03 60 05	TYP1 MPS SCNG	BRCLR BRCLR STA LDA STA INCX CPX BLS LDA JSR CPX BNE LDX STX	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS OUR CBCD #\$30 TNZ #\$20 DISP+10	GET PS NAME GET TIME LEADING ZERO ?
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7el e7 b2 1464 e7e3 5c 1465 e7e4 a3 07 1466 e7e6 23 f7 1467 1468 e7e8 b6 9c 1469 e7ea cd eb 84 1470 e7ed a3 30 1471 e7ef 26 02 1472 e7f1 ae 20 1474 e7f5 b7 bc 1475 e7f7 b6 9b 1476 e7f9 cd eb 84 1477 e7fc bf be 1478 e7fe b7 bf 1479 e800 a6 20 1480 e802 05 99 02 1481 e805 a6 3a	TYP1 MPS SCNG	BRCLR BRCLR STA LDA STA INCX CPX BLS LDA JSR CPX BNE LDX STX	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS OUR CBCD #\$30 TNZ #\$20 DISP+10	GET PS NAME GET TIME LEADING ZERO ?
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7d1 e7 b2 1464 e7e3 5c 1465 e7e4 a3 07 1466 e7e6 23 f7 1467 1468 e7e8 b6 9c 1470 e7ea cd eb 84 1470 e7ed a3 30 1471 e7ef 26 02 1472 e7f1 ae 20 1473 e7f3 bf bb 1474 e7f5 b7 bc 1475 e7f7 b6 9b 1476 e7f9 cd eb 84 1477 e7fc bf be 1478 e7f9 b7 bf 1479 e800 a6 20 1480 e800 05 99 02	TYP1 MPS SCNG	BRCLR BRCLR STA LDA STA INCX CPX BLS LDA JSR CPX BNE LDX STX	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS OUR CBCD #\$30 TNZ #\$20 DISP+10	GET PS NAME GET TIME LEADING ZERO ? YES, MAKE IT A SPACE
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7e1 e7 b2 1464 e7e3 5c 1465 e7e4 a3 07 1466 e7e6 23 f7 1467 1468 e7e8 b6 9c 1469 e7ea cd eb 84 1470 e7ed a3 30 1471 e7ef 26 02 1472 e7f1 ae 20 1473 e7f5 b7 bc 1475 e7f5 bf 9b 1476 e7f5 b7 bf 1477 e7f5 b7 bc 1478 e7fc bf be 1478 e7fc bf be 1478 e7fc bf be 1479 e800 a6 20 1480 e802 05 99 02 1481 e805 a6 3a 1482 e807 b7 bd	TYP1 MPS SCNG CJ TNZ CMIN CSEC DDC	BRCLR STA CLRX LDA STA INCX CPX BLS LDA JSR CPX STX STX STX STX STX STA LDA JSR STX STX STA LDA JSR STX STA LDA JSR STX STA LDA JSR STX STA LDA JSR STX STX STA LDA JSR STX STA LDA JSR STX STA LDA JSR STA LDA JSR STA LDA JSR STA LDA JSR STA LDA JSR STA LDA JSR STA LDA JSR STA LDA JSR STA LDA JSR STA LDA JSR STA LDA JSR STA LDA JSR STA LDA JSR STA LDA LDA JSR STA LDA LDA LDA LDA LDA LDA LDA LDA LDA LD	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS OUR CBCD #\$30 TNZ #\$20 DISP+10 DISP+11 MIN CBCD DISP+14 #\$20 2,TH8,DDC #\$3A DISP+12	GET PS NAME GET TIME LEADING ZERO ? YES, MAKE IT A SPACE
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7el e7 b2 1464 e7e3 5c 1465 e7e4 a3 07 1466 e7e6 23 f7 1467 1468 e7e8 b6 9c 1469 e7ea cd eb 84 1470 e7ed a3 30 1471 e7ef 26 02 1472 e7f1 ae 20 1474 e7f5 b7 bc 1475 e7f7 b6 9b 1476 e7f9 cd eb 84 1477 e7fc bf be 1478 e7fe b7 bc 1478 e7fe b7 bc 1479 e800 a6 20 1480 e802 05 99 02 1481 e805 a6 3a 1482 e807 b7 bd 1484 1485 1486	TYP1 MPS SCNG CJ TNZ CMIN CSEC DDC	BRCLR BRCLR STA CLRX LDA STA INCX CPX BLS LDA JSR CPX BNE LDX STX STA LDA JSR STX STA LDA JSR STX STA LDA JSR STX STX STX STX STX STX STX STX STX STX	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS OUR CBCD #\$30 TNZ #\$20 DISP+10 DISP+10 MIN CBCD DISP+14 #\$20 2,TH8,DDC #\$3A DISP+12	GET PS NAME GET TIME LEADING ZERO ? YES, MAKE IT A SPACE 0.5 Hz FLASHING COLON
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d7 cb 7 c0 1460 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7d e7d e7d e7d 1466 e7e4 e3 07 1466 e7e4 e3 07 1466 e7e4 e3 07 1468 e7e8 b6 9c 1469 e7ea cd eb 84 1470 e7ed a3 30 1471 e7ef 26 02 1472 e7f1 ae 20 1473 e7f5 b7 bc 1475 e7f7 b6 9b 1474 e7f9 cd eb 84 1477 e7fc bf be 1478 e7e 800 a6 20 1480 e802 05 99 02 1481 e805 a6 3a 1482 e807 b7 bd 1483 e809 81 1484	TYP1 MPS SCNG CJ TNZ CMIN CSEC DDC ******	BRCLR BRCLR STA CLRX LDA STA INCX CPX BLS LDA JSR CPX BNE LDX STA LDA JSR LDA JSR STX STA LDA JSR STX STA LDA JSR STX STA LDA STA LDA STA LDA STA CPX STA LDA CPX STA CPX STA LDA CPX STA CP	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS OUR CBCD #\$30 TNZ #\$20 DISP+10 DISP+10 MIN CBCD DISP+14 #\$20 2,TH8,DDC #\$3A DISP+12 ***********************************	GET PS NAME GET TIME LEADING ZERO ? YES, MAKE IT A SPACE 0.5 Hz FLASHING COLON *** t flags. * *
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7d b7 c0 1466 e7de 47d b7 c0 1466 e7de 5f 1462 e7df e6 c1 1463 e7d b7 c0 1466 e7e4 a3 07 1466 e7e4 a3 07 1466 e7e6 23 f7 1467 1468 e7e8 b6 9c 1470 e7ea cd eb 84 1470 e7ea cd eb 84 1470 e7ed a3 30 1471 e7ef 26 02 1473 e7f1 ae 20 1473 e7f5 b7 bc 1475 e7f7 b6 9b 1477 e7f5 b7 bc 1475 e7f9 cd eb 84 1477 e7fc bf be 1478 e7f9 cd eb 84 1477 e7fc bf be 1478 e7f9 cd eb 84 1477 e7fc bf be 1478 e7fe b7 bf 1479 e800 a6 20 1480 e802 05 99 02 1481 e805 a6 3a 1482 e807 b7 bd 1485 1486 1487 1488	TYP1 MPS SCNG CJ TNZ CMIN CSEC DDC *******	BRCLR BRCLR STA CLRX LDA STA INCX CPX BLS LDA JSR CPX STX STA LDA JSR STX STA LDA JSR STX STA LDA JSR STX STA LDA STX STA LDA STX STA LDA STX STA STX STA STX STA STA STA STA STA STA STA STA STA STA	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS OUR CBCD #\$30 TNZ #\$20 DISP+10 DISP+10 DISP+11 MIN CBCD DISP+14 #\$20 2,TH8,DDC #\$3A DISP+12	GET PS NAME GET TIME LEADING ZERO ? YES, MAKE IT A SPACE 0.5 Hz FLASHING COLON * t flags. * *
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7d b7 c0 1466 e7de 47d b7 c0 1466 e7de 5f 1462 e7df e6 c1 1463 e7d b7 c0 1466 e7e4 a3 07 1466 e7e4 a3 07 1466 e7e6 23 f7 1467 1468 e7e8 b6 9c 1470 e7ea cd eb 84 1470 e7ea cd eb 84 1470 e7ed a3 30 1471 e7ef 26 02 1473 e7f1 ae 20 1473 e7f5 b7 bc 1475 e7f7 b6 9b 1477 e7f5 b7 bc 1475 e7f9 cd eb 84 1477 e7fc bf be 1478 e7f9 cd eb 84 1477 e7fc bf be 1478 e7f9 cd eb 84 1477 e7fc bf be 1478 e7fe b7 bf 1479 e800 a6 20 1480 e802 05 99 02 1481 e805 a6 3a 1482 e807 b7 bd 1485 1486 1487 1488	TYP1 MPS SCNG CJ TNZ CMIN CSEC DDC *******	BRCLR BRCLR STA CLRX LDA STA INCX CPX BLS LDA JSR CPX STX STA LDA JSR STX STA LDA JSR STX STA LDA JSR STX STA LDA STX STA LDA STX STA LDA STX STA STX STA STX STA STA STA STA STA STA STA STA STA STA	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS OUR CBCD #\$30 TNZ #\$20 DISP+10 DISP+10 DISP+11 MIN CBCD DISP+14 #\$20 2,TH8,DDC #\$3A DISP+12	GET PS NAME GET TIME LEADING ZERO ? YES, MAKE IT A SPACE 0.5 Hz FLASHING COLON * t flags. * *
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7d b7 c0 1466 e7de 47d b7 c0 1466 e7de 5f 1462 e7df e6 c1 1463 e7d b7 c0 1466 e7e4 a3 07 1466 e7e4 a3 07 1466 e7e6 23 f7 1467 1468 e7e8 b6 9c 1470 e7ea cd eb 84 1470 e7ea cd eb 84 1470 e7ed a3 30 1471 e7ef 26 02 1473 e7f1 ae 20 1473 e7f5 b7 bc 1475 e7f7 b6 9b 1477 e7f5 b7 bc 1475 e7f9 cd eb 84 1477 e7fc bf be 1478 e7f9 cd eb 84 1477 e7fc bf be 1478 e7f9 cd eb 84 1477 e7fc bf be 1478 e7fe b7 bf 1479 e800 a6 20 1480 e802 05 99 02 1481 e805 a6 3a 1482 e807 b7 bd 1485 1486 1487 1488	TYP1 MPS SCNG CJ TNZ CMIN CSEC DDC *******	BRCLR BRCLR STA CLRX LDA STA INCX CPX BLS LDA JSR CPX STX STA LDA JSR STX STA LDA JSR STX STA LDA JSR STX STA LDA STX STA LDA STX STA LDA STX STA STX STA STX STA STA STA STA STA STA STA STA STA STA	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS OUR CBCD #\$30 TNZ #\$20 DISP+10 DISP+10 DISP+11 MIN CBCD DISP+14 #\$20 2,TH8,DDC #\$3A DISP+12	GET PS NAME GET TIME LEADING ZERO ? YES, MAKE IT A SPACE 0.5 Hz FLASHING COLON * t flags. * *
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7d b7 c0 1466 e7de 47d b7 c0 1466 e7de 5f 1462 e7df e6 c1 1463 e7d b7 c0 1466 e7e4 a3 07 1466 e7e4 a3 07 1466 e7e6 23 f7 1467 1468 e7e8 b6 9c 1470 e7ea cd eb 84 1470 e7ea cd eb 84 1470 e7ed a3 30 1471 e7ef 26 02 1473 e7f1 ae 20 1473 e7f5 b7 bc 1475 e7f7 b6 9b 1477 e7f5 b7 bc 1475 e7f9 cd eb 84 1477 e7fc bf be 1478 e7f9 cd eb 84 1477 e7fc bf be 1478 e7f9 cd eb 84 1477 e7fc bf be 1478 e7fe b7 bf 1479 e800 a6 20 1480 e802 05 99 02 1481 e805 a6 3a 1482 e807 b7 bd 1485 1486 1487 1488	TYP1 MPS SCNG CJ TNZ CMIN CSEC DDC *******	BRCLR BRCLR STA CLRX LDA STA INCX CPX BLS LDA JSR CPX STX STA LDA JSR STX STA LDA JSR STX STA LDA JSR STX STA LDA STX STA LDA STX STA LDA STX STA STX STA STX STA STA STA STA STA STA STA STA STA STA	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS OUR CBCD #\$30 TNZ #\$20 DISP+10 DISP+10 DISP+11 MIN CBCD DISP+14 #\$20 2,TH8,DDC #\$3A DISP+12	GET PS NAME GET TIME LEADING ZERO ? YES, MAKE IT A SPACE 0.5 Hz FLASHING COLON * t flags. * *
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7d b7 c0 1466 e7de 47d b7 c0 1466 e7de 5f 1462 e7df e6 c1 1463 e7d b7 c0 1466 e7e4 a3 07 1466 e7e4 a3 07 1466 e7e6 23 f7 1467 1468 e7e8 b6 9c 1470 e7ea cd eb 84 1470 e7ea cd eb 84 1470 e7ed a3 30 1471 e7ef 26 02 1473 e7f1 ae 20 1473 e7f5 b7 bc 1475 e7f7 b6 9b 1477 e7f5 b7 bc 1475 e7f9 cd eb 84 1477 e7fc bf be 1478 e7f9 cd eb 84 1477 e7fc bf be 1478 e7f9 cd eb 84 1477 e7fc bf be 1478 e7fe b7 bf 1479 e800 a6 20 1480 e802 05 99 02 1481 e805 a6 3a 1482 e807 b7 bd 1485 1486 1487 1488	TYP1 MPS SCNG CJ TNZ CMIN CSEC DDC *******	BRCLR BRCLR STA CLRX LDA STA INCX CPX BLS LDA JSR CPX STX STA LDA JSR STX STA LDA JSR STX STA LDA JSR STX STA LDA STX STA LDA STX STA LDA STX STA STX STA STX STA STA STA STA STA STA STA STA STA STA	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS OUR CBCD #\$30 TNZ #\$20 DISP+10 DISP+10 DISP+11 MIN CBCD DISP+14 #\$20 2,TH8,DDC #\$3A DISP+12	GET PS NAME GET TIME LEADING ZERO ? YES, MAKE IT A SPACE 0.5 Hz FLASHING COLON * t flags. * *
1453 e7ce b7 b1 1454 e7d0 b7 ba 1455 e7d2 b7 c0 1456 e7d4 a6 2e 1457 e7d6 03 cb 05 1458 e7d9 05 99 02 1459 e7dc b7 c0 1460 1461 e7de 5f 1462 e7df e6 c1 1463 e7d b7 c0 1466 e7de 47d b7 c0 1466 e7de 5f 1462 e7df e6 c1 1463 e7d b7 c0 1466 e7e4 a3 07 1466 e7e4 a3 07 1466 e7e6 23 f7 1467 1468 e7e8 b6 9c 1470 e7ea cd eb 84 1470 e7ea cd eb 84 1470 e7ed a3 30 1471 e7ef 26 02 1473 e7f1 ae 20 1473 e7f5 b7 bc 1475 e7f7 b6 9b 1477 e7f5 b7 bc 1475 e7f9 cd eb 84 1477 e7fc bf be 1478 e7f9 cd eb 84 1477 e7fc bf be 1478 e7f9 cd eb 84 1477 e7fc bf be 1478 e7fe b7 bf 1479 e800 a6 20 1480 e802 05 99 02 1481 e805 a6 3a 1482 e807 b7 bd 1485 1486 1487 1488	TYP1 MPS SCNG CJ TNZ CMIN CSEC DDC *******	BRCLR BRCLR STA CLRX LDA STA INCX CPX BLS LDA JSR CPX STX STA LDA JSR STX STA LDA JSR STX STA LDA JSR STX STA LDA STX STA LDA STX STA LDA STX STA STX STA STX STA STA STA STA STA STA STA STA STA STA	1,STAT4,TYP1 2,TH8,TYP1 DISP+15 PSN,X DISP+1,X #7 MPS OUR CBCD #\$30 TNZ #\$20 DISP+10 DISP+10 DISP+11 MIN CBCD DISP+14 #\$20 2,TH8,DDC #\$3A DISP+12	GET PS NAME GET TIME LEADING ZERO ? YES, MAKE IT A SPACE 0.5 Hz FLASHING COLON *** t flags. * *

1500			*****	******	******	******
1501 1502			*	pomr di-	-1	*
1502 1503 1504			*	PTY disp		*
1505						
1506	e819 be 86	<u> </u>	PTYD	LDX CPX	PTY #16	PTY
1508	e81b a3 10 e81d 25 01	Ĺ			XOK2	
	e81f 5f e820 a6 10	,	XOK2	BLO CLRX LDA MUL	ш16	
	e822 42	,	AUKZ	MUL	#10	
1512	e823 b7 a8			STA	W8	
1513	e825 3f a7 e827 be a8	/ R	LCD3	CLR LDX	W7 ws	
1515	e829 d6 e6 e82c be a7	ae	LCDS	LDA	PTYT,X	
1516	e82c be a7 e82e e7 b1	7		LDX	W8 PTYT,X W7 DISP,X W8	WAS MOD2
	e830 3c a8			INC	W8	WAS MOD2
	e832 3c a7			INC	W /	
	e834 b6 a7 e836 al 10			LDA CMP	W7 #16 LCD3	
1522	e838 25 ed	i		DDO	LCD3	
1523 1524	e83a 81			RTS		
1525				*****	*****	******
1526 1527			*	RDS disp	ol av	*
1528			*	KDS GIS	piay.	*
1529			*****	*****	******	******
1530 1531	e83b be a0)	NXTC	LDX	DISP2	
1532	e83d e6 ff			T.DA	RT-1 X	RT
	e83f al 20 e84l 26 l3			CMP	#\$20 NOTSP	SPACE ?
1535	e843 0b c9	9 Oc		BRCLR	5,STAT2,FSP	YES, FIRST ONE ?
1536	e846 3c 9f e848 3c a0 e84a b6 a0			INC	DISP1	NO, SKIP THIS ONE
1537	e848 3c at)	RTDS	INC LDA	DISP2 DISP2 #69	
1539	e84c al 45	5	SKP1	CMP	#69	
	e84e 22 18 e850 20 e9	,		BHI BRA		END OF RT BUFFER NO, GET NEXT CHARACTER
1542				Ditt	MAIC	
	e852 la c9	9	FSP	BSET	5,STAT2	FIRST SPACE, SET FLAG NOT A SPACE, CLEAR FLAG SAVE NEW CHARACTER
1545	e854 20 02 e856 1b c9)	NOTSP	BCLR	5,STAT2	NOT A SPACE, CLEAR FLAG
1546	e858 b7 a8	3	CONT	STA	W8	SAVE NEW CHARACTER
	e85a 5f e85b e6 b2		TT.P1	LDA		MOVE
1549	e85d e7 b1			STA	DISP,X	REST
	e85f 5c			INCX		LEFT ONE
1552	e860 a3 0f e862 26 f7	- 7		CPX BNE		PLACE
1553	e862 26 f7 e864 b6 a8	3		LDA	W8	
	e866 b7 c0	J		STA RTS	DISP+15	ADD NEW CHAR. (WAS MOD2)
1556						
1557 1558			*****	******	******	******
1559			*			*
1560			*	Standby	display.	*
1561 1562			*****	*****	******	******
1563						
	e869 08 ch e86c b6 73	0 4±	STBYD	BRSET LDA	4,STAT4,ALRMA DOW	ALARM ARMED ? NO, GET DAY OF WEEK
1566	e86e 48			LSLA		no, cer en or week
1567	e86f bb 73 e871 97	3		ADD TAX	DOW	
1569	e872 d6 ec	72		LDA	DNAME, X	
1570	e875 b7 b1	L		STA	DISP	
	e877 d6 e6 e87a b7 b2				DNAME+1,X DISP+1	
1573	e87c d6 ec	74		LDA	DNAME+2,X	
1574	e87f b7 b3	3		STA	DISP+2 #\$20	
1576	e881 a6 20 e883 b7 b4	í		LDA STA STA STA	DISP+3	
1577	e885 b7 b7	7		STA	DISP+6	
	e887 b7 bb e889 b6 72			STA LDA	DISP+10 DOM+1	DATE
1580	e88b ab 30)		ADD	#\$30	
1581	e88d b7 b6	5		STA LDA	DISP+5 DOM	
1583	e88f b6 71 e891 27 02	2		BEO	ADD20	IF ZERO USE A SPACE
1584	e893 ab 10)				IF NOT MAKE ASCII
	e895 ab 20 e897 b7 b5				#\$20 DISP+4	
1587	e899 be 70)		LDX	MNTH+1	MONTH, LSD
1588	e89b b6 6f	: 1		LDA BEQ	MNTH MTHZ	MONTH, MSD
1590	e89d 27 04 e89f 9f e8a0 ab 0a	•		TXA		
1591	e8a0 ab 0a	1			#10	
1593	e8a2 97 e8a3 bf a8	3	MTHZ	TAX STX	W8	
1594	e8a5 9f		-	TXA		
	e8a6 48 e8a7 bb a8	3		LSLA ADD	W8	
1597	e8a9 97 e8aa d6 ec	•		TAX		
1598	e8aa d6 e6 e8ad b7 b8	87		LDA STA	MNAME-3,X DISP+7	
	e8af d6 ec				MNAME-2,X	
1601	e8b2 b7 b9	9		STA	DISP+8	
1603	e8b4 d6 ec e8b7 b7 ba	: 09 1		LDA STA	MNAME-1,X DISP+9	
1604	e8b9 20 1d	ì		BRA	STIME	

1606		*****	******	******
1607 1608	*	Standby	(alarm armed) d	isplay. *
1609 1610	*	*****	*****	*
1611 1612 e8bb b6 9e	ALRMA	T.DA	AOUR	GET ALARM HOURS
1613 e8bd cd eb 84	ALIGHA	JSR	CBCD	GET ADART HOURD
1614 e8c0 bf b1 1615 e8c2 b7 b2		STA	DISP DISP+1	
1616 e8c4 b6 9d		LDA	AMIN	
1617 e8c6 cd eb 84 1618 e8c9 bf b3		JSR STX	CBCD DISP+2	
1619 e8cb b7 b4			DISP+3	
1620 e8cd 5f 1621 e8ce d6 eb f3 1622 e8d1 e7 b5	ALOP2	LDA	ALARMS+1,X	
1622 e8d1 e7 b5 1623 e8d3 5c		STA INCX	DISP+4,X	
1624 e8d4 a3 06		CPX	#6	
1625 e8d6 23 f6 1626 e8d8 b6 9c	STIME	BLS LDA	ALOP2 OUR	GET TIME
1627 e8da cd eb 84		JSR	CBCD	
1628 e8dd a3 30 1629 e8df 26 02			TMZ	LEADING ZERO ?
1630 e8el ae 20 1631 e8e3 bf bc	TMZ	LDX STX	#\$20 DISP+11	YES, MAKE IT A SPACE
1632 e8e5 b7 bd	1112	STA	DISP+12	
1633 e8e7 b6 9b 1634 e8e9 cd eb 84		LDA JSR	MIN CBCD	
1635 e8ec bf bf		STX	DISP+14	
1636 e8ee b7 c0 1637 e8f0 a6 20			DISP+15 #\$20	
1638 e8f2 05 99 02 1639 e8f5 a6 3a		BRCLR		FLASH ? 0.5 Hz FLASHING COLON
1640 e8f7 b7 be	DTF	STA	DISP+13	0.5 HZ FLASHING COLON
1641 e8f9 81 1642		RTS		
1643 1644	*****	*****	******	************
1644	*	PI disp	lay.	*
1646 1647	* * * * * * * *	*****	******	*
1648				
1649 e8fa 5f 1650 e8fb d6 ec 02	DIPI DLOP	CLRX LDA	PIST.X	
1651 e8fe e7 b1		STA	PIST,X DISP,X	
1652 e900 5c 1653 e901 a3 0f		INCX	#15	
1654 e903 23 f6		BLS LDA	#15 DLOP	
1655 e905 b6 8f 1656 e907 27 10		BEQ	PI PINV SPLIT	
1657 e909 cd eb 48 1658 e90c bf bc		JSR STX	SPLIT DISP+11	
1659 e90e b7 bd		STA	DISP+12	
1660 e910 b6 90 1661 e912 cd eb 48		LDA JSR	PI+1 SPLIT	
1662 e915 bf be 1663 e917 b7 bf		STX STA	DISP+13 DISP+14	
1003 6317 D7 D1		SIM		
	PINV	RTS		
1664 e919 81 1665 1666			******	******
1665 1666 1667		*****		**************************************
1665 1666 1667 1668 1669	***** * *	******* Alarm d	isplay.	* *
1665 1666 1667 1668	****** * * *	******* Alarm d	isplay.	*
1665 1666 1667 1668 1669 1670	******	******* Alarm d ******	isplay. *******	* *
1665 1666 1667 1668 1669 1670 1671 1672 e91a 5f 1673 e91b d6 eb f2 1674 e91e e7 b1	****** * * * * * * * * * * * * * * *	****** Alarm d ****** CLRX LDA STA	isplay.	* * *
1665 1666 1667 1668 1669 1670 1671 1672 e91a 5f 1673 e91b d6 eb f2 1674 e91e e7 b1 1675 e920 5c	******	Alarm d ****** CLRX LDA STA INCX CPX	isplay. ********* ALARMS,X DISP,X #15	* * * YES
1665 1666 1667 1668 1669 1670 1671 1672 e91a 5f 1673 e91b d6 eb f2 1674 e91e e7 b1 1675 e920 5c 1676 e921 a3 0f 1677 e923 23 f6	******	Alarm d ****** CLRX LDA STA INCX CPX	isplay. ********* ALARMS,X DISP,X #15	* * * YES
1665 1666 1667 1668 1669 1670 1671 1672 e91a 5f 1673 e91b d6 eb f2 1674 e91e e7 b1 1675 e920 5c 1676 e921 a3 0f 1677 e923 23 f6 1678 e925 9 cb 31 1679 e928 a6 3a	******	Alarm d ******* CLRX LDA STA INCX CPX BLS BRCLR	isplay. ALARMS,X DISP,X #15 ALOP 4,STAT4,ALOF2	* * * YES
1665 1666 1667 1668 1669 1670 1671 1672 e91a 5f 1673 e91b d6 eb f2 1674 e91e e7 b1 1675 e920 5c 1676 e921 a3 0f 1677 e923 23 f6 1678 e925 09 cb 31 1679 e928 a6 3a 1680 e92a b7 bd	******	Alarm d ******* CLRX LDA STA INCX CPX BLS BRCLR LDA STA	isplay. **************** ALARMS,X DISP,X #15 ALOP 4,STAT4,ALOF2 #\$3A DISP+12	YES ALARM ARMED ? YES
1665 1666 1667 1668 1670 1670 1671 1672 e91a 5f 1673 e91b d6 eb f2 1674 e91e e7 b1 1675 e920 5c 1676 e921 a3 0f 1677 e932 33 f6 1678 e925 09 cb 31 1679 e928 a6 3a 1680 e92a b7 bd 1681 e92c b6 9e 1682 e92c cd eb 84	******	******* Alarm d ******* CLRX LDA STA INCX CPX BLS BRCLR LDA STA LDA JSR	ALARMS,X DISP,X #15 ALOP 4,STAT4,ALOF2 #83A DISP+12 AOUR CBCD	YES ALARM ARMED ? YES GET ALARM HOURS
1665 1666 1667 1668 1669 1670 1671 1672 e91a 5f 1673 e91b d6 eb f2 1674 e91e e7 b1 1675 e920 5c 1676 e921 a3 0f 1677 e923 23 f6 1678 e925 09 cb 31 1679 e928 a6 3a 1680 e92a b7 bd 1681 e92c b6 9e 1682 e92c de b84 1683 e931 a3 30	******	Alarm d ******* CLRX LDA STA INCX CPX BLS BRCLR LDA STA LDA JSR CPX BNE	ALARMS,X DISP,X #15 ALOP 4,STAT4,ALOF2 #\$3A DISP+12 AOUR CBCD #\$30	YES ALARM ARMED ? YES
1665 1666 1667 1668 1669 1670 1671 1672 1673 1691 1673 1691 1673 1691 1675 1676 1676 1676 1676 1677 1672 1676 1677 1672 1676 1677 1678 1678 1678 1678 1678 1678	******* * * ******** ALRMD ALOP	Alarm d ******** CLRX LDA STA INCX CPX BLS BRCLR LDA STA LDA JSR CPX BNE LDB	isplay. **************** ALARMS, X DISP, X #15 ALOP 4,STAT4,ALOF2 #\$3A DISP+12 AOUR CBCD #\$30 TN3 #\$30 TN3 #\$20	YES ALARM ARMED ? YES GET ALARM HOURS
1665 1666 1667 1668 1669 1670 1671 1672 1672 1673 1672 1673 1673 1671 1672 1674 1675 1675 1676 1677 1672 1676 1677 1678 1678 1678 1678 1678 1678	******	Alarm d CLRX LDA STA INCX CPX BLS BRCLR LDA STA LDA JSR CPX BNE LDA STX STX STX	ALARMS, X DISP, X #15 ALOP 4,STAT4,ALOF2 #\$3A DISP+12 AOUR CBCD #\$30 TN3 #\$20 DISP+10 DISP+10 DISP+11	YES ALARM ARMED ? YES GET ALARM HOURS LEADING ZERO ?
1665 1666 1667 1668 1669 1670 1671 1672 e91a 5f 1673 e91b d6 eb f2 1674 e91e e7 b1 1675 e920 5c 1676 e921 a3 0f 1677 e923 23 f6 1678 e925 09 cb 31 1679 e928 a6 3a 1680 e92a b7 bd 1681 e92c b6 9e 1682 e92e cd eb 84 1683 e931 a3 30 1684 e933 26 02 1685 e935 ae 20 1686 e937 bf bb 1687 e939 b7 bc 1688 e93b b6 9d	******* * * ******** ALRMD ALOP	Alarm d ******** CLRX LDA STA INCX CPX BLS BRCLR LDA STA LDA JSR CPX BNE LDA JSR STA LDA STA LDA STA LDA LDA LDA LDA LDA LDA LDA LDA LDA LD	ALARMS,X DISP,X #15 ALOP 4,STAT4,ALOF2 #\$3A DISP+12 AOUR CBCD #\$30 TN3 #\$20 DISP+10 DISP+11 AMIN	YES ALARM ARMED ? YES GET ALARM HOURS LEADING ZERO ?
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1665 1666 1667 1668 1669 1670 1671 1672 e91a 5f 1673 e91b d6 eb f2 1674 e91e e7 b1 1675 e920 5c 1676 e921 a3 0f 1677 e921 a3 0f 1678 e925 o9 cb 1678 e925 o9 cb 1680 e92a b7 bd 1681 e92c b6 9e 1682 e92c cd eb 84 1683 e931 a3 30 1684 e933 26 02 1685 e935 ae 20 1686 e937 bf bb 1687 e939 b7 bc 1688 e935 b6 9d 1689 e93d cd eb 84 1690 e940 bf be 1691 e942 b7 bf 1692 e944 0b cb 12 1693 e947 05 99 0f 1694 e943 a6 20 1695 e94c 0c cb 06 1696 e94f b7 be 1697 e951 b7 bc 1697 e951 b7 bc 1698 e933 20 04 1699 e955 b7 bb 1700 e957 b7 bc 1701 e959 81 1702 1703 1704 1707 1708 1706 1707 1708	******* * * * * * * * * * * * * * * *	Alarm d CLRX LDA STA LDA STA LDA STA LDA STA LDA JSR CPX ENE LDA JSR CPX ENE LDA JSR CPX ENE LDA JSR CPX ENE LDA JSR RCLR LDA JSR STA LDA JSR STA STA LDA JSR STA STA STA RRCLR BRCLR BRCLR BRCLR LDA RRSET STA STA STA STA STA STA STA STA STA ST	ALARMS,X DISP,X #15 ALOP 4,STAT4,ALOF2 #\$3A DISP+12 AOUR CBCD #\$30 TN3 #\$20 DISP+10 DISP+11 AMIN CBCD DISP+13 DISP+13 DISP+14 5,STAT4,ALOF2 2,TH8,ALOF2 #\$20 6,STAT4,FH DISP+13 DISP+14 5,STAT4,FH DISP+14 5,STAT4,FH DISP+14 1,STAT4,FH DISP+14 ALOF2 BISP+15 BISP+16 FISP+17 BISP+18 DISP+18 DISP+19 FISP+11 BISP+11 ALOF2 DISP+11 BISP+13 BISP+14 BISP+16 BISP+17 BISP+18 B	YES ALARM ARMED ? YES GET ALARM HOURS LEADING ZERO ? YES, MAKE IT A SPACE SET-UP ? HOURS ? NO, FLASH MINUTES YES, FLASH HOURS
1665 1666 1667 1668 1669 1670 1671 1672 e91a 5f 1673 e91b d6 eb f2 1674 e91e e7 b1 1675 e920 5c 1676 e921 a3 0f 1679 e922 8d 63 a 1680 e925 b7 bd 1681 e92c b6 9e 1682 e92c ed eb 84 1683 e931 a3 30 1684 e933 26 02 1685 e935 ae 20 16868 e937 bf bb 1687 e939 b7 bc 1688 e93b d6 9d 1689 e93d cd eb 84 1690 e940 bf be 1691 e942 b7 bf 1692 e944 0b cb 12 1693 e947 05 99 0f 1694 e94a a6 20 1695 e946 0c cb 06 1696 e94f b7 be 1697 e951 b7 bf 1698 e955 b7 bb 1700 e957 b7 bc 1701 e959 81 1702 1703 1704 1705 1706 1707 1708 1709 e95a 5f 1710 e95b d6 ec 12	******* * * * * * * * * * * * * * * *	Alarm d ********* CLRX LDA STA INCX CPX BLS BRCLR LDA STA LDA JSR CPX BRCLR LDA JSR STA LDA JSR STA LDA STA LDA STA LDA STA LDA STA RTS STA RCLR LDA BRCLR LDA BRSET STA RTS STA RTS ******* CLRX LDA STA CTP ********** CLRX LDA STA STA STA RTS STA STA STA STA STA STA STA STA STA S	ALARMS, X DISP, X #15 ALOP 4, STAT4, ALOF2 #\$3A DISP+12 AOUR CBCD #\$30 TN3 #\$20 DISP+10 DISP+10 DISP+11 AMIN CBCD DISP+13 DISP+14 5, STAT4, ALOF2 2, TH8, ALOF2 #\$20 6, STAT4, FH DISP+13 DISP+14 5, STAT4, FH DISP+13 DISP+14 5, STAT4, FH DISP+14 DISP+13 DISP+14 DISP+14 DISP+14 DISP+14 ALOF2 DISP+14 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11	YES ALARM ARMED ? YES GET ALARM HOURS LEADING ZERO ? YES, MAKE IT A SPACE SET-UP ? HOURS ? NO, FLASH MINUTES YES, FLASH HOURS
1665 1666 1667 1668 1669 1670 1670 1671 1672 e91a 5f 1673 e91b d6 eb f2 1674 e91e e7 b1 1675 e920 5c 1676 e921 a3 0f 1677 e923 23 f6 1678 e925 09 cb 31 1679 e928 a6 3a 1680 e92a b7 bd 1681 e92c b6 9e 1682 e92e cd eb 84 1683 e931 a3 30 1684 e933 26 02 1685 e935 ae 20 1685 e935 ae 20 1686 e937 bf bb 1687 e939 b7 bc 1688 e930 b7 bc 1688 e935 b7 bc 1688 e935 b7 bc 1688 e935 b7 bc 1689 e934 cd eb 84 1690 e940 bf be 1691 e942 b7 bf 1692 e944 0b cb 12 1693 e947 05 99 0f 1694 e94a a6 20 1695 e954c 0c cb 06 1696 e94f b7 be 1697 e951 b7 bf 1698 e953 20 04 1699 e955 b7 bb 1700 e957 b7 bc 1701 e959 81 1702 1703 1704 1705 1706 1707 1708 1709 e95a 5f 1710 e95b d6 ec 12 1711 e95e e7 b1 1712 e960 5c	******* * * * * * * * * * * * * * * *	Alarm d CLRX LDA STA LDA JSR CPX STA LDA JSR STX STA LDA JSR STX STA LDA STA STA STA RECLR LDA RECLR LDA RECLR LDA RECLR LDA STA STA STA STA STA STA STA STA STA ST	ALARMS, X DISP, X #15 ALOP 4,STAT4, ALOF2 #\$3A DISP+12 AOUR CBCD #\$30 TN3 #\$20 DISP+10 DISP+11 AMIN CBCD DISP+13 DISP+13 DISP+13 DISP+14 4,STAT4,ALOF2 2,TH8,ALOF2 #\$20 6,STAT4,FH DISP+13 DISP+14 TOPSP+13 DISP+14 TOPSP+13 DISP+14 ALOF2 TOPSP+13 DISP+14 ALOF2 DISP+14 ALOF2 DISP+10 DISP+11 TOPSP+10 DISP+11 DISP+11 DISP+13 DISP+14 ALOF2 DISP+14 ALOF2 DISP+10 DISP+10 DISP+11 DISP+10 DISP+10 DISP+11	YES ALARM ARMED ? YES GET ALARM HOURS LEADING ZERO ? YES, MAKE IT A SPACE SET-UP ? HOURS ? NO, FLASH MINUTES YES, FLASH HOURS
1665 1666 1667 1668 1669 1670 1671 1672 e91a 5f 1673 e91b d6 eb f2 1674 e91e e7 b1 1675 e920 5c 1676 e921 a3 0f 1677 e922 86 3a 1680 e92a b7 bd 1688 e93b d6 eb 84 1683 e931 a3 30 1680 e92a b7 bd 1684 e933 26 02 1685 e935 ae 20 1685 e935 ae 20 1686 e937 bf bb 1687 e939 b7 bc 1688 e93b d6 eb 84 1689 e93d cd eb 84 1689 e93d cd eb 84 1689 e93d cd cb 84 1689 e93d cd cb 84 1690 e940 bf be 1691 e942 b7 bf 1692 e944 0b cb 12 1693 e947 05 99 0f 1694 e944 bf be 1691 e942 b7 bf 1692 e944 0b cb 12 1693 e947 05 99 0f 1694 e944 a6 20 1695 e94c 0c cb 06 1696 e94f b7 be 1697 e955 b7 bf 1698 e953 20 04 1699 e955 b7 bf 1700 e957 b7 bc 1701 e959 81 1702 1703 1704 1705 1706 1707 1708 1709 e95a 5f 1710 e95b d6 ec 12 1711 e95e c7 b1 1712 e960 5c 1713 e961 a3 0f 1714 e960 5c 1713 e961 a3 0f	******* * * * * * * * * * * * * * * *	Alarm d Alarm d CLRX LDA STA LDA JSR CPX STA LDA JSR STX STA LDA JSR STX STA LDA STA STA TA BECLR LDA BRSET STA STA STA STA STA STA STA STA STA ST	ALARMS, X DISP, X #15 ALOP 4, STAT4, ALOF2 #\$3A DISP+12 AOUR CBCD #\$30 TN3 #\$20 DISP+10 DISP+11 AMIN CBCD DISP+13 DISP+13 DISP+13 DISP+14 4, STAT4, ALOF2 #\$20 6, STAT4, FH DISP+13 DISP+14 TOP FOR THE PROPERTY OF THE PROPER	YES ALARM ARMED ? YES GET ALARM HOURS LEADING ZERO ? YES, MAKE IT A SPACE SET-UP ? HOURS ? NO, FLASH MINUTES YES, FLASH HOURS
1665 1666 1667 1668 1669 1670 1670 1671 1672 e91a 5f 1673 e91b d6 eb f2 1674 e91e e7 b1 1675 e920 5c 1676 e921 a3 0f 1677 e922 32 3f 6 1678 e925 09 cb 31 1679 e928 a6 3a 1680 e92a b7 bd 1681 e92c b6 9e 1682 e92e cd eb 84 1683 e931 a3 30 1684 e933 26 02 1685 e935 ae 20 1685 e935 ae 20 1686 e937 bf bb 1687 e939 bf bc 1688 e930 dd eb 84 1689 e93d cd eb 84 1690 e940 bf be 1691 e942 b7 bf 1699 e954 bf be 1691 e942 b7 bf 1692 e944 0b cb 12 1693 e947 05 99 0f 1694 e944 bf be 1691 e942 b7 bf 1698 e953 20 04 1695 e94c 0c cb 06 1696 e94f bf be 1691 e945 b7 bc 1698 e955 b7 bf 1698 e955 b7 bf 1700 e957 b7 bc 1701 e959 81 1702 1703 1704 1705 1706 1707 1708 1709 e95a 5f 1711 e95b d6 ec 12 1711 e95e c7 b1 1712 e960 5c 1713 e961 a3 0f 1714 e965 a6 31 1715 e965 a6 31 1715 e965 a6 31 1715 e965 a6 31	******* * * * * * * * * * * * * * * *	Alarm d Alarm d CLRX LDA STA LDA JSR CPX STA LDA JSR STX STA LDA JSR STX STA LDA STA STA TA BECLR LDA BRSET STA STA STA STA STA STA STA STA STA ST	ALARMS, X DISP, X #15 ALOP 4, STAT4, ALOF2 #\$3A DISP+12 AOUR CBCD #\$30 TN3 #\$20 DISP+10 DISP+11 AMIN CBCD DISP+13 DISP+13 DISP+13 DISP+14 4, STAT4, ALOF2 #\$20 6, STAT4, FH DISP+13 DISP+14 TOP FOR THE PROPERTY OF THE PROPER	YES ALARM ARMED ? YES GET ALARM HOURS LEADING ZERO ? YES, MAKE IT A SPACE SET-UP ? HOURS ? NO, FLASH MINUTES YES, FLASH HOURS TP FLAG HIGH ?
1665 1666 1667 1668 1669 1670 1671 1672 1672 1673 1671 1672 1673 1671 1672 1673 1671 1672 1673 1674 1674 1674 1675 1674 1675 1676 1676 1676 1677 1672 1676 1677 1672 1676 1678 1679 1679 1679 1679 1679 1679 1679 1679	******* * * * * * * * * * * * * * * *	Alarm d Alarm d CLRX LDA STA LDA JSR CPX STA LDA JSR STX STA LDA JSR STX STA LDA STA STA TA BECLR LDA BRSET STA STA STA STA STA STA STA STA STA ST	ALARMS, X DISP, X #15 ALOP 4, STAT4, ALOF2 #\$3A DISP+12 AOUR CBCD #\$30 TN3 #\$20 DISP+10 DISP+10 DISP+11 AMIN CBCD DISP+13 DISP+14 5, STAT4, ALOF2 2, TH8, ALOF2 #\$30 F, STAT4, ALOF2 #\$30 DISP+13 DISP+14 5, STAT4, ALOF2 #\$20 6, STAT4, FH DISP+13 DISP+14 ALOF2 DISP+14 ALOF2 DISP+15 DISP+16 DISP+17 DISP+18 DISP+19 DISP+19 DISP+19 DISP+10 DISP+11 ALOF2 DISP+10 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+13 DISP+14 ALOF2 DISP+15 DISP+16 DISP+17 DISP+18 DISP+19 DISP+19 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+13 DISP+14 ALOF2 DISP+15 DISP+16 DISP+17 DISP+17 BLOP #\$31 3, STAT3, TPLOW DISP+6	YES ALARM ARMED ? YES GET ALARM HOURS LEADING ZERO ? YES, MAKE IT A SPACE SET-UP ? HOURS ? NO, FLASH MINUTES YES, FLASH HOURS TP FLAG HIGH ? YES, DISPLAY A 1
1665 1666 1667 1668 1669 1670 1670 1671 1672 e91a 5f 1673 e91b d6 eb f2 1674 e91e e7 b1 1675 e920 5c 1676 e921 a3 0f 1677 e922 32 3f 6 1678 e925 09 cb 31 1679 e928 a6 3a 1680 e92a b7 bd 1681 e92c b6 9e 1682 e92e cd eb 84 1683 e931 a3 30 1684 e933 26 02 1685 e935 ae 20 1685 e935 ae 20 1686 e937 bf bb 1687 e939 bf bc 1688 e930 dd eb 84 1689 e93d cd eb 84 1690 e940 bf be 1691 e942 b7 bf 1699 e954 bf be 1691 e942 b7 bf 1692 e944 0b cb 12 1693 e947 05 99 0f 1694 e944 bf be 1691 e942 b7 bf 1698 e953 20 04 1695 e94c 0c cb 06 1696 e94f bf be 1691 e945 b7 bc 1698 e955 b7 bf 1698 e955 b7 bf 1700 e957 b7 bc 1701 e959 81 1702 1703 1704 1705 1706 1707 1708 1709 e95a 5f 1711 e95b d6 ec 12 1711 e95e c7 b1 1712 e960 5c 1713 e961 a3 0f 1714 e965 a6 31 1715 e965 a6 31 1715 e965 a6 31 1715 e965 a6 31	******* * * * * * * * * * * * * * * *	Alarm d ********* CLRX LDA STA LDA JSR STX STA LDA JSR STX STA LDA JSR STX STA LDA JSR CPX STA LDA JSR STA BRCLR LDA STA BRCLR LDA BRCLR LDA STA STA STA STA STA STA STA STA STA ST	ALARMS, X DISP, X #15 ALOP 4, STAT4, ALOF2 #\$3A DISP+12 AOUR CBCD #\$30 TN3 #\$20 DISP+10 DISP+11 AMIN CBCD DISP+13 DISP+14 5, STAT4, ALOF2 2, TH8, ALOF2 2, TH8, ALOF2 18, STAT4, FH DISP+13 DISP+14 ALOF2 DISP+10 DISP+11 TISP+13 DISP+14 ALOF2 DISP+10 DISP+11 ALOF2 DISP+10 DISP+10 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+11 ALOF2 DISP+12 ALOF2 DISP+13 ALOF2 ALOF3 ALOF2 ALOF3 ALOF	YES ALARM ARMED ? YES GET ALARM HOURS LEADING ZERO ? YES, MAKE IT A SPACE SET-UP ? HOURS ? NO, FLASH MINUTES YES, FLASH HOURS TP FLAG HIGH ? YES, DISPLAY A 1

1722	*****	*****	******	******
1723 1724	*	PIN dis	plays.	*
1725 1726	*			* ******
1727 1728 e972 5f	DPTN1	CI.RX		
1728 e972 5f 1729 e973 d6 ec 22 1730 e976 e7 b1	PLOP	LDA	PINST1,X DISP,X	
1731 e978 5c		TNCX		
1732 e979 a3 0f 1733 e97b 23 f6		BLS	PLOP	
1734 e97d b6 91 1735 e97f 27 10		LDA BEQ	PIN PINNV	
1734 e97d b6 91 1735 e97f 27 10 1736 e981 cd eb 48 1737 e984 bf bc 1738 e986 b7 bd		JSR STX	SPLIT DISP+11	
1737 e984 bf bc 1738 e986 b7 bd 1739 e988 b6 92		STA	#15 PLOP PIN PINNV SPLIT DISP+11 DISP+12 PIN+1 SPLIT DISP+13 DISP+14	
1740 e98d bf be		JSR	SPLIT	
1742 e98f b7 bf		STA	DISP+13 DISP+14	
1743 e991 81				
1745 e992 5f 1746 e993 d6 ec 32 1747 e996 e7 b1	DPIN2 PLOP2	CLRX LDA	PINST2,X	
1747 e996 e7 bl 1748 e998 5c		STA INCX CPX BLS LDA BEQ LSRA	DISP,X	
1749 e999 a3 0f 1750 e99b 23 f6		CPX	#15 PLOD3	
1751 e99d b6 91		LDA	PIN	DATE
1752 e99f 27 f0 1753 e9al 44		BEQ LSRA	PINNV	
1754 e9a2 44 1755 e9a3 44		LSRA LSRA		
1756 e9a4 cd eb 84 1757 e9a7 a3 30		JSR	CBCD #\$30	
1758 e9a9 26 02		BNE	DTNO	
1759 e9ab ae 20 1760 e9ad bf b3 1761 e9af b7 b4	DTN0	STX	#\$20 DISP+2	
1761 e9af b7 b4 1762 e9b1 a3 31		STA CPX	DISP+3 #\$31	
1763 e9b3 27 24 1764 e9b5 al 31		BEQ CMP	NOTRD #\$31	
1765 e9b7 26 08	DTNO NOTST NOTND	BNE	NOTST	
1766 e9b9 a6 73 1767 e9bb b7 b5 1768 e9bd a6 74 1769 e9bf b7 b6		STA	DISP+4	
1768 e9bd a6 74 1769 e9bf b7 b6		STA	DISP+5	
1770 e9c1 al 32 1771 e9c3 26 08	NOTST	CMP BNE	#\$32 NOTND	
1772 e9c5 a6 6e 1773 e9c7 b7 b5		LDA STA	#'n' DTSP+4	
1774 e9c9 a6 64 1775 e9cb b7 b6 1776 e9cd al 33		LDA	#'d' DTSP+5	
1776 e9cd al 33 1777 e9cf 26 08	NOTND	CMP	#\$33 NOTED	
1777 e9cf 26 08 1778 e9dl a6 72		LDA	#'r'	
1779 e9d3 b7 b5 1780 e9d5 a6 64		STA LDA	DISP+4 #'d'	
1781 e9d7 b7 b6 1782 e9d9 b6 91	NOTED	STA LDA	DISP+5 PIN	HOURS
1782 e9d9 b6 91 1783 e9db a4 07 1784 e9dd be 92		AND	#7 DIN: 1	
1785 e9df 58		ASLX	FINTI	
1787 e9e1 58		ASLX		
1788 e9e2 49 1789 e9e3 cd eb 84		ROLA JSR	CBCD	
1789 e9e3 cd eb 84 1790 e9e6 bf bb 1791 e9e8 b7 bc		STX	CBCD DISP+10 DISP+11 PIN+1 #\$3F CBCD DISP+13 DISP+14	
1792 e9ea b6 92 1793 e9ec a4 3f		LDA	PIN+1	MINUTES
1794 e9ee cd eb 84		JSR	CBCD	
1795 e9f1 bf be 1796 e9f3 b7 bf		STA	DISP+13 DISP+14	
1797 e9f5 81 1798		KID		
1799 1800	******	******	******	************
1801 1802	*	MJD dis	play.	*
1803 1804	*****	*****	******	******
1805 e9f6 ad 21 1806 e9f8 b6 5d	DMJD	BSR LDA	SMJD MJD	
1807 e9fa 27 1c		BEQ	MJDNV	
1808 e9fc ab 30 1809 e9fe b7 bb		STA	#\$30 DISP+10	
1810 ea00 b6 5e 1811 ea02 ab 30		A DD	MJD+1 #\$30	
1812 ea04 b7 bc 1813 ea06 b6 5f			DISP+11 MJD+2	
1814 ea08 ab 30 1815 ea0a b7 bd		ADD	#\$30 DISP+12	
1816 ea0c b6 60		LDA	MJD+3	
1817 ea0e ab 30 1818 ea10 b7 be		STA	#\$30 DISP+13	
1819 ea12 b6 61 1820 ea14 ab 30		ADD	MJD+4 #\$30	
1821 eal6 b7 bf 1822 eal8 81	MJDNV	STA RTS	DISP+14	
1823 1824 eal9 5f		CLRX		
1825 eala d6 ec 42	MLOP	LDA	MJDST,X	
1826 eald e7 bl 1827 ealf 5c		INCX	DISP,X	
1828 ea20 a3 0f 1829 ea22 23 f6			#15 MLOP	
1830 ea24 81		RTS		

1832		*****	*****	*****	******
1833		*	EON di	splay.	*
1835 1836			*****	*****	********
1839 1840 1841 1842 1843 1844	ea25 cd ea 19 ea28 b6 af ea2a a0 08 ea2c ae 10 ea2e 42 ea2f 97 ea30 a6 20 ea32 b7 b9	DEON	LDA SUB LDX MUL	SMJD RTDIS #8 #16	CLEAR FREQUENCY CHARACTERS
1846 1847 1848 1849 1850 1851 1852 1853 1854 1855 1856 1857 1858 1859 1861 1862 1863	ea34 b7 ba ea36 d6 01 47 ea39 b7 b1 ea3b d6 01 48 ea3e b7 b2 ea40 d6 01 48 ea43 b7 b3 ea45 d6 01 48 ea48 b7 b4 ea4a d6 01 48 ea4d d6 01 46 ea52 b7 b7 ea52 b7 b7 ea55 b7 b7 ea55 b7 b8		STA LDA STA	#\$20 DISP+8 DISP+9 EON+2,X DISP+9 EON+3,X DISP+1 EON+4,X DISP+2 EON+5,X DISP+3 EON+6,X DISP+4 EON+7,X DISP+5 EON+9,X DISP+6	DISPLAY PS (EON)
1865 1866	ea5e d6 01 52 ea61 a1 cd ea63 26 04 ea65 5c		BNE INCX	EON+13,X #205 NFIL	FILLER ?
1869 1870	ea66 d6 01 52 ea69 al fa ea6b 27 43 ea6d al cc	NFIL	BEO	EON+13,X #250 MLWF #204	YES, TRY AGAIN MEDIUM/LONG ? NO, FREQUENCY OK ?
1872	ea6f 22 3e	FOK2	BHI	FNOK2	VHF
1874	ea71 ae 0a ea73 42 ea74 ab 2e	FOR2	MUL ADD	#10	
1876 1877 1878	ea76 b7 a1 ea78 9f ea79 a9 22 ea7b b7 a2		STA TXA ADC STA JSR		CALCULATE FREQUENCY (BINARY
	ea7d cd eb 1f		JSR	DCON2	CONVERT TO DECIMAL
1882 1883 1884 1885 1886 1889 1890 1891 1893 1894 1895 1897 1898 1899 1901 1902 1903 1904 1905	ea80 b6 34 ea82 26 02 ea84 a6 f0 ea86 ab 30 ea88 b7 bb ea8a 97 ea8b b6 35 ea8d 26 06 ea91 26 02 ea91 26 02 ea91 26 02 ea91 b6 36 ea95 bb 30 ea97 b7 bc ea99 b6 36 ea9b ab 30 ea9f a6 2e ea31 b7 bd ea9f a6 2e ea31 b7 bd ea3f a6 37 ea5 ab 30 ea3f b7 bd ea3f b7 bd ea9f b6 37 ea5 ab 30 ea6 b7 b6 ea9b b6 36 ea9b b7 b6 ea9b b7 b7 b7 b6 ea9b b7 b7 b6 ea9b b7 b7 b7 b6 ea9b b7 b7 b7 b6 ea9b b7 b7 b7 b7 ea9b b7 b7 b7 ea9b b7 b7 b7 ea9b b7 ea8b	TYPE3 NZ1 NZ2 FNOK2	BNE LDA ADD STA LDA BNE CPX BNE LDA ADD STA ADD STA LDA ADD STA ADD STA LDA ADD STA ADD STA ADD STA ADD STA	Q+4 NZ1 #\$F0 #\$30 DISP+10 Q+5 NZ2 #\$20 NZ2 #\$720 DISP+11 Q+6 #\$30 DISP+12 #\$2E DISP+12 #\$2E DISP+14 Q+8 #\$30 DISP+14 Q+8	DISPLAY VHF EON FREQUENCY
1909 1910	eab0 5c eab1 d6 01 52 eab4 al 0f	MLWF		EON+13,X #15	DISPLAY M/L EON FREQUENCY
1912 1913 1914 1915 1916 1917	eab6 23 02 eab8 ab 1b eaba ab 10 eabc ae 09 eabe 42 eabf bf a2 eac1 b7 a1 eac3 ad 5a eac5 b6 35	LONG	BLS ADD ADD LDX MUL STX STA BSR LDA	LONG #27 #16 #9 W2 W1 DCON2 Q+5	MW OFFSET M/L OFFSET CONVERT TO BCD IN Q
1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1931 1932 1933 1934 1935 1935 1937	eac7 26 02 eac9 a6 f0 eacb ab 30 eacd b7 ba eacf b6 36 ead1 ab 30 ead3 b7 bb ead5 b6 37 ead7 ab 30 ead9 b7 bc eadb b6 38 eadd ab 30 eadf b7 bd eae1 a6 6b eae3 b7 bc eae5 a6 48 eae7 b7 bf eae9 a6 7a eae9 b7 c0 eaeb b7	NZ3	BNE LDA ADD	% NZ3 #\$70 #\$70 P\$30 DISP+9 Q+6 #\$30 DISP+10 Q+7 #\$30 DISP+11 Q+8 #\$30 DISP+12 #'k' DISP+13 #'H' DISP+14 #'z' DISP+14	IF THOUSANDS OF kHz A ZERO DISPLAY AS A SPACE

1941					*****	*****	******	******
1942 1943					*	Sleep d	ianlav	*
1944					*	-		*
1945 1946					*****	******	******	******
	eaee	5f			SLEEPD	CLRX		
1948	eaef	d6	ec h1	52	SLOP	LDA STA	SLPST,X DISP,X	
	eaf2 eaf4		DI			TNCX	2101 /11	
1951	eaf5	a3	0f			CPX	#15	
1952	eaf7	23 b6	f6			BLS LDA	#15 SLOP SLEPT	
	eafb					JSR	CBCD	
	eafe					STX	DISP+8	
	eb00 eb02					STA RTS	DISP+9	
1958	CDUL	01						
1959 1960					******	*****	******	******
1961					*	M/S & D	I display.	*
1962					*			**********
1963 1964					*****	*****	******	******
1965	eb03				DMSD ILOP	CLRX		
1966	eb04	d6	ec	62	ILOP	LDA	MSDST,X DISP,X	
1967	eb07 eb09	e /	DΙ					
	eb0a		0f			CPX	#15 TLOP	
	eb0c					BLS	ILOP 0,STAT3,MSM2 #'M' DISP+6 DI	M/C FIAC CEE
	eb0e eb11					LDA	#'M'	YES, MUSIC
1973	eb13	b7	b7			STA	DISP+6	
	eb15 eb17				MSM2	LDA JSR	DI CBCD	
	ebla					STX	DISP+13	
	eblc					STA	DISP+14	
1978	eble	81				RTS		
1980					*****	*****	******	**************
1981 1982					*	Convert	binary to unpac	ked BCD in O *
1983					*			*
1984					*****	*****	******	******
	eblf	ae	54		DCON2	LDX	#R	CLEAR
1987	eb21	bf	ad			STX	NUM1	P.D.
1988	eb23 eb26	2a	eI 5c	86		JSR INC	CLRAS R+8 CLO	RR R <- 1
1990	eb28	cd	ef			ODIC	CHQ	CLEAR RQ
	eb2b eb2d						#14 W6	14 BITS TO CONVERT
1993	eb2f	34	a2		LOOP2	STA LSR	W2	MOVE OUT
1994	eb31 eb33	36	al			ROR	W1	FIRST (LS) BIT
1995	eb33	ae	30			PCC	#O	ZERO ONE, ADD
1997	eb37	bf	ae			STX	NUM2	CURRENT VALUE
	eb39				NXT	JSR	W2 W1 NXT #Q NUM2 ADD #R	OF R
	eb3c eb3e				IVAI	LDX STX	NUM2	ADD R TO
2001	eb40	cd	ee	33		JSR	NUM2 ADD W6	ITSELF
2002	eb43 eb45	3a	a6			DEC BNE	W6 LOOP2	ALL DONE ?
2003	eb45 eb47	81	es			RTS	LOOP2	DONE ?
2005								******
2006 2007					*			*
2008					*	Split A	nibbles into A	(LS) and X (MS) *
2009					*	and con	vert to ASCII.	*
2011					*****	*****	******	******
2012	eb48	97			SPLIT	TAX		MSD INTO X, LSD INTO A
2014	eb49	99				SEC		,
	eb4a eb4b					RORX		
	eb4c					RORX		
2018	eb4d	54				LSRX		
	eb4e eb4f		39			LSRX CPX	#\$39	\$30-\$39 <- 0-9
	eb51		07			BLS	XOK	\$30 \$35 \$ 0 \$
	eb53					INCX		
2023	eb54 eb55	5c				INCX		
2025	eb56	5c				INCX		
2026	eb57 eb58	5c				INCX		
	eb59					INCX		
2029	eb5a	a4				AND	#\$0F	\$41-\$46 <- A-F
	eb5c eb5e					ADD CMP	#\$30 #\$39	
2032	eb60	23	02			BLS	AOK	
	eb62		07		7.07	ADD	#7	
∠∪34	eb64	вΤ			AOK	RTS		

2036	*****	******	******	*****
2037	*			*
2038 2039	*	Send a	nd clock data t	o LCD module. *
2040 2041	*	Check	to see if LCD m	odule is busy. *
2042 2043	*****	******	******	******
2044 eb65 b7 02 2045 eb67 18 03	CLOCK	STA	PORTC 4,PORTD	
2046 eb69 19 03		BCLR	4,PORTD 4,PORTD	CLOCK IT
2047 eb6b 81 2048		RTS		
2049 eb6c 15 03	WAIT	BCLR	2, PORTD	READ LCD MODULE BUSY FLAG
2050 eb6e 16 03 2051 eb70 19 03		BCLR	4,PORTD	READ ECD MODULE BUSI FLAG
2052 eb72 3f 07 2053 eb74 18 03	WLOOP	CLR BSET	PORTCD 4,PORTD	INPUT ON PORTC CLOCK HIGH
2054 eb76 b6 02 2055 eb78 19 03		LDA BCLR	PORTC 4.PORTD	READ MODULE CLOCK LOW
2056 eb7a b7 a7		STA	W7	DEGY 2
2057 eb7c 0e a7 f5 2057 eb7f 33 07 2059 eb81 17 03		COM	PORTCD	OUTPUT ON PORTC
2059 eb81 17 03 2060 eb83 81		BCLR RTS	3,PORTD	READ LCD MODULE BUSY FLAG INPUT ON PORTC CLOCK HIGH READ MODULE CLOCK LOW BUSY ? OUTPUT ON PORTC
2061 2062				******
2063 2064	*	W B	ap	*
2065	*			& decimal adjust). *
2066 2067				*******
2068 eb84 ad 1c 2069 eb86 ad 13	CBCD	BSR	UPX	DECIMAL ADJUST SAVE ADD \$16 (BCD 10) ADJUST
2070 eb88 b7 a7	BCD	STA	W7	SAVE
2071 eb8a ab 16 2072 eb8c ad 08		BSR	#\$16 ADJU	ADJUST
2073 eb8e 5a 2074 eb8f 2a f7		DECX BPL	BCD	TOO FAR ? YES, RESTORE A
2075 eb91 b6 a7 2076 eb93 cc eb 48		LDA	W7	YES, RESTORE A
		OPIE	SFEET	
2077 2078 eb96 28 03 2079 eb98 ab 06 2080 eb9a 81	ADJ U	ADD	#6	YES
2000 CD3G 01		1010		
2082 eb9b ab 06 2083 eb9d 29 02	ADJI	ADD	#6	NO, BUT IS LS DIGIT BIGGER THAN 9 ? NO, RESTORE
2084 eb9f a0 06		SUB	#6	NO, RESTORE
2087 eba2 97 2088 eba3 54	UPX	LSRX		
2088 eba3 54 2089 eba4 54 2090 eba5 54		LSRX		
2091 eba6 54		LSRX		MSB IN X
2092 eba7 a4 0f 2093 eba9 81		RTS	#\$0F	LSB IN A
2094 2095	*****	*****	******	*****
2096 2097	*	ICD in	itialisation.	*
2098	*			*
2099 2100				******
2101 ebaa a6 a0 2102 ebac c7 01 00	INITD	LDA STA	#\$A0 RT	SPACES BETWEEN PTY & RT
2103 ebaf c7 01 01		STA	RT+1 PT+3	
2105 ebb5 c7 01 04		STA	RT+4	
2106 ebb8 a6 2d 2107 ebba c7 01 02		STA	#\$2D RT+2	DASH BETWEEN EXISTING DISPLAY & RT
2108 ebbd a6 20 2109 ebbf ae 05		LDA LDX	#\$20 #5	INITIALISE RADIOTEXT TO SPACES AFTER CONF LOSS OR TEXT A/B CHANGE
2110 ebcl d7 01 00 2111 ebc4 5c	CLOP	STA INCX	RT,X	SPACES BETWEEN PTY & RT DASH BETWEEN EXISTING DISPLAY & RT INITIALISE RADIOTEXT TO SPACES AFTER CONF LOSS OR TEXT A/B CHANGE
2112 ebc5 a3 45		CPX BNE		
2113 ebc7 26 f8 2114 ebc9 3f 9f		CLR	DISP1	INITIALISE SCROLLING POINTERS
2115 ebcb 3f a0 2116 ebcd 3f 8e			DISP2 PTY	CLEAR PTY
2117 ebcf 3f 91 2118 ebdl 3f 92 2119 ebd3 3f b0		CLR	PTY PIN PIN+1 DI	AND
2110 ebd1 31 92 2119 ebd3 3f b0		CLR CLR	DI	PIN AND DI
2120 ebd5 11 ca 2121 ebd7 17 ca		BCLR	3,STAT3	AND M/S CLEAR TP FLAG CANCEL RT DISPLAY
2122 ebd9 15 c9 2123		BCLR	2,STAT2	CANCEL RT DISPLAY
2124 ebdb 5f		CLRX	#\$2D	
2126 ebde e7 c1	PLOP3	STA	#\$2D PSN,X	CLEAR PS NAME
2127 ebe0 5c 2128 ebe1 a3 08		INCX CPX	#8	
2129 ebe3 26 f9 2130 ebe5 81		BNE RTS	PLOP3	
2131 2132 abos 55	CLREON	OI DV		
2132 ebec 51 2133 ebe7 a6 ff 2134 ebe9 d7 01 45 2135 ebec 5c	CLINEON	LDA STA	#\$FF	EON DAM OLEAD
	ETOP	INCX		EON RAM CLEAR
2136 ebed a3 b0 2137 ebef 26 f8		CPX BNE	#176 ELOP	
2138 ebf1 81		RTS		

2140 2141			******	******	*************************
2142 2143			*	Display	strings. *
2144 2145					*********
	ebf2 20 20 41 6c 61 5 6d 20 2d 20 20 4f 46 46 20 20			FCC	' Alarm - OFF '
2147	ec02 20 50 49 20 63 6 64 65 20 2d 20 20 20 20 20	бf	PIST	FCC	'PI code - '
2148	ec12 20 54 50 20 2d 2 30 20 20 54 41 20 2d 20 30 20	20	TAPST	FCC	' TP - 0 TA - 0 '
2149	ec22 20 50 49 4e 20 6 6f 2e 20 2d 20 20	бе	PINST1	FCC	' PIN no
2150	20 20 20 20 ec32 20 20 20 20 74 6 20 61 74 20 2d 2d	68	PINST2	FCC	' th at '
2151	2e 2d 2d 20 ec42 20 4d 4a 20 64 6 79 20 2d 20 20 20	61	MJDST	FCC	' MJ day - '
2152	20 20 20 20 ec52 20 53 6c 65 65 5 20 20 20 30 20 6d	70	SLPST	FCC	' Sleep 0 min. '
	69 6e 2e 20 ec62 20 4d 2f 53 20 2 53 20 20 20 44 49 20 20 30 20	20	MSDST	FCC	'M/S S DI 0'
2154			******	******	*********
2156 2157 2158			* *	MJD day	and month strings. *
2159 2160			******	******	*********
	ec72 4d 6f 6e 54 75 6 57 65 64 54 68 75 46 72 69 53 61 74 53 75 6e	65	DNAME	FCC	'MonTueWedThuFriSatSun'
2162 2163 2164	ec87 69 6e 76			FCC	'inv'
	ec8a 4a 61 6e 46 65 6 4d 61 72 41 70 72 4d 61 79 4a 75 6e 4a 75 6c 41 75 67 53 65 70 4f 63 74 4e 6f 76 44 65 63	62	MNAME	FCC	'JanFebMarAprMayJunJulAugSepOctNovDec'
2166 2167	10 01 70 11 03 03				
2168 2169			*		***************************************
2170 2171			*		* ************************************
2172 2173 2174	ecae 6e 6f 20 70 72 6				'no program type ' 0
	67 72 61 6d 20 74 79 70 65 20 ecbe 20 20 20 20 20 2				' News ' 1
	4e 65 77 73 20 20 20 20 20 20 ecce 43 75 72 72 65 6			FCC	'Current affairs ' 2
	74 20 61 66 66 61 69 72 73 20 ecde 20 20 49 6e 66 6			FCC	' Information ' 3
	72 6d 61 74 69 6f 6e 20 20 20 ecee 20 20 20 20 20 5			FCC	' Sport ' 4
	70 6f 72 74 20 20 20 20 20 20 ecfe 20 20 20 45 64 7			FCC	' Education ' 5
	63 61 74 69 6f 6e 20 20 20 20	, ,		FCC	
		4.4		Dag	
2181	ed0e 20 20 20 20 20 4 72 61 6d 61 20 20 20 20 20 20				' Drama ' 6
	ed0e 20 20 20 20 20 47 2 61 6d 61 20 20 20 20 20 20 edle 20 20 20 20 20 43 7 65 7 7 7 5 7 2 65 20 20 20 20 20 20 20	75		FCC	' Drama ' 6
	ed0e 20 20 20 20 20 472 61 6d 61 20 20 20 20 20 20 20 ed1e 20 20 20 20 20 20 20 20 20 20 20 20 20	75 63		FCC	' Drama ' 6 ' Culture ' 7 ' Science ' 8
2183	ed0e 20 20 20 20 20 20 27 26 16 d6 120 20 20 20 20 20 20 20 20 20 20 20 20 2	75 63 56		FCC FCC	' Drama ' 6 ' Culture ' 7 ' Science ' 8 ' Varied ' 9
2183 2184	ed0e 20 20 20 20 20 20 27 26 1 6d 61 20 20 20 20 20 20 20 20 20 20 20 20 20	75 63 56 70		FCC FCC FCC	' Drama ' 6 ' Culture ' 7 ' Science ' 8 ' Varied ' 9 ' Pop music ' 10
2183 2184	ed0e 20 20 20 20 20 20 27 26 16 d6 61 20 20 20 20 20 20 20 20 20 20 20 20 20	75 63 56 70		FCC FCC FCC	' Drama ' 6 ' Culture ' 7 ' Science ' 8 ' Varied ' 9
2183 2184 2185	ed0e 20 20 20 20 20 20 27 26 66 61 20 20 20 20 20 20 20 20 20 20 20 20 20	75 63 56 70		FCC FCC FCC	' Drama ' 6 ' Culture ' 7 ' Science ' 8 ' Varied ' 9 ' Pop music ' 10
2183 2184 2185 2186	ed0e 20 20 20 20 20 20 27 26 66 67 20 20 20 20 20 ed1e 20 20 20 20 20 20 20 20 20 20 20 20 20	75 63 56 70 63		FCC FCC FCC FCC FCC	' Drama ' 6 ' Culture ' 7 ' Science ' 8 ' Varied ' 9 ' Pop music ' 10 ' Rock music ' 11
2183 2184 2185 2186 2187	ed0e 20 20 20 20 20 20 27 26 66 61 20 20 20 20 20 20 20 20 20 20 20 20 20	775 63 556 70 63 220		FCC FCC FCC FCC FCC FCC	' Drama ' 6 ' Culture ' 7 ' Science ' 8 ' Varied ' 9 ' Pop music ' 10 ' Rock music ' 11 ' Easy listening ' 12

2191							*****	*****	****	***	****	***	***	****	***	****	****	****	
2192 2193 2194							*		VF	D ch	nara	acte	er s	set.				*	
2195							* Position in table is ASCII value. * * Entry is the VFD character used. *												
2197							*	Last co	lumr	sho	ows	cha	arac	cters	re	olac	ced	*	
2198 2199							*	by space	ers	and	shc	oulo	dn't	t occi	ır.	cor	itroi	*	
2200 2201							*	: has be	een	ente	ered	l as	3 -					*	
2202 2203							*	" has be										*	
2204 2205								*****							***:	****	****		
2206 2207	edae edb2	7e 7e	7e 7e	7e 7e	7e 7e		VTAB	FCB FCB	\$7E \$7E	,\$7E ,\$7E	Ξ,\$7 Ξ,\$7	7E,\$ 7E,\$	57E 57E					all all	
2208 2209	edb6 edba	7e 7e	7e 7e	7e 7e	7e 7e			FCB FCB	\$7E	,\$7E ,\$7E	Ξ,\$7 Ξ,\$7	7E,\$ 7E,\$	57E 57E					all all	
2210 2211	edbe	7e	7e	7e	7e			FCB	\$7E	,\$7E	Ξ,\$7	7E,\$	57E					all	
2212 2213	edbe edc2 edc6	7e 7e	7е 7е	7e 7e	7e 7e			FCB FCB FCB FCB	\$7E \$7E	,\$7E ,\$7E	Ξ,\$7 Ξ,\$7	7E, 7E,	57E 57E					all all	
2215	edca																	all	
2216 2217	edce edd2	7e 7e	7b 7e	7a 7e	7e 7a			FCB FCB	\$7E	,\$7E ,\$7E	3,\$7 ∑,\$7	7A, \$ 7E, \$	7E 7A	\$!	" &	#	# \$%8	t
2218 2219	edd2 edd6 edda	7e 3f	7e 7d	7e 3e	7e 7d			FCB FCB FCB FCB	\$7E \$3F	,\$7E ,\$7E	E,\$7 ⊃,\$3	7E,\$ 3E,\$	7E 7D	()	*	+	all	
2220	edde																		
	ede2 ede6							FCB FCB	\$04 \$08	,\$05 ,\$09	5,\$0 9,\$7)6,\$ 7D,\$	507 57E	4 8	5 9	6	7	;	
2224 2225	edea	7e	7e	7e	7c													<=>	•
2227	edee edf2	0d	0e	0f	10			FCB FCB	\$7E \$0E	,\$0 <i>I</i> ,\$0I	A,\$0 E,\$0)B, \$	0C	@ D	A E	B	C G	@	
2228 2229	edf6 edfa	11 15	12 16	13 17	14 18			FCB FCB	\$11 \$15	,\$12	2,\$1 5,\$1	L3,5 L7,5	14	H L	I	J N	K O		
2230 2231	edfe	19	1a	1b	1c														
2232 2233	ee02 ee06 ee0a	1d 21	1e 22	1f 23	20 7e			FCB FCB FCB FCB	\$1E \$21	,\$1E	E,\$1 2,\$2	LF, \$	320 37E	T X	U Y	V Z	W [[
2235																		\]^	
	ee0e ee12				26 2a			FCB FCB	\$7A \$27	,\$24 ,\$28	1,\$2 3,\$2	25, 29,	26 2A	d	a e	b f	c g		
	eel6 eela				2e 32			FCB FCB	\$2E \$2F	, \$20 , \$30	2,\$2 0,\$3	2D, \$	32E	h 1	i m	j n	k o		
2240																	s		
2242 2243	eele ee22 ee26	37 3b	38 3c	39 3d	3a 7e			FCB FCB	\$37 \$3E	, \$34 , \$38 , \$30 , \$71	3,\$3 2,\$3	39,8 3D.8	3A 57E	t x	u v	r v z		{	
2244 2245	ee2a	7e	7e	7e	7e			FCB	\$7E	,\$71	₹,\$7	7E,	7E		}	~		àll	
2246 2247							*****	*****	****	***	****	***	***	****	***	***	****	****	
2248 2249							*		MC6	8HC)5E0) fi	ınct	tions				*	
2250 2251							*	Add, Sul	btra	ct,	Mul	ltip	oly	, Div	ide	,		*	
2252 2253								MJD -> 0				mor	nth	and y	year	r		*	
2254 2255							*	P. Topp:	ing				5tl	n Dece	embe	er '	91	*	
2256 2257							*	Transfer										*	
2258 2259							*	*****							***	***	****	****	
2260 2261	ee2e	bf	ae				TRA	STX	NUM	12				CLEA	R DI	ESTI	INATI	ON	
2262 2263	ee30	cd	ef	86				JSR	CLR	AS									NUM1
2264 2265							*	******							***	****	****	*	
2266 2267							*	Addition										*	
2268 2269							*	(X) <-									i	*	
2270 2271								******			****	****	***	****	***:	****	****	****	
2273		bf	a7					STX	CAR W7	RY									
2274 2275	ee39	аб	09					T.DA	W5 #NE)				ANSW	ER I	POIN	TER		
2276 2277	ee3d	be	ad					STA LDX	NUM	NT Il				lst 1	No.	POI	INTER		
2278 2279	ee41	be	ae					LDX	W3 NUM					2nd I	No.	POI	INTER		
2280 2281	ee45	be	a3				LOOP	LDX	W4 W3										
2282 2283	ee49	3a	a3					DEC	W3	1,X									
2284 2285	ee4d	eb	08					ADD		1,X				ADD					
2287	ee4f ee51	bb	ab						W4 CAR					SET (ON A	ADDI	TION	OVEF	RFLOW
2288 2289	ee55	ad	11					BSR	ADJ	RY				OR PO	OS. MAL	RES ADJ	JUST	SUBTE	RACTION
2290	ee59	e7	08					STA	W5 ND-	1,X				SAVE	ANS	SWEF	2		
2292 2293 2294	ee5d	3a	ac ac						W5 COU LOC	INT				DONE	2				
2294 2295 2296	ee61	be	a7					LDX RTS	W7	·E				PONE					
2297	ee64		Πa					arm.	#10	,				YES,	SII	TRAC	ግጥ ገ በ		
2299	ee66 ee68	3с	ab					TNC	CAR	RY				AND I	REC	ORD	CARR	Y	
2301	ee6a ee6c	24					MUU	BHS RTS	AJ	1				10 OI NO	R M	ORE	?		
2302	CEOC	υI						1110						140					

2304				*****	*****	******	******
2305 2306 2307				* *		tion, complement: (X=REG-ND) of BO	
2308 2309 2310 2311				* * *	(X) <- (X and I	(NUM1) - (NUM2), NUM2 should not b	X preserved. * oe equal) *
2312				*****	*****	******	******
	ee6d			SUB	STX	W6	ANSWER POINTER
	ee6f ee71				BSR CLR	CARRY	9S COMP. SECOND NUMBER SET CARRY TO ONE
2317	ee73	3c a	b		INC	CARRY	BEFORE ADDING
2319	ee75						ADD FIRST NUMBER
2320	ee77 : ee79 :	be a	e 3		LDX BSR	NUM2 COMP	9S COMPLIMENT SECOND NUMBER
2322	ee7b	be a	.6		LDX	W6	RESTORE ANSWER POINTER
2323 2324	ee7d	81			RTS		
	ee7e ee80				LDA STA	#ND COUNT	9S COMPLIMENT
2327	ee82	a6 0	9	LOOP3	LDA	#\$09	
	ee84 ee86					ND-1,X ND-1,X	
2330	ee88 ee89	5a			DECX	COUNT	
	ee8b					LOOP3	
2333 2334	ee8d	81			RTS		
2335	ee8e	ad e	e	COM10	BSR	COMP	NINES COMPLIMENT THEN
	ee90 ee92			ADD1	LIDA	#IND	ADD 1 FOR TENS COMPLIMENT ENTER WITH X = REG-ND
2338	ee94	6c 1	1	ADD2	INC	2*ND-1,X	
	ee96 ee98					2*ND-1,X #\$0A	
	ee9a ee9c					RETURN #10	
2343	ee9e	e7 1			STA	2*ND-1,X	
2344	eea0 eeal	5a 3a a	c		DECX DEC	COUNT	
2346	eea3 eea5	26 e	f		BNE	ADD2	
2348	eeas	01					
2349 2350				******	*****	*******	*************
2351				*	Mult., I	R <- P x Q, over	. in TMP, X = #R. *
2352 2353				*****	*****	*****	******
2354							
	ееаб	ae 5	4	MULT	LDX	#R	
2355 2356	eea6 eea8	cd e	f 86		JSR	#R CLRAS	
2355 2356 2357		cd e ae 4	f 86 b		JSR LDX	CLRAS #TMP	CLEAR RESULT
2355 2356 2357 2358 2359	eea8 eeab eead eeb0	cd e ae 4 cd e ae 1	f 86 b f 86 2		JSR LDX JSR LDX	CLRAS #TMP CLRAS #2*ND	
2355 2356 2357 2358 2359 2360 2361	eea8 eeab eead eeb0 eeb2 eeb4	cd e ae 4 cd e ae 1 bf a ae 0	f 86 b f 86 2 6 9		JSR LDX JSR LDX STX LDX	CLRAS #TMP CLRAS #2*ND W6 #ND	CLEAR RESULT INIT. R POINTER
2355 2356 2357 2358 2359 2360 2361 2362	eea8 eeab eead eeb0 eeb2 eeb4 eeb6	cd e ae 4 cd e ae 1 bf a ae 0 e6 4	f 86 b f 86 2 6 9	STR	JSR LDX JSR LDX STX LDX LDX LDA	CLRAS #TMP CLRAS #2*ND W6 #ND P-1,X	INIT. R POINTER
2355 2356 2357 2358 2359 2360 2361 2362 2363 2364	eea8 eeab eead eeb0 eeb2 eeb4 eeb6 eeb8 eeba	cd e ae 4 cd e ae 1 bf a ae 4 bf a bf a	f 86 b f 86 2 6 9 1 1 b	STR	JSR LDX JSR LDX STX LDX LDA STX STX STA	CLRAS #TMP CLRAS #2*ND W6 #ND P-1,X W1 CARRY	INIT. R POINTER SAVE P POINTER SAVE P
2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366	eea8 eeab eead eeb0 eeb2 eeb4 eeb6 eeb8 eeba eebc eebe	cd e ae 4 cd e ae 1 bf a e6 4 bf a b7 a ae 0 e6 2	f 86 f 86 2 6 6 9 1 1 b 9 f	STR	JSR LDX JSR LDX STX LDX LDX LDA STX STX STA LDX LDX	CLRAS #TMP CLRAS #2*ND W6 #ND P-1,X W1 CARRY #ND O-1,X	INIT. R POINTER SAVE P POINTER SAVE P POINTER
2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367	eea8 eeab eead eeb0 eeb2 eeb4 eeb6 eeb8 eeba eebc eebe	cd e ae 4 cd e ae 1 bf a e6 4 bf a ae 0 e6 2 b7 a	f 86 f 86 2 6 9 1 1 b 9 f 4	STR	JSR LDX JSR LDX STX LDX LDA STX STA LDA STA LDA STA	CLRAS #TMP CLRAS #2*ND W6 #ND P-1,X W1 CARRY #ND Q-1,X W4	INIT. R POINTER SAVE P POINTER SAVE P INIT. Q POINTER SAVE Q
2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369	eea8 eeab eead eeb0 eeb2 eeb4 eeb6 eeb8 eeba eebc eebc eebc eec0 eec2 eec4	cd e ae 4 cd e ae 1 bf ae 6 bf a ae 6 2 b7 a ae 2 b7 a ae 3 b7 a	£ 86 b f 86 2 6 9 1 1 1 b 9 9 f 4 0 0 b	STR	JSR LDX JSR LDX STX LDX LDA STA LDX LDA STA LDX LDA STA LDA STA	CLRAS #TMP CLRAS #2*ND W6 #ND P-1,X W1 CARRY #ND Q-1,X W4 TZO CARRY	INIT. R POINTER SAVE P POINTER SAVE P INIT. Q POINTER SAVE Q IF ZERO GOTO NEXT Q RECALL P
2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370	eea8 eeab eead eeb0 eeb2 eeb4 eeb6 eeb8 eeba eebc eebc eec2 eec4 eec6	cd e ae 4 cd e ae 1 ae 6 bf a ae 6 b7 ae 6 27 3 b6 a ae 6 ae 2 b7 a ae 6 ae 6 ae 6 ae 6 ae 6 ae 6 ae 6 ae	f. 86 b 86 2 6 9 1 1 1 1 b b 9 f. 4 4 0 0 b 3	STR	JSR LDX JSR LDX STX LDX STX STA LDA STA LDA STA BEQ LDA STA	CLRAS #TMP CLRAS #2*ND W6 #ND P-1,X W1 CARRY #ND Q-1,X W4 TZO CARRY	INIT. R POINTER SAVE P POINTER SAVE P INIT. Q POINTER SAVE Q IF ZERO GOTO NEXT Q
2355 2356 2357 2358 2359 2361 2362 2363 2364 2365 2366 2367 2368 2369 2371 2372	eea8 eeab eead eeb0 eeb2 eeb4 eeb6 eeb8 eeba eebc eec2 eec4 eec6 eec8	cd ed 4 ed cae 4 ed bf ae 6 f bf ae 6 f ae 6	f 86 f 86 g 86 g 1 l b g f 4 0 b 3	STR XTT	JSR LDX JSR LDX STX LDX STX LDA STX STA LDA STA BEQ LDA STA BEQ LDA STA CLRA LJSR	CLRAS #TMP CLRAS #2*ND W6 #ND P-1,X W1 CARRY #ND Q-1,X W4 TZO CARRY W3 3 CARRY	INIT. R POINTER SAVE P POINTER SAVE P INIT. Q POINTER SAVE Q IF ZERO GOTO NEXT Q RECALL P SAVE P RIGHT SHIFT INTO C
2355 2356 2357 2358 2360 2361 2362 2363 2365 2366 2367 2368 2370 2371 2372 2373 2374	eea8 eeab eead eeb0 eeb2 eeb4 eeb6 eeb8 eeba eebc eecc0 eecc4 eecc6 eecc8 eecc9	cd e 4 e 4 e 2 e 2 e 2 e 2 e 2 e 2 e 2 e 2	f 86 f 86 2 6 6 9 1 1 b 9 f 4 0 0 b 3 b 2 4	STR XTT PLY	JSR LDX JSR LDX STX LDA STX LDA STX LDA STX LDA LDX LDA	CLRAS #TMP CLRAS #2*ND W6 #ND P-1,X W1 CARRY #ND,X W4 TZO CARRY W3 CARRY W3 CARRY W4 W3	INIT. R POINTER SAVE P POINTER SAVE P INIT. Q POINTER SAVE Q IF ZERO GOTO NEXT Q RECALL P SAVE P RIGHT SHIFT INTO C C = ZERO ? NO, A=A+Q
2355 2356 2357 2358 2360 2361 2362 2363 2365 2366 2367 2368 2370 2371 2372 2373 2374	eea8 eeab eead eeb0 eeb2 eeb4 eeb6 eeb8 eeba eebc eecc0 eecc4 eecc6 eecc8 eecc9	cd e 4 e 4 e 2 e 2 e 2 e 2 e 2 e 2 e 2 e 2	f 86 f 86 2 6 6 9 1 1 b 9 f 4 0 0 b 3 b 2 4	STR XTT PLY SHF	JSR LDX JSR LDX STX LDX LDX STX LDX LDA STA LDX LDA STA LDA STA BEQ CLRA LDA STA BEQ CLRA LDA STA BCC ADD	CLRAS #TMP CLRAS #2*ND W6 #NDD P-1, X W1 CARRY #ND Q-1, X W4 TZO CARRY W3 CARRY W3 CARRY W4 CARRY W4 CARRY W3	INIT. R POINTER SAVE P POINTER SAVE P INIT. Q POINTER SAVE Q IF ZERO GOTO NEXT Q RECALL P SAVE P RIGHT SHIFT INTO C C = ZERO ? NO, A=A+Q ZERO ?
2355 2356 2357 2359 2360 2361 2362 2363 2364 2365 2366 2370 2371 2372 2373 2374 2375 2377	eea8 eeab eead eeb0 eeb2 eeb4 eeb6 eeb8 eeba eebc eec0 eec2 eec4 eec6 eec8 eec9 eecd eecd1	cd e 4 e 1 a 0 e 2 e 3 e 6 e 7 e 7 e 7 e 7 e 7 e 7 e 7 e 7 e 7	£ 86 b 6 86 2 9 1 1 1 b 9 9 4 4 0 b 3 3 b 2 4 4 4 4	STR XTT PLY SHF	JSR LDX JSR LDX JSR LDX LDX LDX LDX LDA STX LDA STX LDA STA LDX LDA STA ABC LTA LSR BCC LSR BCC LSR BCC AADD TST BEQ ASL	CLRAS #TMP CLRAS #2*ND W6 #NDD P-1,X W1 CARRY #ND Q-1,X W4 TZO CARRY W3 CARRY W3 CARRY CARRY CARRY CARRY CARRY CARRY CARRY CARRY W4 CARRY W4 CARRY W4 CARRY W4 CARRY W6 CARRY W7 CARRY W8 CARRY W8 CARRY W8 CARRY W8 CARRY W8 CARRY W8 CARRY W8 CARRY W8 CARRY W8 CARRY W8 CARRY W8 CARRY W8 CARRY W8 CARRY W8 CARRY W8 CARRY W8 CARRY CARRY W8 CARRY W8 CARRY W8 CARRY W8 CARRY W8 CARRY W8 CARRY CARRY W8 CARRY W8 CARRY CARRY W8 CARRY CARRY W8 CARRY CA	INIT. R POINTER SAVE P POINTER SAVE P INIT. Q POINTER SAVE Q IF ZERO GOTO NEXT Q RECALL P SAVE P RIGHT SHIFT INTO C C = ZERO ? NO, A=A+Q
2355 2356 2357 2358 2361 2362 2362 2363 2364 2365 2366 2367 2370 2371 2372 2373 2374 2375 2376 2377 2377 2377 2377	eea8 eeab eead eeb0 eeb2 eeb4 eeb6 eeb8 eeba eebc eecc2 eec4 eec6 eec8 eec9 eecd eecf eed1 eed3 eeb5 eed7	cd e 4 e 1 a 0 4 e 1 a 0 6 a e 6 f a a a 6 6 2 a 3 a a a 6 f a 2 a 2 a 2 a 6 f a 2 a 2 a 6 f a 6 a 6 f	£ 86 bf 86 26 9 1 1 1 b 9 9 f 4 0 0 b 5 3 b 2 2 4 b b 4 4 4 2 2	STR XTT PLY SHF	JSR LDX JSR LDX JSR LDX LDX LDX LDA STX LDA STX LDA STA LDA STA LDA STA LDA STA STA STA STA STA STA STA STA STA ST	CLRAS #TMP CLRAS #2*ND W6 #ND P-1,X W1 CARRY #ND Q-1,X W4 TZO CARRY W3 GARRY W4 CARRY W4 CARRY W4 LY CARRY W4 LY	INIT. R POINTER SAVE P POINTER SAVE P INIT. Q POINTER SAVE Q IF ZERO GOTO NEXT Q RECALL P SAVE P RIGHT SHIFT INTO C C = ZERO ? NO, A=A+Q ZERO ? YES, FINISHED WITH THIS Q NO, LEFT SHIFT Q Q = Q + 1
2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2366 2367 2370 2371 2373 2374 2375 2377 2378 2377 2378	eea8 eeab eead eeb0 eeb2 eeb4 eeb6 eeb8 eebc eebc eecc2 eec4 eec6 eec8 eec9 eecd eecf eed1 eed3 eed5 eed7 eed7	caed e 1 a 0 4 a a a 0 2 a a 3 a a a a 0 a a 0 a a 6 b b a 6 b b b 5 b b 5 d f a 4 0 a a 0 a a 6 b b a 6 b b b 6 a 6 b 7 6 a 5 b b 6 7 a 6 b b 7 6 a 6 b b 7 6 b b 7 6 b b 7 6 b b 7 6 b b 7 6 b b 7 6 b b 7 6 b b 7 6 b b 7 6 b b 7 6 b b 7 6 b b 7 6 b b 7 6 b 6 b	f. 86 bf. 86 26 91 11 b9 9f. 4 0 b3 b2 4 4 4 2 2	STR XTT PLY SHF	JSR LDX JSR LDX JSR LDX STX LDX LDX STX LDA STA LDA STA BEQ LDA STA BEQ CLRA LSR BCC ADD BCC ADD BCC ADD BCC ADD BCC ADD BCC ADD STA BEQ BCC ADD SCRA BCC ADD SCRA BCC ADD SCRA BCC ADD SCRA BCC SCRA BCC SCRA BCC SCRA BCC SCRA BCC SCRA SCRA SCRA SCRA SCRA SCRA SCRA SC	CLRAS #TMP CLRAS #2*ND W6 #ND P-1,X W1 CARRY #ND Q-1,X W4 TZO CARRY W3 CARRY W3 CARRY W4 CARRY W4 CARRY CARRY W4 CARRY W4 CARRY W4 CARRY W4	INIT. R POINTER SAVE P POINTER SAVE P INIT. Q POINTER SAVE Q IF ZERO GOTO NEXT Q RECALL P SAVE P RIGHT SHIFT INTO C C = ZERO? NO, A=A+Q ZERO? NO, A=A+Q ZERO? NO, LEFT SHIFT Q Q = Q + 1 SAVE Q POINTER
2355 2356 2357 2358 2359 2361 2362 2363 2364 2365 2370 2371 2372 2373 2374 2377 2377 2379 2379 2381 2382 2383 2383 2383 2384 2372 2373 2374 2375 2376 2377 2378 2378 2378 2378 2378 2378 2378	eea8 eeab eead eeb0 eeb4 eeb6 eeb8 eeba eebc eec0 eec2 eec4 eec6 eec8 eec9 eecb eecd eecf eed1 eed3 eed5 eed8 eeda	cae d e 1 a 0 4 a a a 6 b 5 a e 6 b 7 f 3 4 a a a 0 a a f a 0 a a 2 3 a a a a a 2 3 a a a a a a a a a	f. 86 b f. 86 26 9 1 1 1 b 9 9 f f. 4 0 0 b 3 b 2 2 4 4 b 4 4 4 2 2 2 6 a	STR XTT PLY SHF	JSR LDX JSR LDX STX LDX STX LDA STX LDA STA LDA STA LDA STA LDA STA LDA STA LDA STA BEQ LDA ADD TST BEQ ADD BCC ADD BCC STS BCC ADD BCC BCC BCC BCC BCC BCC BCC BCC BCC B	CLRAS #TMP CLRAS #2*ND W6 #ND P-1, X W1 CARRY #ND Q-1, X W4 TZO CARRY W3 CARRY W3 CARRY W4 CARRY W4 CARRY W4 CARRY W4 CARRY W4 CARRY W4 CARRY W4 W6 W6 W6 W6 W6 W6 W6 W6 W6 W6	INIT. R POINTER SAVE P POINTER SAVE P INIT. Q POINTER SAVE Q IF ZERO GOTO NEXT Q RECALL P SAVE P RIGHT SHIFT INTO C C = ZERO? NO. A=A+Q ZERO? YES, PINISHED WITH THIS Q NO. LEFT SHIFT Q Q = Q + 1 SAVE Q POINTER R POINTER ADD R TO A
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23556 23577 23588 23600 23620 23620 23642 23656 23670 23710 23720 23710 23720 23736 23760 23771 23788 23789 23820 23821 23822 23838 23822 23838 23822 23838 23822 23838	eea8 eeab eeab eeb0 eeb2 eeb1 eeb2 eeb2 eeb2 eeb2 eec2 eec4 eec5 eec6 eec6 eec6 eec6 eec6 eec6 eec6	cdedededededededededededededededededed	f 86 bf 86 86 91 11 b9 91 40 0b3 b2 44 b4 44 2 2 6 6 8 6 8 6 8 6 8 6 6 8 6 6 8 6 6 8 6 6 8 6	STR XTT PLY SHF C4 C2	JSR LDX JSR LDX JSR LDX STX LDA STX LDA STA LDX STA LDX STA LDX STA LDA STA LDA STA ADD BEQ LDA ADD BCC STX LDX STA LDA STA ADD STA ADD STA ADD STA ADD STA ADD STA LDA STA LDB STB STB LDB STB STB LDB STB STB STB STB STB STB STB STB STB ST	CLRAS #TMP CLRAS #2*ND W6 #NDD P-1, X W1 CARRY #ND Q-1, X W4 TZO CARRY W3 CARRY W4 CARRY W3 CARRY W4 CARRY C4 W4 PLY W2 W6 R-ND-1, X ADJ R-ND-1, X CARRY R-ND-2, X W3 CARRY W6 W2 CARRY W6 W6 CC3 W6	INIT. R POINTER SAVE P POINTER SAVE P INIT. Q POINTER SAVE Q IF ZERO GOTO NEXT Q RECALL P SAVE P RIGHT SHIFT INTO C C = ZERO? NO, A=A+Q ZERO? NO, LEFT SHIFT Q Q = Q + 1 SAVE Q POINTER R POINTER ADD R TO A ADJUST R = R + A ADD R-(ND+2) TO CARRY R-(ND+2) = R-(ND+2) + CARRY RECALL P SAVE Q POINTER SAVE IN CARRY
2355 2357 2358 2359 2350 2357 2358 2359 2350 2350 2350 2350 2350 2350 2350 2350	eea8 eeab eeab eebb eebb eebb eebb eebb	cdededabaebbaeebb27ebb7f44324b33278afebbd24aa aaa4444aa aaa0aabbbe0b27ebb7f45abbd032780bbe0bd5abb0b5bbb023a5a6	f 86 bf 86 86 86 91 1 b 9 f 4 0 0 b 3 b 2 2 4 b 4 4 2 2 2 6 a e a b 9 9 9 3 b 6 2 2 3 6 5 5	STR XTT PLY SHF C4 C2	JSR LDX JSR LDX LDX STX LDX LDA STX LDX LDA STX LDX LDA STA LDX STA LDX STA LDA STA BEQ LDA BEQ LDA BEQ LDA BEQ LDA BEQ LDA STA BCC LSR BCC LDX BCC LD	CLRAS #TMP CLRAS #2*ND #6 #2*ND #6 #ND P-1,X W1 CARRY #ND CARRY W3 CARRY W4 TZ0 CARRY W4 CARRY C4 W4 PLY W2 W6 R-ND-1,X ADJ R-ND-1,X CARRY R-ND-2,X R-ND-2,X W3 CARRY W6 W6 W6 W6 W6 W6 W6 W6 W7T	INIT. R POINTER SAVE P POINTER SAVE P INIT. Q POINTER SAVE Q IF ZERO GOTO NEXT Q RECALL P SAVE P RIGHT SHIFT INTO C C = ZERO ? NO, A=A+Q ZERO ? YES, FINISHED WITH THIS Q NO, LEFT SHIFT Q Q = Q + 1 SAVE Q POINTER R POINTER ADD R TO A ADJUST R = R + A ADD R-(ND+2) TO CARRY R-(ND+2) = R-(ND+2) + CARRY RECALL P SAVE R POINTER Q POINTER Q POINTER DEC. R POINTER DEC. R POINTER
2355 2357 2357 2356 2358 2359 2360 2362 2365 2365 2365 2377 2378 2377 2377 2377 2377 2377 2377	eea8 eeab eeab eebb eebb eebb eebb eebb	cde 4e1 1a0 4aae 4e6 1a0 4aae	f 86 bf 86 86 86 99 11 1 b 9 f 4 0 0 b 3 b 2 2 4 b b 4 4 4 2 2 2 6 a e a b 9 9 9 3 b 6 2 3 3 6 5 6 8 8	STR XTT PLY SHF C4 C2	JSR LDX JSR LDX JSR LDX STX LDX STX LDA STX LDA STA LDA STA LDA STA BEQ LDA STA BEQ ADD BCC ADD JSR STX LDX ADD JSR STA ADD JSR STA ADD JSR STA ADD JSR STA LDA ADD JSR STA ADD JSR STA ADD JSR STA ADD JSR STA ADD JSR ADD ADD ADD ADD ADD ADD ADD ADD ADD AD	CLRAS #TMP CLRAS #2*ND W6 #ND P-1, X W1 CARRY #ND Q-1, X W4 TZO CARRY W3 CARRY W4 CARRY W4 CARRY W4 CARRY C4 W4 PLY W2 W6 R-ND-1, X CARRY X DJ R-ND-2, X R-ND-2, X R-ND-2, X W3 CARRY W6 W2 CARRY W6 W2 CARRY W6 XTT W6 W6 XTT W6 #ND-1	INIT. R POINTER SAVE P POINTER SAVE P INIT. Q POINTER SAVE Q IF ZERO GOTO NEXT Q RECALL P SAVE P RIGHT SHIFT INTO C C = ZERO ? NO, A=A+Q ZERO ? YES, FINISHED WITH THIS Q NO, LEFT SHIFT Q Q = Q + 1 SAVE Q POINTER R POINTER ADD R TO A ADJUST R = R + A ADD R-(ND+2) TO CARRY R(ND+2) = R-(ND+2) + CARRY RECALL P SAVE IN CARRY SAVE R POINTER Q POINTER Q POINTER DEC. R POINTER DEC. R POINTER R POINTER
2355 2357 2356 2357 2356 2357 2358 2359 2370 2361 2362 2376 2376 2377 2375 2377 2375 2377 2375 2377 2375 2377 2375 2377 2375 2377 2375 2377 2375 2377 2375 2377 2375 2377 2375 2377 2375 2377 2375 2377 2375 2377 2375 2377 2375 2377 2375 2377 2375 2377 2377	eea8 eeab eeab eeb0 eeb0 eeb0 eeb0 eeb0 eeb0	cde 4 e1 a 0 4 a a 6 2 2 a 3 a a a 0 a a 6 a 6 a 6 4 e 4 a a a a a 0 a a 6 a 6 a 6 b 7 f 4 4 3 4 4 b 3 2 5 a f e b 6 a 4 4 a a a a a 0 a a 6 a 6 a 6 a 6 a 6 a 6 a	£ 86 bf 86 86 91 1 b9 9 f 4 0 0 b 3 b 2 2 4 b 4 4 2 2 2 6 a e a a b 9 9 9 3 b 6 2 2 3 6 5 6 8 6 6 8 6 6 8 6 6 8 6 6	STR XTT PLY SHF C4 C2	JSR LDX JSR LDX JSR LDX LDX STX LDX STX LDA STA LDX STA LDA STA LDA STA BEQ LDA ACLE BCC ADD DECX STX LDX STA ADD JSR ADD JSR LDA ADD STA ADD STA LDA STA LDA ADD STA LDA STA LDA STA LDA ADD STA LDA STA LDA DECX STY LDX STA LDA DECX STX LDX LDX LDX LDX LDX LDX LDX LDX LDX LD	CLRAS #TMP CLRAS #2*ND W6 #ND P-1, X W1 CARRY #ND Q-1, X W4 TZO CARRY W3 CARRY W4 CARRY W4 CARRY W4 CARRY C4 W4 PLY W2 W6 R-ND-1, X CARRY X DJ R-ND-2, X R-ND-2, X R-ND-2, X W3 CARRY W6 W2 CARRY W6 W2 CARRY W6 XTT W6 W6 XTT W6 #ND-1	INIT. R POINTER SAVE P POINTER SAVE P INIT. Q POINTER SAVE Q IF ZERO GOTO NEXT Q RECALL P SAVE P SAVE P RIGHT SHIFT INTO C C = ZERO ? NO, A=A+Q ZERO ? YES, FINISHED WITH THIS Q NO, LEFT SHIFT Q Q = Q + 1 SAVE Q POINTER R POINTER ADD R TO A ADJUST R = R + A ADD R-(ND+2) TO CARRY R(ND+2) = R-(ND+2) + CARRY RECALL P SAVE IN CARRY SAVE R POINTER Q POINTER DEC. R POINTER DEC. Q POINTER R POINTER R POINTER R POINTER R POINTER
23556 23577 23586 23579 23600 23620 23620 23621 23626 23636 23670 23711 23722 23732	eea8 eeab eeab eebb eebb eebb eebb eebb	cd e 4 e 1 a 0 4 a a c 2 a 3 a a a 0 a a c a c a c a b b a e e b b 7 6 a a a a 0 a a c a c a b b a e e b b 7 6 a a a a 0 a a c a c a c a c a c a c a c	f 86 bf 86 86 91 1 b 9 9 f 4 0 0 b 3 b 2 2 4 4 b 4 4 2 2 2 6 a e a a b 9 9 9 3 b 6 6 2 2 3 6 5 6 6 8 6 6 1	STR XTT PLY SHF C4 C2	JSR LDX JSR LDX STX LDA STX LDA STX LDA STA LDX STA LDX STA LDX STA LDX STA LDA STA LDA STA CLRA LSR SC ADD DC STA ASL BRA STA STA LDX STA ADD DECX STA LDA STA ADD DECX STA LDA STA ADD DECX STX LDA STA LDS STA LDA STA LDS STA LDA STA LDS STA LDA STA LDS DECX STA LDD DECX DECX STA LDD DECX DECX DECX STA LDD DECX DECX DECX DECX DECX DECX DECX DE	CLRAS #TMP CLRAS #2*ND W6 #NDD P-1, X W1 CARRY #ND Q-1, X W4 TZO CARRY W3 CARRY W4 CARRY W5 W4 CARRY C4 W4 PLY W6 R-ND-1, X ADJ R-ND-1, X CARRY W6 W1 W6 W1 W6 W1	INIT. R POINTER SAVE P POINTER SAVE P INIT. Q POINTER SAVE Q IF ZERO GOTO NEXT Q RECALL P SAVE P RIGHT SHIFT INTO C C = ZERO? NO, A=A+Q ZERO? NO, A=A+Q ZERO? YES, FINISHED WITH THIS Q NO, LEFT SHIFT Q Q = Q + 1 SAVE Q POINTER R POINTER ADD R TO A ADJUST R = R + A ADD R-(ND+2) TO CARRY R-(ND+2) = R-(ND+2) + CARRY ROMAND R TO A ADJUST SAVE R POINTER ADD R-(ND+2) TO CARRY R-(ND+2) = R-(ND+2) + CARRY CARRY SAVE R POINTER DEC. Q POINTER R POINTER R POINTER R POINTER R = R + ND-1 P = P + 1
23556 23576 23589 23590 2360 2362 2362 23656 23662 23656 2370 2371 2372 2373 2375 2377 2378 2379 2379 2379 2379 2389 2389 2389 2389 2399 2399 2399 239	eea8 eeab eeab eeb0 eeb0 eeb0 eeb0 eeb0 eeb0	cde 4 e1 aa 0 4 aa a 0 2 a 3 a a a a 0 a a 0 a a 4 e4 a 4 a 4 a 4 a a a a a 0 a a cao a b 5 a b b a e b f 4 a 4 a 4 a 4 a 4 a 4 a 4 a 4 a 4 a 4	f 86 6 86 86 9 1 1 1 b 9 f f 4 0 0 b 3 b 2 4 b 4 4 4 2 2 6 a e e a b 9 9 3 b 6 2 3 3 6 5 6 8 8 6 1 2	STR XTT PLY SHF C4 C2	JSR LDX JSR LDX JSR LDX STX LDX STX LDA STA ADD STA ASL BRA DECX STX LDX STA LDA STA LDA STA LDA DECX STX LDX STA LDA LDA STA LDA STA LDA STA LDA STA LDA STA LDA STA LDA LDA LDA STA LDA LDA LDA STA LDA LDA LDA LDA LDA LDA LDA LDA LDA LD	CLRAS #TMP CLRAS #2*ND W6 #NDD P-1, X W1 CARRY #ND Q-1, X W4 TZO CARRY W3 CARRY W4 CARRY W5 W4 CARRY C4 W4 PLY W6 R-ND-1, X ADJ R-ND-1, X CARRY W6 W1 W6 W1 W6 W1	INIT. R POINTER SAVE P POINTER SAVE P INIT. Q POINTER SAVE Q IF ZERO GOTO NEXT Q RECALL P SAVE P SAVE P RIGHT SHIFT INTO C C = ZERO ? NO, A=A+Q ZERO ? YES, FINISHED WITH THIS Q NO, LEFT SHIFT Q Q = Q + 1 SAVE Q POINTER R POINTER ADD R TO A ADJUST R = R + A ADD R-(ND+2) TO CARRY R(ND+2) = R-(ND+2) + CARRY RECALL P SAVE IN CARRY SAVE R POINTER Q POINTER DEC. R POINTER DEC. Q POINTER R POINTER R POINTER R POINTER R POINTER

2406				*****	*****	*****	******	**
2407 2408				*	Diminio	n of BCD numbers		*
2408				*				*
2410				*	R <- P	/ Q, remainder in X = #R, TMQ used	n TMP.	*
2412				*				*
2413 2414							******	**
2415	ef07 a	e 54	0.5	DIV	LDX	#R	CLEAR	
2416	ef0c a	e 42	86		LDX	#P	TRANSFER	
2418	ef0e b	f ad			STX	NUM1	P TO	
2420	ef12 c	d ee	2e		JSR	TRA	P (TMP)	
2421	ef15 a	e 30			LDX	#Q NTIM1	TRANSFER	
2423	ef19 a	e 39			LDX	#R CLRAS #P NUM1 #TMP TRA #Q NUM1 #TMQ TRA	WORKING	
2424 2425	eflb c	d ee	2e		JSR	TRA	Q (TMQ)	
2426	efle a			POSS	LDA	#ND	O (TMQ) NUMBER DIGITS FIND LEAST SIGNIFIC NON-ZERO DIGIT ZERO ? YES, SHIFT Q UP ONE PLACE Q WAS ZERO SAVE NO. DIDITS - NO. SI	
	ef20 b ef22 a			LOOP6	LDX	#TMQ	FIND LEAST SIGNIFIC	CANT
2429	ef24 f	6			LDA	0,X	NON-ZERO DIGIT	
2431	ef25 2 ef27 c	d ef	64		JSR	SHIFT	YES, SHIFT Q	
2432	ef2a 2 ef2c 2	6 f6		70	BNE	LOOP6	UP ONE PLACE	
2434	ef2e b	6 20		NOSH	LDA	COUNT	SAVE	
2435 2436	ef30 b	7 al			STA	Wl	No. DIDITS - No. SI	HIFTS
2437	ef32 a	e 4b		SUBB	LDX	#TMP	SUBTRACT Q	
2439	ef34 b	or ad	6d		STX JSR	NUM1 SUB	NO. DIDITS - NO. SI SUBTRACT Q FROM P TOO FAR? IF YES, GO TO NEXT INCREMENT RELEVANT DIGIT IN RESULT ONCE AGAIN TOO FAR, ADD Q BACK ON SET UP TO SHIFT BACK WORKING Q MOVE ALL DIGITS DOWN ONE PLACE DOWN ONE PLACE DONE? CLEAR MS DIGIT INCREMENT POINTER FINISHED? NO, NEXT DIGIT	
2440	ef39 b	6 ab			LDA	CARRY	TOO FAR ?	DIGIT
2442	ef3b 2 ef3d b	06 e al			LDX	W1	INCREMENT RELEVANT	DIGIT
2443	ef3f 6 ef41 2	c 53			INC	R-1,X	DIGIT IN RESULT	
2445	ef43 a	e 4b		NEXTD	LDX	#TMP	TOO FAR, ADD	
2446	ef45 c ef48 a	d ee	33	POP	JSR LDY	ADD #TMO	Q BACK ON	
2448	ef4a a	6 08		ROR	LDA	#ND-1	SHIFT BACK	
	ef4c b	7 ac		RRR	STA LDA	COUNT ND-2.X	WORKING Q MOVE ALL	
2451	ef50 e	7 08		1000	STA	ND-1,X	DIGITS	
2452 2453	ef52 5 ef53 3	a a ac			DECX	COUNT	DOWN ONE PLACE	
2454	ef53 3 ef55 2	6 f7			BNE	RRR	DONE ?	
2455	ef57 6 ef59 3	c al			INC	ND-1,X W1	INCREMENT POINTER	
	ef5b b	6 al			LDA	W1	DINITOURD O	
2459	ef5d a ef5f 2	6 dl			BNE	SUBB	NO, NEXT DIGIT	
2460	ef61 a	e 54		RTRN	LDX	#R		
2462	0200	-					******	
2463 2464				*	*****	******	******	*
2465 2466				*	Shift.			*
2467					*****	*****	******	******
2468	ef64 h	7 a 3		SHIFT	STA	W3		
2470	ef66 c	d ef	79	D1111 1	JSR	DR1	W1: MSD, W2: LSD	
2471	ef69 b	e al	79	AGS	LDX LDA	W1 1.X	MOVE ALL DIGITS	
2473	ef6d f	7			STA	0,X	UP ONE PLACE	
2475	ef6e 5 ef6f b ef71 2 ef73 b	3 a2			INCX CPX	W2	DONE ? YES, RECOVER NEW D: AND PUT IT IN LSD	
2476	ef71 2	6 f8			BNE	AGS w2	DONE ?	TCTT
2478	ei75 i	7			STA	0,X	AND PUT IT IN LSD	1011
	ef76 3 ef78 8				DEC RTS	COUNT		
2481						***		
2482	ef79 b	of al		DR1	STX	W1 #ND-1	STORE POINTERS (USED IN DIGIT AND	DO)
	ef7d 5			AXL	INCX		,	~ /
	ef7e 4 ef7f 2	a 6 fc			DECA BNE	AXL		
	ef81 b				STX RTS	W2		
2489	ef83 8	1						
2490 2491				******	*****	******	*******	**
2492				*	Clear.			*
2493 2494				******	*****	*****	******	*
2495	- 601	- 20		GT O	T DV	#0	GI DAD O	
	ef84 a ef86 b			CLQ CLRAS	LDX STX	#Q W5	CLEAR Q	
2498	ef88 a	6 09			LDA STA		CLEAR No. DIGITS	
2500	ef8a b ef8c 7	f		CR	CLR	COUNT 0,X	STARTING AT X	
2501	ef8d 5 ef8e 3	C			INCX DEC	COUNT		
2503	ef90 2	6 fa			BNE	CR	DONE ?	
	ef92 b				LDX RTS	W5		

```
2507
2508
2509
                                                                                                  MJD - day of week and year.
 2510
2511
                                                                                                   DOW = (MJD+2)MOD7 (= WD-1)
2511
2512
2513
2514
2515
2516 ef95 ae 5d
2517 ef97 bf ad
2518 ef99 ae 42
2519 ef9b cd ee 2e
2520 ef9e ae 5d
2521 ef9e of 60 83
                                                                                                           = INT((MJD-15078.2)/3652500)
                                                                                                                       #MJD
NUM1
                                                                                                   STX
                                                                                                                       #P
TRA
#MJD
2519 ef9b cd ee 2e
2520 ef9e ae 5d
2521 efa0 cd f0 83
2522
2523 efa3 ae 39
2524 efa5 cd ee 90
2525 efa8 ae 39
2526 efaa cd ee 90
2527 efad ae 30
2528 efaf cd ef 86
2529 efb2 a6 07
2531 efb6 cd ef 07
2531 efb6 cd ef 07
2532 efb9 b6 53
2533 efb9 b6 53
2533 efbb b7 73
2534
2535 efbd ae 5d
2537 efc1 ae 30
2538 efc3 fa ee
2539 efc5 cd f0 98
2540 efc8 ae 42
2541 efca cd ee 6d
2542 efcd cd f0 a3
2544 efd3 bf ad
2554 efd6 ae 66
2546 efd7 cd ee 2e
2547
2548
2549
2550
2551
                                                                                                   JSR
                                                                                                                                                                  P <- MTD
                                                                                                   JSR
                                                                                                                       TIOK
                                                                                                                                                                 MJD <- MJD TIMES 10,000
                                                                                                  LDX
JSR
LDX
JSR
                                                                                                                       #P-ND
ADD1
#P-ND
ADD1
                                                                             DOFFW
                                                                                                                                                                  P <- MJD + 2
                                                                                                                        #Q
CLRAS
#7
                                                                                                   LDX
                                                                                                   JSR
LDA
                                                                                                  STA
JSR
LDA
STA
                                                                                                                       #/
Q+ND-1
DIV
TMP+ND-1
DOW
                                                                                                                                                                 Q <- 7
R <- (MJD+2)/7
REMAINDER (WD-1) IN TMP
                                                                             YEAR
                                                                                                   LDX
                                                                                                                        #MJD
                                                                                                                       HMJD
NUM1
#Q
NUM2
TRCY
#P
SUB
                                                                                                  STX
LDX
STX
JSR
LDX
JSR
JSR
JSR
                                                                                                                                                                  Q <- CY (150782000)
                                                                                                                                                                 P <- 10K(MJD-15078.2)
Q <- 3652500
R <- Y' ((MJD-15078.2)/365.25)
                                                                                                                       TRDY
DIV
                                                                                                                       NUM1
#YR
TRA
                                                                                                   STX
                                                                                                  MJD - month and day.
2551
2552
                                                                                                  INT
#MJD
NUM1
#P
                                                                             MONTH
                                                                                                                                                                 R <- 10K(INT(Y'*365.25))
                                                                                                   LDX
                                                                                                   STX
LDX
                                                                                                                       NUM2
                                                                                                   STX
                                                                                                  JSR
LDX
JSR
STX
LDX
                                                                                                                       TRDO1
#Q
SUB
NUM1
                                                                                                                                                                 P <- 149561000
                                                                                                                                                                  Q <- 10K(MJD-14956.1)
                                                                                                                       #R
NUM2
                                                                                                   STX
                                                                                                   LDX
                                                                                                                        #P
SUB
                                                                                                                                                                  P <- 10K(MJD-14956.1-INT(Y'*365.25))
                                                                                                                       TRDM
DIV
NUM1
#P
TRA
P+ND-2
                                                                                                  JSR
JSR
STX
LDX
JSR
LDA
                                                                                                                                                                  Q <- 306001
R <- M'
                                                                                                                                                                                                           MJD-14956.1-INT(Y'*365.25)
                                                                                                                                                                                         INT
                                                                                                                                                                                                                                     306001
                                                                                                                                                                  P <- M
SAVE M
                                                                                                   STA
                                                                                                                        MNTH
                                                                                                                       P+ND-1
MNTH+1
                                                                                                   T<sub>1</sub>DA
2577 f009 b6 4a
2578 f00b b7 70
2579
2580 f00d cd f0 ae
2581 f010 cd f0 77
2582 f013 bf ad
2583 f015 ae 39
2584 f017 cd ee 2e
2585 f01a cd f0 6b
2586 f01d bf ae
2587 f01f ae 39
2588 f021 bf ad
2599 f022 cd ee 33
2590 f026 bf ad
2591 f028 ae 42
2592 f02a bf ae
2593 f02c cd f0 b9
2594 f02f 3f 47
2595 f031 ae 54
2596 f033 cd ee 33
2597 f036 bf ae
2598 f038 ae 5d
2599 f03a bf ae
2598 f03a bf ad
2599 f03a bf ad
2599 f03a bf ad
2599 f03a bf ad
2600 f03c ae 30
2601 f03e cd ee 6d
2602 f041 e6 04
2603 f043 b7 72
2604 f045 e6 03
2605 f047 b7 71
                                                                                                   STA
                                                                                                  JSR
JSR
STX
                                                                                                                       TRDM
MULTI
NUM1
#TMQ
                                                                                                                                                                  Q <- 306001
R <- 10K(INT(M'*30.6001))
                                                                                                   LDX
JSR
                                                                                                                                                                  TMQ <- 10K(INT(M'*30.6001))
R <- 10K(INT(Y'*365.25))
                                                                                                                        TRA
INT
                                                                                                  JSR
STX
LDX
STX
JSR
STX
LDX
JSR
CLR
LDX
JSR
STX
LDX
STX
                                                                                                                       NUM2
#TMQ
NUM1
ADD
NUM1
#P
NUM2
                                                                                                                                                                  TMQ <- 10K(INT(Y'*365.25)+INT(M'*30.6001))
                                                                                                                                                                  P <- 149561000
P <- 149560000
                                                                                                                        TRD01
                                                                                                                       TRDO1
P+ND-4
#R
ADD
NUM2
#MJD
NUM1
                                                                                                                                                                  R <- 10K(14956+INT(Y'*365.25)+INT(M'*30.6001))
                                                                                                   LDX
JSR
                                                                                                                        #Q
SUB
                                                                                                                                                                 O <- MJD-R (10K*DOM)
                                                                                                  LDA
STA
LDA
STA
                                                                                                                       ND-5,X
DOM+1
ND-6,X
DOM
                                                                                                                                                                  MJD-14956-INT(Y'*365.25)-INT(M'*30.6001)
```

```
2607
2608
2609
                                                                                                                                                                          MJD - final correction of year & month and subs.
   2610
2611
                                                                                                                                                                           If M' = 14 or 15, then K = 1, else K = 0
Y = Y' + K

M = M' - 1 - K*12
                                                                                                                                                                                                               MNTH
KE02
                                                                                                                                       ADJU2
                                                                                                                                                                                                                                                                                     MONTH, MSD 0 ?
0 ?
NO, M'= 10 THRU 15
0 ?
NO, M'= 11 THRU 15
LESS THAN 14
NO, M'= 14 OR 15, K=1
Y <- Y'+1
MONTH, MSD (-10)
DEC. MONTH
AND AGAIN (-2)
-12
M'= 10
PUT 10 IN LSD
CLEAR MSD 9<-10, 1,2<-14,15, 3-8<-4-9, 10-12<-11-13
                                                                                                                                                                                                                                                                                        MONTH, MSD
                                                                                                                                                                           BEO
                                                                                                                                                                           T<sub>1</sub>DA
                                                                                                                                                                                                               MNTH+1
KE01
                                                                                                                                                                          BEQ
CMP
BLO
LDX
JSR
CLR
                                                                                                                                                                                                              #4
KE02
#YR-ND
ADD1
MNTH
                                                                                                                                       KE1
                                                                                                                                                                                                               MNTH+1
                                                                                                                                                                           DEC
                                                                                                                                                                           DEC
                                                                                                                                                                                                               MNTH+1
KE02
                                                                                                                                                                                                              #10
MNTH+1
MNTH
MNTH+1
                                                                                                                                       KE01
                                                                                                                                                                           T.DA
                                                                                                                                                                          STA
CLR
DEC
RTS
                                                                                                                                       KE02
                                                                                                                                                                                                              #YR
NUM1
#P
TRA
TRDY
MULT
R+ND-4
                                                                                                                                                                           LDX
                                                                                                                                        INT
                                                                                                                                                                           STX
LDX
                                                                                                                                                                          JSR
JSR
JSR
CLR
                                                                                                                                                                                                                                                                                        P <- Y'
Q <- 10K*365.25
R <- 10K*Y'*365.25
                                                                                                                                       MULTI
                                                                                                                                                                           CLR
CLR
                                                                                                                                                                                                               R+ND-3
R+ND-2
                                                                                                                                                                                                                                                                                       R <- 10K(INT(Y'*365.25))
                                                                                                                                                                           CLR
RTS
                                                                                                                                                                                                               R+ND-1
                                                                                                                                                                          TXA
ADD
STA
LDA
                                                                                                                                       T10K
                                                                                                                                                                                                                                                                                       TIMES 10,000
                                                                                                                                                                                                               #ND-4
W1
4,X
0,X
                                                                                                                                                                           STA
                                                                                                                                                                           INCX
                                                                                                                                                                                                              W1
SLP
0,X
1,X
2,X
3,X
                                                                                                                                                                          CPX
BNE
CLR
CLR
CLR
CLR
                                                                                                                                                                          RTS
2660 2661 2662 2662 2663 2664 2665 2666 2667 6098 ae 09 2668 f099 de f0 c3 2669 f098 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609 26 9 609
                                                                                                                                                                           MJD constants.
                                                                                                                                                                                                              CY-1,X
Q-1,X
                                                                                                                                       CYL
                                                                                                                                                                           LDA
                                                                                                                                                                           STA
                                                                                                                                                                          DECX
BNE
RTS
                                                                                                                                                                                                               CYL
                                                                                                                                                                                                              #ND
DY-1,X
Q-1,X
                                                                                                                                                                          LDX
LDA
                                                                                                                                       TRDY
DYL
                                                                                                                                                                           STA
                                                                                                                                                                           DECX
                                                                                                                                                                           BNE
                                                                                                                                                                                                               DYT.
                                                                                                                                                                           RTS
                                                                                                                                                                          LDX
LDA
STA
                                                                                                                                                                                                               #ND
DM-1,X
Q-1,X
                                                                                                                                      TRDM
DML
                                                                                                                                                                           DECX
                                                                                                                                                                                                               DMT.
                                                                                                                                                                           BNE
                                                                                                                                                                           RTS
                                                                                                                                                                          LDX
LDA
STA
                                                                                                                                                                                                               #ND
DO1-1,X
P-1,X
                                                                                                                                      TRDO1
DO1L
                                                                                                                                                                                                               DO1L
                                                                                                                                                                           BNE
                                                                                                                                                                           RTS
  2694
2695 f0c4 01 05 00 07 08 02 CY
                                                                                                                                                                          FCB
                                                                                                                                                                                                               1,5,0,7,8,2,0,0,0
  2695 f0c4 01 05 00 07 08 02 CY
00 00 00
2696 f0cd 00 00 03 06 05 02 DY
05 00 00
2697 f0d6 01 04 09 05 06 01 DO1
00 00 00
2698 f0df 00 00 00 03 00 06 DM
                                                                                                                                                                                                               0,0,3,6,5,2,5,0,0
                                                                                                                                                                                                                1,4,9,5,6,1,0,0,0
                                                                                                                                                                                                               0.0.0.3.0.6.0.0.1
                                                                                                                                                                          FCB
2698 FOGT 00 00

2699 0 00 01

2700

2701

2702

2703

2704

2705

2706 fff4

2707

2708 fff6 e2 9d

2710 fff8 e0 00

2711 fffa e3 0a

2712 fffc e0 00

2713 fffe e0 00

2714 gffe e0 00

2714 2715
                         00 00 01
                                                                                                                                                                          ORG
                                                                                                                                                                                                               SFFF4
                                                                                                                                                                           FDR
                                                                                                                                                                                                               START
                                                                                                                                                                                                                                                                                        SERIAL
                                                                                                                                                                          FDB
FDB
FDB
                                                                                                                                                                                                               TINTB
START
SDATA
                                                                                                                                                                                                                                                                                        TIMER B
TIMER A
EXTERNAL INTERRUPT & RTI
                                                                                                                                                                                                                START
                                                                                                                                                                                                                                                                                        RESET
                                                                                                                                                                          FDB
                                                                                                                                                                                                               START
   2715
                                                                                                                                                                          END
```

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