MAINTENANCE MANUAL

PE GE - STAR ENCODER
(19D430317G1-11)
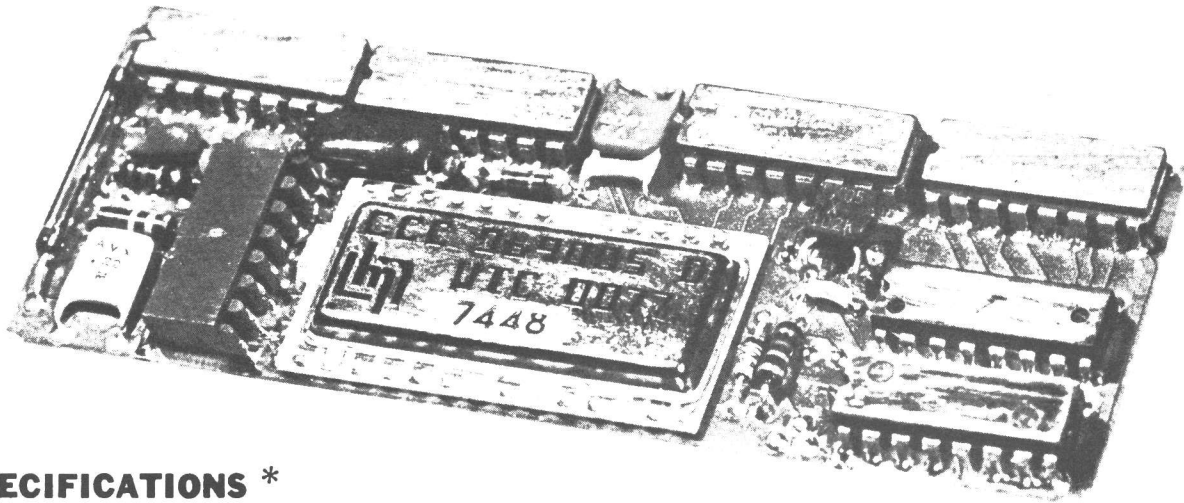
SPECIFICATIONS *

Dimensions	3.7''L x 1.35''W x 0.280''D
Weight	Less than 2 oz.
Input Voltage	7.5 ± 1.5 volts DC
Current Drain (Standby)	1.0 ma (max)
Current Drain (Transmit)	150 ma (max)
PTT Input	Closure to ground, 100 ma (max)
Emergency Input (19A134337P1)	Magnetically coupled to internal reed switch
Emergency Input (19A134337P4)	7.5 ± 1.5 volts applied to Pin 7 of J1 concurrent with PTT.
Data Output	2.4 ± 0.4 volts P-P into 10K Ohms load
Temperature Range	-30°C to +60°C.
Humidity Range	0% to 90%, non-condensing.

*These specifications are intended primarily for the use of the serviceman. Refer to the appropriate Specification Sheet for the complete specifications.

GENERAL ⊕ ELECTRIC

TABLE OF CONTENTS

ILLUSTRATIONS

DESCRIPTION

The PE GE-STAR Encoder is mounted directly within General Electric PE Series Radios (extended package only). It provides a burst of digital information containing the identification number of the portable unit on each depression of the press-to-talk switch.

The Group 1 and Group 2 versions have the additional capability to transmit a second message. This message contains the identification number of the portable unit and proper additional coding to produce an emergency message reception in a companion base station decoder and display.

This manual contains information for use by qualified electronic technicians.

OPERATION

Press-To-Talk Message

With each depression of the press-to-talk switch, a digital message is transmitted containing the portable identification number. The press-to-talk switch need only be closed momentarily to send the complete message. This allows the use of the press-to-talk as a non-verbal acknowledge or 10-4 message.

Emergency Message, G1 Version

This module has a reed switch which is held in the normally closed position by an externally applied magnetic field. Removal of the magnetic field allows the switch to open, causing a second unique message to be transmitted independent of the press-to-talk switch. This message is normally decoded as an "Emergency" condition at the base station.

Emergency Message, G3 Version

This module contains circuits which sense the position of a special Emergency Switch on the radio. When this switch is closed and the press-to-talk switch is then depressed, a unique second message is transmitted. This message is normally decoded as an "Emergency" condition at the base station.

Message Repeat, G1 and G3 Versions

Once triggered, the emergency message is automatically repeated four times for a total of five transmissions. This repeat function assures reception of the emergency message by the base station during periods of heavy channel usage.

Attack Delay

Prior to sending digital information, a waiting time is needed to assure all system delays are passed. The attack delay is normally set to 300 milliseconds to account for typical transmitter turn-on and repeater turn-on delay times. See Circuit Description for adjustment of attack delay times.

Transmission Method

The Encoder utilizes a coherent (synchronous) phase-shift-keyed signalling technique. Reliability is strengthened by the presence of redundant information in the digital burst. Normally four redundant ID and three data segments are included providing three opportunities for recognition of the message at the base station decoder.

Digital messages are introduced into the transmitter at the microphone audio input. Voice audio is inhibited during the digital transmission to prevent possible mixing of voice and data.

DATA MESSAGE FORMAT

Single Message

The single message format is shown in Figure 1 as a 32 bit message divided into four words, Sync, ID, Data and Error Detection Code. The first half-message (SYNC) combines the SYNC and ID words and the second half-message (DATA), of equal length, combines the Data and Error Detection Code words.

Multiple Message

The total mutiple message transmitted is also shown in Figure 1. The first 40 milliseconds are occupied by a preamble of alternating ones and zeros. This is followed by SYNC and DATA half-messages. Four SYNC and three DATA half-messages are transmitted. On alternate messages, most of the SYNC half-message is inverted while DATA half-messages are always true. The first three bits of SYNC are always 0-1-1 when SYNC is true. The last two bits of SYNC are inverted with the ID alternately.

Code Structure

The data half-message is encoded with press-to-talk (PTT) or Emergency information depending on the input to the module. The code for PTT has a "1" in the last bit position of the DATA field in Figure 1. The EDC field contains the error detection code of six bits corresponding to the data message. The Emergency message contains "1"s in the last three bit positions of the DATA

```
        ◄──────────────── 80 MS FULL MESSAGE ────────────────►

                ┌──── INVERTED EVERY ────┐
                │     OTHER MESSAGE       │
        ◄─ SYNC ─►◄──────── ID ────────►◄──── DATA ────►◄─ ECD ─►

        ┌─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┐
        │O│I│I│ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │
        └─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┘

        ◄──── SYNC HALF MESSAGE ────►◄──── DATA HALF MESSAGE ────►
```

PRE-AMBLE*	SYNC	DATA	SYNC	DATA	SYNC	DATA	SYNC
16 BITS	16 BITS	16 BITS	16 BITS	16 BITS	16 BITS	16 BITS	16 BITS

```
    ◄─ 40 MS ─►
       (TYP)
    ◄──────────────── 320 MS. TOTAL MESSAGE LENGTH ────────────────►
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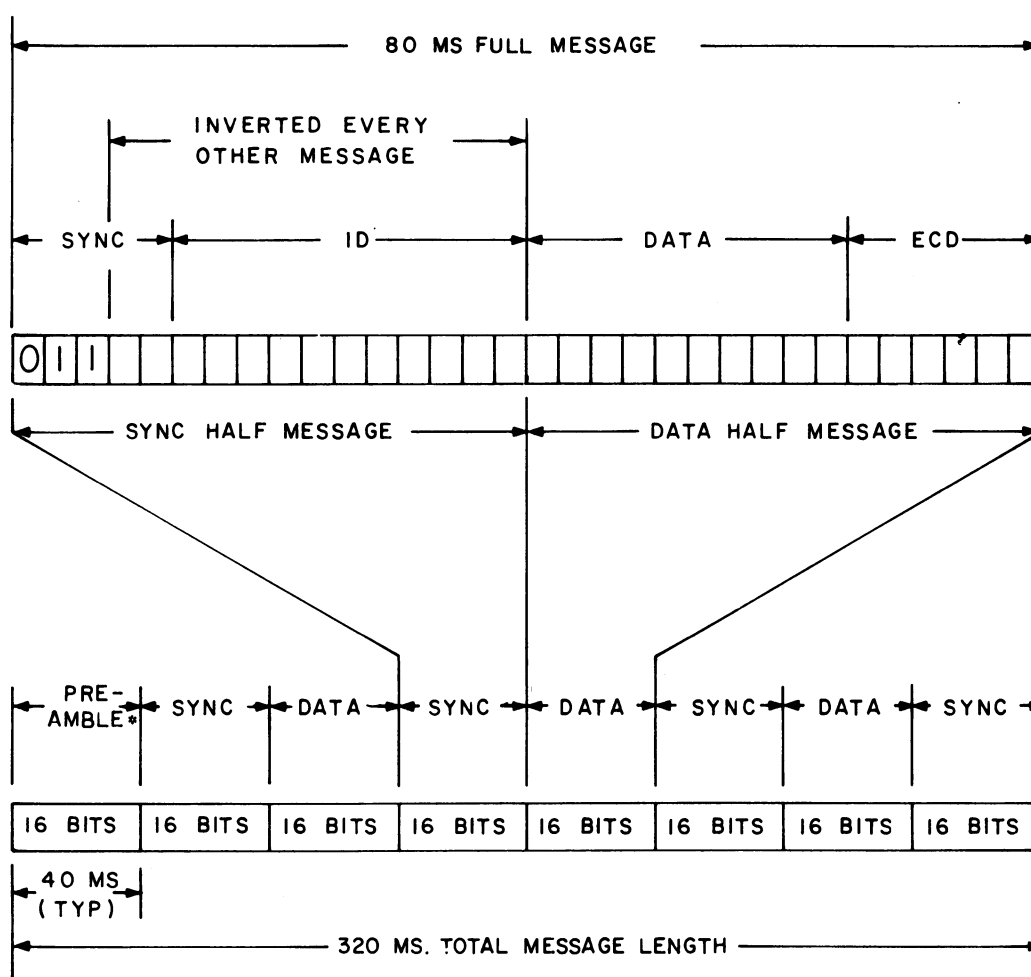
*PREAMBLE IS 16 BITS OF ALTERNATING I AND O   RC3822

Figure 1 - Data Message Format

field. The EDC field then contains a different error detecting code corresponding to the Emergency message.

CIRCUIT DESCRIPTION

The following circuit description is referenced to Schematic Diagram, 19D430477.

Hybrid Circuit

The main component of the Encoder is the hybrid circuit U1. It contains many integrated circuits and discrete devices which provide the basic timing and control logic functions. Since it is not practical to repair the device, the following discussion will treat it as an input/output element without specific reference to the internal theory of operation.

PTT Message Sequence Start

The circuit senses the state of the PTT line of the radio. As long as it is high (7.5 volts), the module is in the low-drain standby mode. When the PTT is depressed, the line goes low (approx. 0 volts) and is held low for the duration of the PTT message through Pin 1 of the hybrid circuit.

During the period of message transmission, power is applied to the remainder of the circuit from the hybrid. Vc powers the

Programmable Read-Only-Memory (PROM), U6. Vc is normally 5.0 volts and is supplied from U1-17. Ve powers the CMOS integrated circuits (U2, 3, 4, 5) through U1-11 and is also nominally 5.0 volts.

At the end of the transmit sequence, both Vc and Ve are turned off to return the module to the standby mode.

Attack Delay

At the time PTT is depressed, the module is prevented from starting a transmit sequence for the period of the system attack delay. The delay is generated by the RC time constant of C1 and R1 and is nominally 300 ms. At the end of the delay time Vc and Ve are turned on. The reset input of binary counter (U3-11) is capacitively coupled to Vc through U1-16 to assure U3 is reset to zero at the beginning of the data message.

Message Generation

The entire message format is stored in U6. This IC is a PROM organized into 32 words, each 8 bits long, for a total of 256 bits. Since each message is 128 bits long, two such messages are stored in one PROM.

Outputs Q4 through Q8 of U3 select an eight bit PROM word. The proper bit within the PROM word is selected by the binary number on the A, B and C inputs of the multiplexer U7.

NOTE

The outputs of U3 that feed the PROM are buffered by U4A, B, D, E and F. The remainder of the discussion is presented as if these "amplifiers" were not in the circuit since the outputs of U4A, B, D, E, and F are logically identical to their respective inputs.

The generation of the data message begins when the CLR input of U3 (U3-11) is forced high momentarily as Vc is switched on. This pulse resets U3 and all outputs are low. The selected PROM word is at PROM address "00000". Since U3-12, U3-14 and U7-9 are also low, the bit number selected is binary "000" (Bit 0). Initially the data output of the multiplexer (U7-3) is Bit 0 of PROM word "00000". This is the first bit of the message preamble.

The clock oscillator formed by U2A and U2C runs at 3200 Hz. This is 8 times the data bit rate. The clock output is counted by U3. After 8 clock pulses U3-7 goes high. The binary word address is then 00001. Since U7-11, 10 and 9 did not change, Bit 0 of each successive word is selected and presented at U7-3 through 32 words at a 400

bit per second rate. After 32 bits, U3-12 goes high and U3-7, 5, 4, 6 and 13 go low and Bit 1 of word 00000 is then selected and presented at U7-3. The process continues through Bit 1 of the 32 words, then bits 2 and 3 are selected for a total of 128 bits. After 128 bits U3-15 goes high. That high is buffered through U4C and coupled to U1-19 to reset the message sequence and turn off Vc and Ve.

During the time the digital message is being generated, U7-3 and a 1600 Hz square wave from U3-9 are combined in the exclusive OR, U2B. The output of U2B is 400 bits per second, 4 cycle per bit synchronous phase shift keyed digital information.

Emergency Message, G1 and G3-11 Versions

The emergency message circuit is shown in Figures 3 and 7, Schematic Diagrams, 19D430477 and 19D430479 respectively.

The emergency message is stored in the PROM in Bits 4 through 7 of each of the 32 words. Ve remains high through the entire sequence preventing restarting the sequence until all five emergency messages have been sent. During that period U7-9 is held high through U1-8 to access bits 4 through 7 in the 32 words of U6.

At the end of the first emergency message Vc goes low and the transmitter de-keys. The clock formed by U2A and U2C however continues running since Ve stays high. U3-11 is coupled to U5-1. U5 is a 7-stage binary counter. It is used to count the number of emergency messages transmitted. Each time U5-6 goes high another emergency message sequence is started. After five messages are sent, U5-3 goes high which resets the emergency sequence forcing Vc and Ve off.

Data Output and Radio Keying

Keying is maintained internal to U1 during any message cycle. It is controlled directly by Vc.

Data output from U2B is returned to U1-13. Data is outputted to audio input of the radio from U1-14.

Power-up

Circuits within U1 prevent the possibility of sending a digital message when power is applied to the module. Capacitor C4 couples the power supply turn-on transient into U1-3.

Miscellaneous

The resistors R2 and R3 and capacitor C3 are the feedback network for the

oscillator formed by U2A and U2C. R2 and R3 are factory selected to assure oscillation at 3200 Hz. In the event U2 fails, R3 and possibly R2 will have to be adjusted in value to reset the oscillator to 3200 ±16 Hz.

Jumper W2 is supplied as standard. Removal of W2 and addition of CR2 and R5 shortens the message duration to 240 milliseconds.

The attack delay of the GE STAR Encoder can be varied by replacement of R1 connected between U1-20 and -22.

Attack Delay Milliseconds	R1 Meg Ohms
100	0.47
200	1.0
400	2.2
600	3.3

Attack delay is factory adjusted to within 10% of nominal value at 25°C.

MAINTENANCE

Should the GE-STAR Encoder fail to operate properly, the service technician should follow the test methods of this section. Analysis of the four most probable failure modes are detailed in step by step flow charts. Charts are labeled Chart 1, No Data Transmit; Chart II, Transmits One Message Only; Chart III, Continuous Transmit.

REMOVING IC's (and all other soldered-in components) can be easily accomplished by using a de-soldering tool such as a SOLDA-PULLT® or equivalent. To remove an IC, heat each lead separately on the solder side and remove the old solder with the de-soldering tool.

An alternate method is to use a special soldering tip that heats all of the pins simultaneously.

```
┌──────────────── NOTE ────────────────┐
│                                       │
│ Since all possible failure modes can- │
│ not be anticipated, the service tech- │
│ nician should familiarize himself     │
│ with the circuit descriptions before  │
│ attempting to repair an inoperative   │
│ module.                               │
│                                       │
└───────────────────────────────────────┘
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┌──────────────── NOTE ────────────────┐
│                                       │
│ In all tests where a voltage measure- │
│ ment is required, a tolerance of ±.5  │
│ volts is implied.                     │
│                                       │
└───────────────────────────────────────┘
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┌─────────────── CAUTION ───────────────┐
│                                        │
│ Double-sided circuit boards are easily │
│ damaged when soldering is performed by │
│ inexperienced personnel.  A spring     │
│ loaded solder removal tool should be   │
│ used whenever removal of any part is   │
│ necessary.                             │
│                                        │
└────────────────────────────────────────┘
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CHART I NO DATA TRAMSMISSION

Depress PTT switch or ground pin 1 of J1. Check for 5.2 volts at pin 17 of U1. → (BAD) → Replace U1

(OK) ↓

Depress PTT switch. Check for 5.2 volts at pin 11 of U1. → (BAD) → Replace U1

(OK) ↓

Depress PTT switch. Check for 1600Hz square wave at pin 9 of U3. → (BAD) → Replace U3

(OK) ↓

Depress PTT switch. Check for square waves at pin 3 of U7. → (BAD) → Replace U7

(OK) ↓

Depress PTT switch. Check for square waves at pin 13 of U1. → (BAD) → Replace U2*

(OK) ↓

Depress PTT switch. Check for square waves at pin 14 of U1. → (BAD) → Replace U1

(OK) ↓

Check radio for proper connections and operation.

*See note on page 7

CHART II TRANSMITS ONE MESSAGE ONLY (G1 and G3)
CHART II-A TRANSMITS PTT ONLY

Initiate emergency sequence. Check for 5 messages to be sent. → (BAD) → Replace U1

OK

Initiate emergency sequence. Check for 5 volts on pin 8 of U1. → (BAD) → Replace U1

OK

Check for 5 volts on pin 13 of U3. → (BAD) → Replace U3

OK
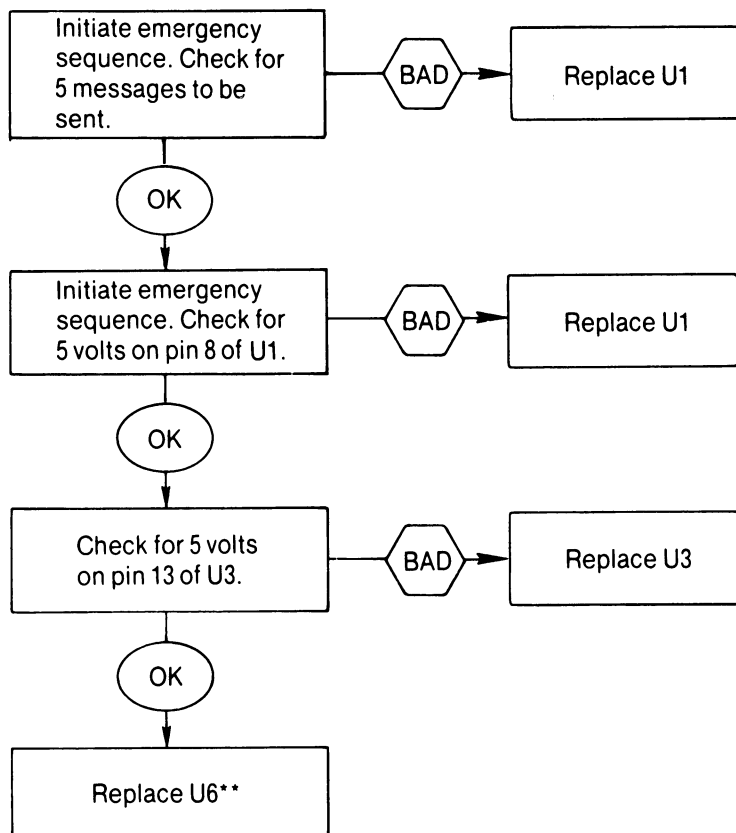
Replace U6**

CHART II-B TRANSMITS EMERGENCY ONLY (G1 and G3 only)

Depress PTT switch. Check for 0 volts at pin 8 of U1. → (BAD) → Replace U1

OK

Depress PTT switch. Check for 0 volts at pin 13 of U3. → (BAD) → Replace U3

OK
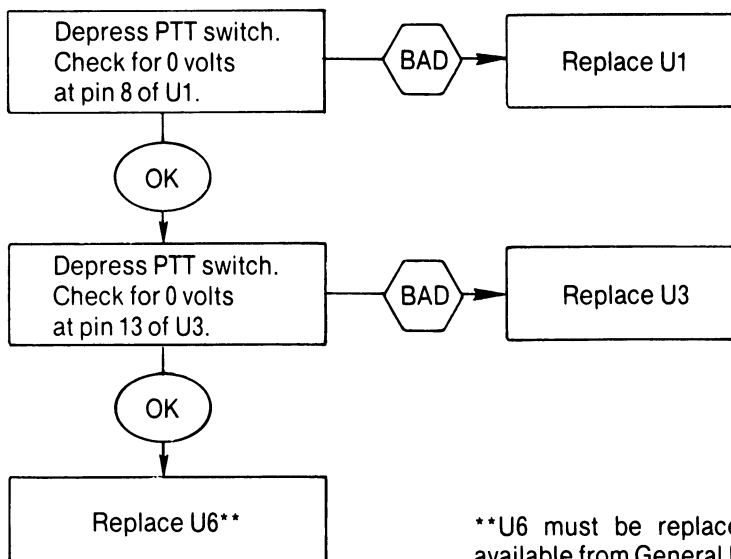
Replace U6**

**U6 must be replaced with a preprogrammed part available from General Electric Service Parts.

CHART II-C TRANSMITS ONLY ONE EMERGENCY MESSAGE ((G1 and G3 only)

```
┌──────────────────────┐
│ Unsolder one end of  │
│ jumper W1. Turn on    │            ╱BAD╲        ┌──────────────┐
│ power. Initiate       ├──────────⟨     ⟩───────▶│  Replace U3  │
│ emergency sequence.   │            ╲   ╱         └──────────────┘
│ Check for square      │
│ wave at pin 15 of U3. │
└──────────┬───────────┘
         ( OK )
           │
           ▼
┌──────────────────────┐
│ Check for 5 volts at  │            ╱BAD╲        ┌──────────────┐
│ pin 4 of U5 five      ├──────────⟨     ⟩───────▶│  Replace U5  │
│ seconds after start   │            ╲   ╱         └──────────────┘
│ of sequence.          │
└──────────┬───────────┘
         ( OK )
           │
           ▼
┌──────────────────────┐
│ Replace U1. Resolder │
│ jumper W1.            │
└──────────────────────┘
```
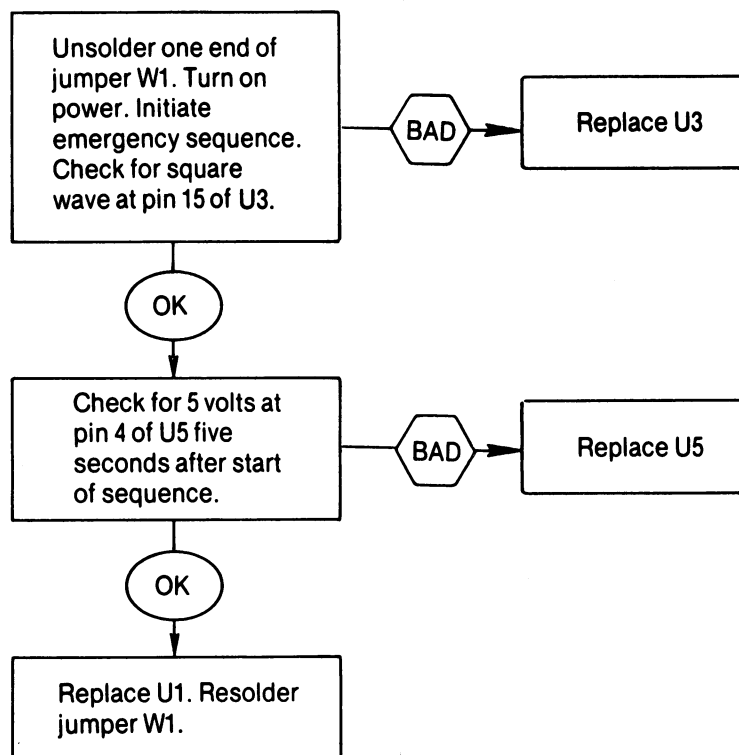
NOTE

*Replacement of U2 or C3 will require resetting of the oscillator frequency. Resistors R1 and R2 are factory selected. To reset the frequency;

    a. Select a 1% metal film resistor to bring the oscillator to within 1500 to 1616 Hz.

    b. Select a 5% composition carbon resistor to trim the oscillator frequency to within 1584 to 1616 Hz.

    Substitution of other resistor types for those specified will result in failure of the module to perform to specifications.

CHART III CONTINUOUS TRANSMIT
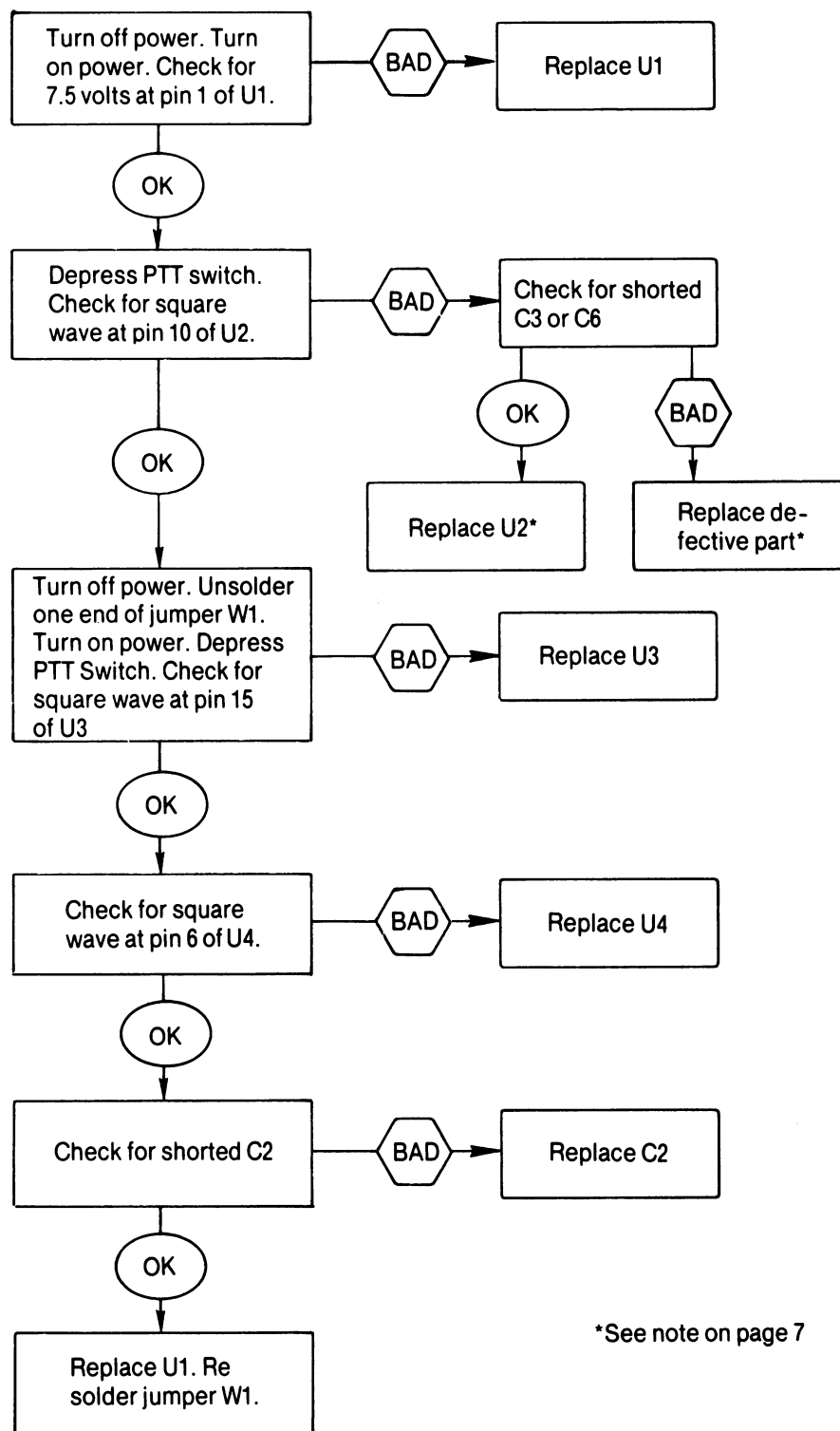
Turn off power. Turn on power. Check for 7.5 volts at pin 1 of U1.

→ BAD → Replace U1

↓ OK

Depress PTT switch. Check for square wave at pin 10 of U2.

→ BAD → Check for shorted C3 or C6

Check for shorted C3 or C6:
- OK → Replace U2*
- BAD → Replace defective part*

↓ OK

Turn off power. Unsolder one end of jumper W1. Turn on power. Depress PTT Switch. Check for square wave at pin 15 of U3

→ BAD → Replace U3

↓ OK

Check for square wave at pin 6 of U4.

→ BAD → Replace U4

↓ OK

Check for shorted C2

→ BAD → Replace C2

↓ OK

Replace U1. Re solder jumper W1.

*See note on page 7
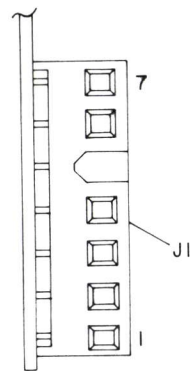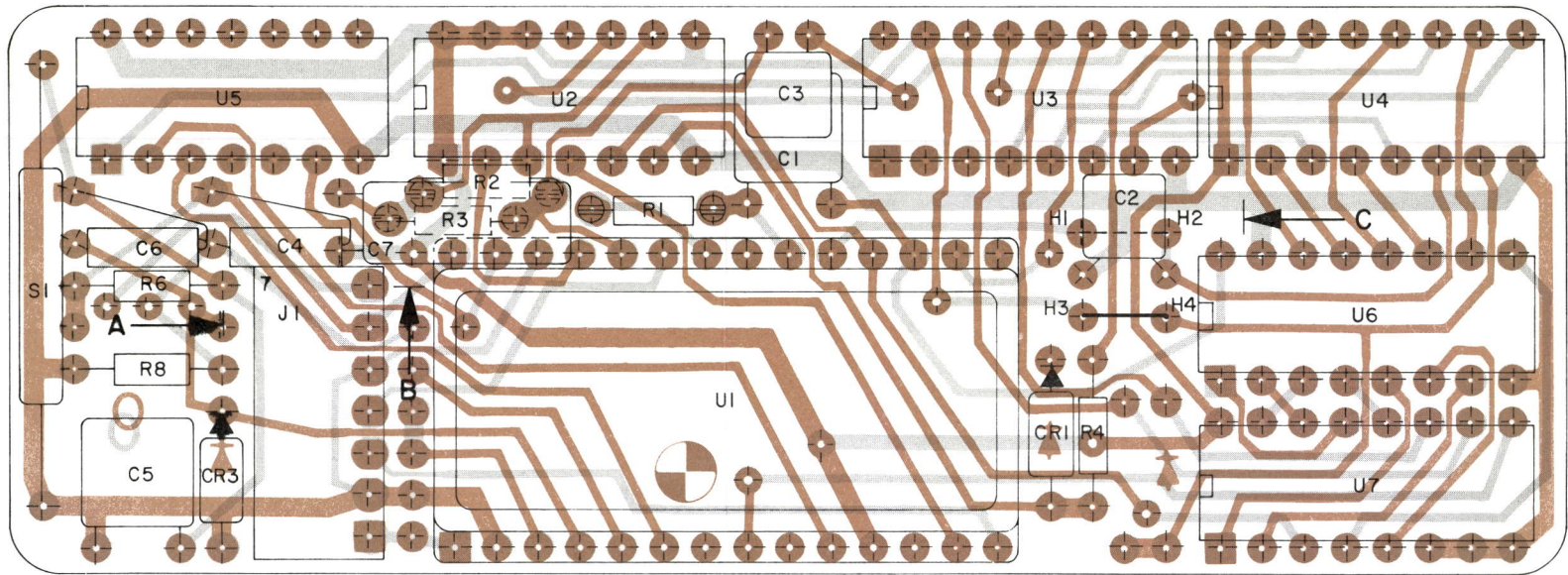
VIEW A
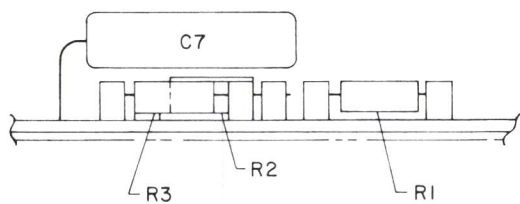
VIEW B
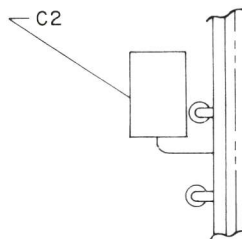
DETAIL C

(19D430717, Rev. 0)
(19D430301, Sh. 2, Rev. 0)
(19D430301, Sh. 3, Rev. 0)

SWITCH ASSEMBLE
19C327135G1, G2

RING 19A134348

SLIDE 19C327018P1 (19C327135G1)
19C327018P2 (19C327135G2)

SCREW N136AP503C

SUPPORT 19B227320P1

RETAINER 19C327019P1

PERMANET MAGNET
19A134349P2

(19C330422, Rev. 0)

OUTLINE DIAGRAM

PE GE-STAR ENCODER BOARD &
MAGNETIC SWITCH (19D430317G1-11)
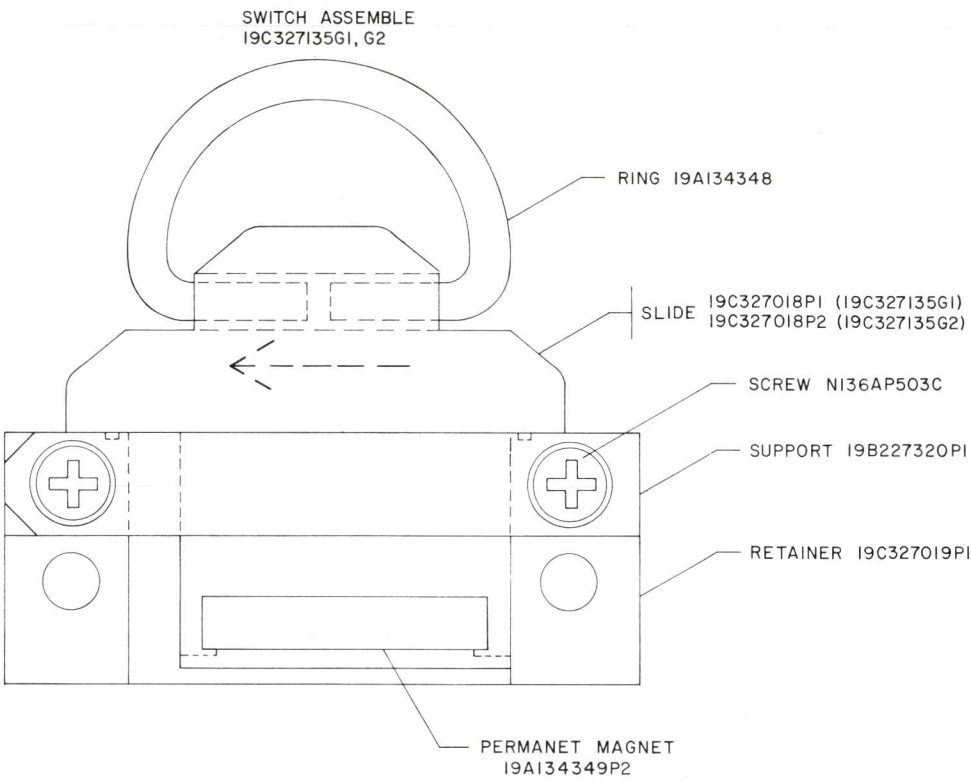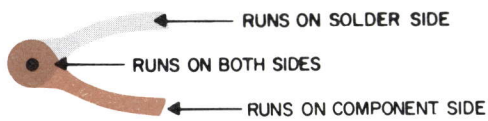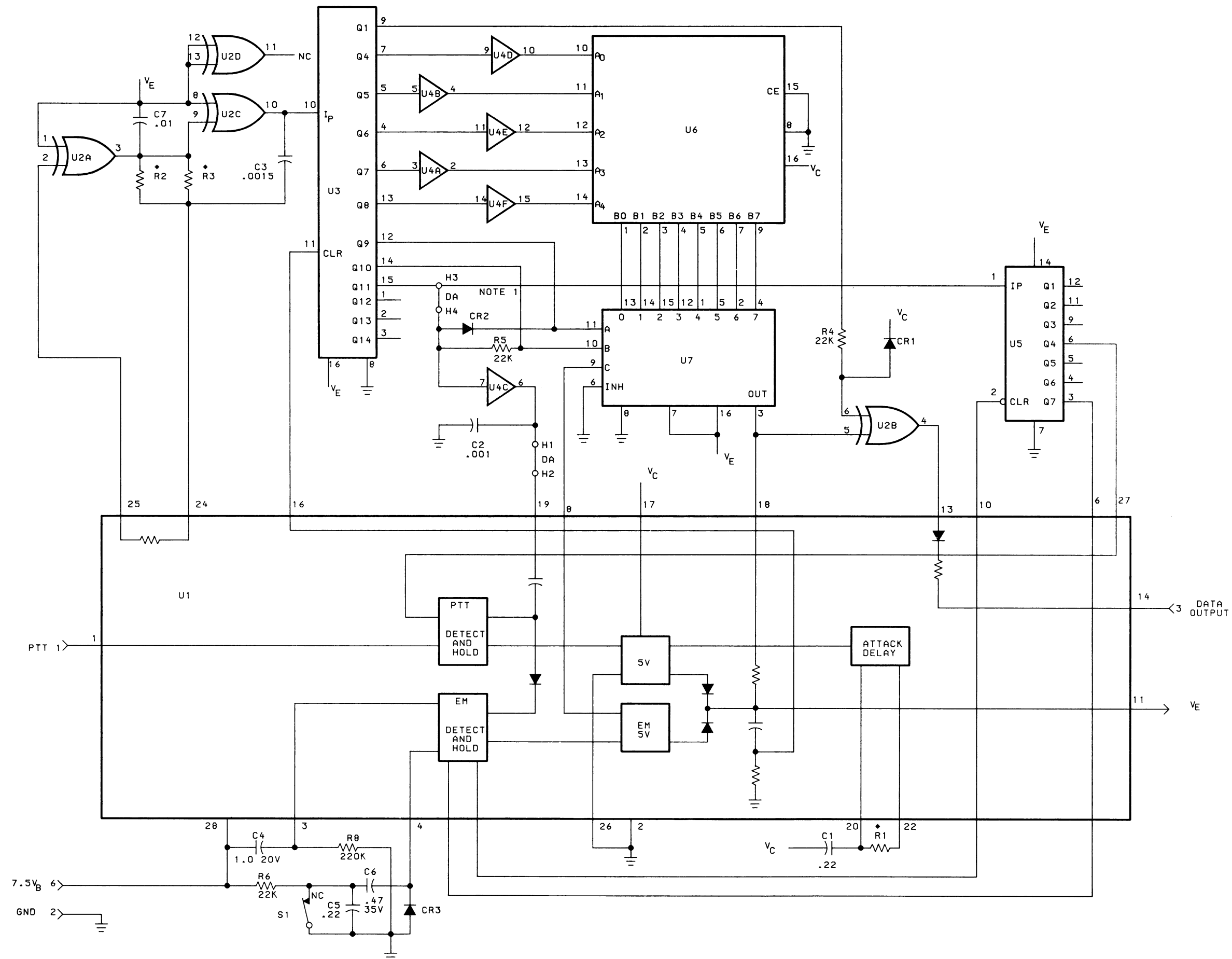
RUNS ON SOLDER SIDE
RUNS ON BOTH SIDES
RUNS ON COMPONENT SIDE

NOTES:
* ◆ VALUES SELECTED AT FINAL TEST.
1. FOR 240 MILLISECONDS MESSAGE ADD CR2 AND R5 AND REMOVE JUMPER BETWEEN H3 & H4.

POWER & GND CONNECTIONS

DEVICE	V_E PIN NO	GND PIN NO
U2	14	7
U4	1	8

ASSEMBLY	ATTK TIME	REV
19D430317G1	300 M S	
G4	100 M S	
G5	200 M S	
G6	400 M S	
G7	500 M S	

SCHEMATIC DIAGRAM

PE GE-STAR ENCODER
WITH MAGNETIC SWITCH

(19D430477, Rev. 1)

Issue 1   11

LBI30813

SCHEMATIC DIAGRAM

PE GE-STAR ENCODER
WITHOUT MAGNETIC SWITCH

12   Issue 1

ASSEMBLY	ATTK TIME	REV
19D430317G3	300 M S	
G8	100 M S	
G9	200 M S	
G10	400 M S	
G11	500 M S	

POWER & GND CONNECTIONS

DEVICE	V_E PIN NO	GND PIN NO
U2	14	7
U4	1	8

NOTES:
♦ VALUES SELECTED AT FINAL TEST.
1. FOR 240 MILLISECONDS MESSAGE
ADD CR2 AND R5 AND REMOVE
JUMPER BETWEEN H3 & H4.

(19D430479, Rev. 1)
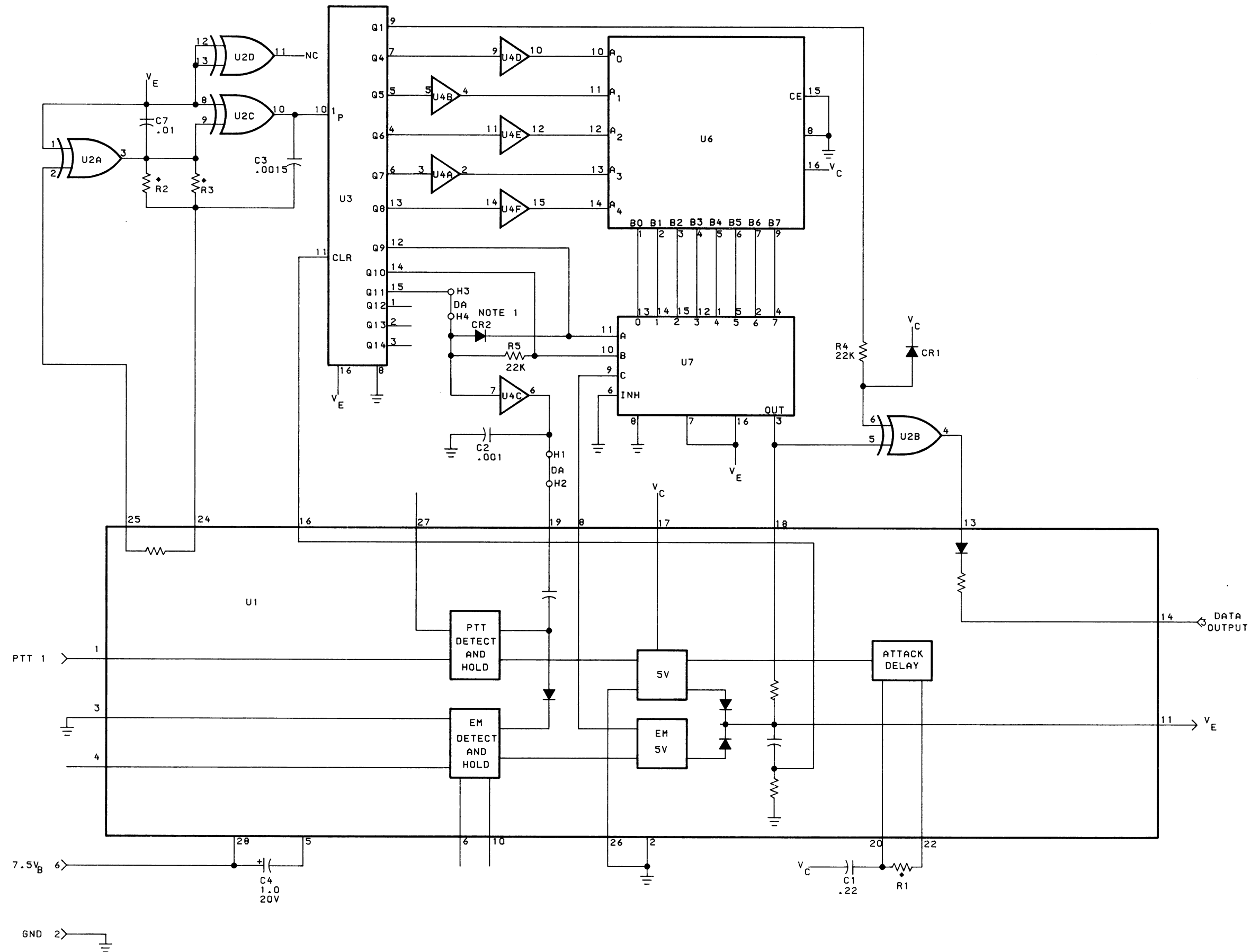
NOTES:
♦ VALUES SELECTED AT FINAL TEST.
1. FOR 240 MILLISECONDS MESSAGE ADD CR2 AND R5 AND REMOVE JUMPER BETWEEN H3 & H4.

POWER & GND CONNECTIONS

DEVICE	V_E PIN NO	GND PIN NO
U2	14	7
U4	1	8

ASSEMBLY	ATTK TIME	REV
19D430317G2	300 M S	

(19D430478, Rev. 1)

SCHEMATIC DIAGRAM

PE GE-STAR ENCODER
NO EMERGENCY MESSAGE

Issue 1   13

PARTS LIST

PE GE – STAR ENCODER ASSEMBLY
19D430317G1-G11
ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
		19D430317
		G1 300MS W/MAG SW & EM REPEAT
		G2 300MS NO EM
		G3 300MS W/EM REPEAT NO MAG SW
		G4 100MS W/MAG SW & EM REPEAT
		G5 200MS W/MAG SW & EM REPEAT
		G6 400MS W/MAG SW & EM REPEAT
		G7 500MS W/MAG SW & EM REPEAT
		G8 100MS W/EM REPEAT NO MAG SW
		G9 200MS W/EM REPEAT NO MAG SW
		G10 400MS W/EM REPEAT NO MAG SW
		G11 500MS W/EM REPEAT NO MAG SW
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116192P16	Ceramic: .22 µf ±10%, 50 VDCW; sim to Erie 8131-M050-W5R-224K.
C2	19A116192P13	Ceramic: 1000 pf ±10%, 50 VDCW; sim to Erie 8121-A050-W5R-102K.
C3	19A116288P46	Ceramic: 1500 pf ±5%, 50 VDCW; sim to Erie 8131-M50-COG-152J.
C4	5491674P28	Tantalum: 1.0 µf ±20%, 25 VDCW; sim to Sprague Type 162D.
C5	19A116192P16	Ceramic: .22 µf ±10%, 50 VDCW; sim to Erie 8131-M050-W5R-224K.
C6	5491674P27	Tantalum: .47 µf ±20%, 35 VDCW; sim to Sprague Type 162D.
C7	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	19A115661P1	Silicon, fast recovery, 225 mA.
CR3	19A115661P1	Silicon, fast recovery, 225 mA.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J1	19A138393G1	Connector, printed wiring: sim to Molex 22-15-2071.
		- - - - - - - - - RESISTORS - - - - - - - - - -
		NOTE: Selected at the time of manufacture. When reordering give GE drawing Number plus value of resistor.
R1	3R151P104J	Composition: 100K ohms ±5%, 1/8 w.
	3R151P114J	Composition: 110K ohms ±5%, 1/8 w.
	3R151P224J	Composition: 220K ohms ±5%, 1/8 w.
	3R151P474J	Composition: 470K ohms ±5%, 1/8 w.
	3R151P754J	Composition: 750K ohms ±5%, 1/8 w.
	3R151P824J	Composition: 820K ohms ±5%, 1/8 w.
	3R151P914J	Composition: 910K ohms ±5%, 1/8 w.
	3R151P105J	Composition: 1.0 megohm ±5%, 1/8 w.
	3R151P115J	Composition: 1.15 megohms ±5%, 1/8 w.
	3R151P125J	Composition: 1.25 megohms ±5%, 1/8 w.
	3R151P135J	Composition: 1.35 megohms ±5%, 1/8 w.
	3R151P155J	Composition: 1.5 megohms ±5%, 1/8 w.
	3R151P165J	Composition: 1.6 megohms ±5%, 1/8 w.
	3R151P185J	Composition: 1.8 megohms ±5%, 1/8 w.
	3R151P205J	Composition: 2.0 megohms ±5%, 1/8 w.
	3R151P225J	Composition: 2.2 megohms ±5%, 1/8 w.
	3R151P245J	Composition: 2.4 megohms ±5%, 1/8 w.
	3R151P275J	Composition: 2.7 megohms ±5%, 1/8 w.
	3R151P305J	Composition: 3.0 megohms ±5%, 1/8 w.
	3R151P335J	Composition: 3.3 megohms ±5%, 1/8 w.

SYMBOL	GE PART NO.	DESCRIPTION
R2	3R151P754J	Composition: 750K ohms ±5%, 1/8 w.
	3R151P824J	Composition: 820K ohms ±5%, 1/8 w.
	3R151P914J	Composition: 910K ohms ±5%, 1/8 w.
	3R151P105J	Composition: 1.0 megohm ±5%, 1/8 w.
	3R151P115J	Composition: 1.15 megohms ±5%, 1/8 w.
	3R151P125J	Composition: 1.25 megohms ±5%, 1/8 w.
	3R151P135J	Composition: 1.35 megohms ±5%, 1/8 w.
	3R151P155J	Composition: 1.5 megohms ±5%, 1/8 w.
	3R151P165J	Composition: 1.6 megohms ±5%, 1/8 w.
	3R151P185J	Composition: 1.8 megohms ±5%, 1/8 w.
	3R151P205J	Composition: 2.0 megohms ±5%, 1/8 w.
	3R151P225J	Composition: 2.2 megohms ±5%, 1/8 w.
	3R151P275J	Composition: 2.7 megohms ±5%, 1/8 w.
	3R151P335J	Composition: 3.3 megohms ±5%, 1/8 w.
	3R151P475J	Composition: 4.7 megohms ±5%, 1/8 w.
	3R151P106J	Composition: 10.0 megohms ±5%, 1/8 w.
R3	19A134801	Resistor metal film. Note: Selected at the time of manufacture. When reordering give GE drawing Number plus value of resistor.
	19A134801P1	Metal film: 54.9K ohms ±1%, 1/8 w.
	19A134801P2	Metal film: 61.9K ohms ±1%, 1/8 w.
	19A134801P3	Metal film: 68.1K ohms ±1%, 1/8 w.
	19A134801P4	Metal film: 75K ohms ±1%, 1/8 w.
	19A134801P5	Metal film: 80.6K ohms ±1%, 1/8 w.
	19A134801P6	Metal film: 84.5K ohms ±1%, 1/8 w.
	19A134801P7	Metal film: 90.9K ohms ±1%, 1/8 w.
	19A134801P8	Metal film: 95.3K ohms ±1%, 1/8 w.
	19A134801P9	Metal film: 100K ohms ±1%, 1/8 w.
R4 thru R6	3R151P223J	Composition: 22K ohms ±5%, 1/8 w.
R8	3R151P224J	Composition: 220K ohms ±5%, 1/8 w.
		- - - - - - - - - SWITCHES - - - - - - - - - -
S1	19A134193P1	Relay, dry reed: 1/4 amp at 100 v contact rating; sim to Gordos Corp No. MR 456.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - -
U1	19A134811P1	Hybrid: sim to Integrated Microsystems IMI 0077 Digital Hybrid.
U2	19A134097P26	Digital, Quad Exclusive-Or Gate: Identification No. 4030.
U3	19A134097P17	Digital, 14-Stage Binary/Ripple Counter: Identification No. 4020.
U4	19A134097P42	Digital, Hex Buffer/Converter (Non-Inverting): Identification No. 4050.
U5	19A134097P21	Digital, 7 Stage Binary Counter: Identification No. 4024.
U7	19A134097P43	Digital, Single 8-Channel Multiplexer: Identification No. 4051.
		- - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A134198P1	Polarity tab. (Located at J1-5).
	19A115965P8	Terminal. (Used with R1-R3).
		ASSOCIATED ASSEMBLIES
U6	19A134331P2	Integrated circuit, Programmable Read Only Memory.
	19B226627G1	Belt loop assembly.

SYMBOL	GE PART NO.	DESCRIPTION
		MOUNTING KIT
		19A136579G1 NON-SWIVEL
		19A136579G2 SWIVEL
		- - - - - - - - - CAPACITORS - - - - - - - - -
C2	19C307102P4	Tantalum: 33 µf ±20%, 10 VDCW; sim to Corning Electronics S336R-20.
	NP243580	Nameplate.
	19A136578P1	Insulator.
	19B227318P1	Cover, rear. (NON-SWIVEL).
	19B227476G1	Cover, rear. (SWIVEL).
	19C317394P7	Gasket.
	19A134425P2	Machine screw: 7/16.
	N404P8P	Lockwasher, internal tooth: No. 2.
	19A130397P1	Strap.
		MAGNETIC SWITCH ASSEMBLY
		19C327135G1 RIGHT SIDE
		19C327135G2 LEFT SIDE
	19C327019P1	Retainer.
	19B227320P1	Support.
	19A134348P2	Retaining ring.
	19A134349P2	Permanent magnet.
	N136AP503C	Tap screw, phillips POZIDRIV: No. 2-32 x 3/16.
	19C327018P1	Slide. (Left side).
	19C327018P2	Slide. (Right side).
		ENCODER INTERCONNECT CABLE
		19B227303G2
		- - - - - - - - - CAPACITORS - - - - - - - - - -
C2101	5491674P1	Tantalum: 1.0 µf +40-20%, 10 VDCW; sim to Sprague Type 162D.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P2101	19A134152P25	Connector, printed wiring: sim to Molex 22-03-2071.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R2101	3R151P222J	Composition: 2.2K ohms ±5%, 1/8 w.
R2102	3R151P123J	Composition: 12K ohms ±5%, 1/8 w.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

NOTE ORIENTATION OF MISSING PIN

SEE NOTE 1-C

COVER
19B227318P1

SWITCH (SEE NOTE 9)
19C327135G1

SCREW
19A134425P2
LK WASH
N404P8P
(2 PLACES)

NAMEPLATE
NP243580
(SEE NOTE 6

SEE NOTE 4

C2101
R2102
P2101 REF
1 2 3 4 5 6 7
PIN NUMBERS REFERENCE
R2101

CABLE
19B227303G2

ENCODER BD
(CALLED FOR ON INDEX)

INSULATOR
19A136578P1

GASKET 19C317394P6
(PARTIALLY REMOVED FOR CLARITY)

INTEGRATED CIRCUIT
19A134331P2
(CALLED FOR ON INDEX)

CONTROL UNIT CALLED FOR ON INDEX

COMPONENT SIDE SYSTEM BOARD

C1
H30
H33
H32
H34
J6

B

CR6
H87
H67

H3
H2
H1
(ON SOLDER SIDE OF BOARD)

PROM CODE NO.

SEE NOTE 7
.500
1.000

A A
.50
.40
.20

STRAP
19A130397P1
(SEE NOTE 8)

KEEP INSIDE SURFACE FREE OF GASKET ADHESIVE

SECTION 'A-A'

SEE NOTE 10
C2
R7

H5
C2
C3
C5
R7
R6
R9
Q1
E
H1
Q2
R8
B
C
H3 H2
H4
R5

VIEW B
ROTATED 90° CCW

P2101
1 PTT
2 R2101 2.2K 1/8W GND
3 C2101 1.0UF
5 R2102 12K 1/8W
7 GREEN DATA IN
4 N.C.
6 RED +7.5V
ALL WIRES SFT-28

INSTALLATION INSTRUCTIONS:

1. ASSEMBLE PWB IN COVER AS FOLLOWS:
   A) PLACE INSULATOR IN COVER.
   B) PLACE PWB IN COVER AS SHOWN. POSITION PWB AGAINST INSIDE SURFACE AT TOP.
   C) SECURE PWB IN PLACE BY NEATLY APPLYING A BEAD OF RTV (GE 118) ALONG BOTTOM EDGE AND AT EACH TOP CORNER AS SHOWN. ALLOW TO SET UP FOR APPROXIMATELY 24 HOURS. PER P15F-EA104.
   D) ASSEMBLE GASKET.

2. HOOK UP CABLE PER FOLLOWING CHART TO SYSTEMS BOARD

CONNECTION CHART			
FROM	TO	WIRE COLOR	FUNCTION
P2101-1	SYSTEM BD HOLE 87	VIOLET	PTT
P2101-2	SYSTEM BD HOLE 2	BLACK	GROUND
P2101-7	SYSTEM BD HOLE 1	GREEN	DATA IN
P2101-6	SYSTEM BD HOLE 34	RED	+7.5 VDC

3. DRESS CONNECTOR END OF CABLE AS SHOWN. NOTE ORIENTATION (PIN 5 IS REMOVED.)

4. ASSEMBLE COVER/PWB TO RADIO AND SECURE WITH EXISTING 3/16" LONG SCREWS AND LOCK WASHERS AT BOTTOM. NOTE LOCATION OF "S" BEND IN CABLE AS POSITIONED IN RADIO.

5. ALIGN SWITCH ASSEMBLY AT TOP AND SECURE WITH 2 SCREWS. SLIDE/ MAGNET ASSEMBLY TO BE IN CENTER POSITION.

6. PLACE APPROPRIATE IDENTIFICATION LETTERS IN RECESSES ON RETAINER.

7. ALIGN AND ASSEMBLE GASKET TO COVER USING ADHESIVE PER CPD PROCESS P7C-EA117P1. SHADED AREAS TO BE KEPT FREE OF ADHESIVE.

8. ADHERE STRAP TO GASKET AS SHOWN. ALIGN WITH ONE EDGE OF RELIEF NOTCH AND DIMENSION AS SHOWN. APPLICATION TOL ± .030.

9. SLIDE SWITCH WILL BE NORMALLY SET UP TO MOVE OFF CENTER SAFETY POSITION TOWARD PTT SWITCH TO PERMIT EXTRACTION.

10. ADD C2 PART OF KIT 19A136579 AS SHOWN. SOLDER TO PIN THRU H5 AND LEAD OF R7.

(19D423898, Rev. 10)

INSTALLATION INSTRUCTIONS

GE STAR ENCODER

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