

## **Technical Note Addendum**

### **Modifying the LLNL Rangefinder for Operation at 5.8GHz**

Transmitter component changes – Rev\_B

These changes replace Rev\_A changes entirely

1. Change C3 to a 47 ohm 0805 resistor
2. Delete R2
3. Delete R4
4. Delete 5nH trace inductor in shunt with output, located at SMA
5. Shunt C6 with 1000pF 0805 chip cap with ground end soldered to SMA connector
6. Add 1.2cm wire to Q1 drain and dress along ground plane towards SMA and C6 and tune by adjusting height to ground plane for a null at 5.4GHz in output spectrum.
7. Cut trace between U1 pin 2 and pin 3, and connect a 22pF 0805 chip cap between pins 2,3.
8. Add a 200 ohm resistor from U1 pin 3 to ground (sets RF pulse width).

11/18/00

## **Technical Note Addendum**

### **Modifying the LLNL Modular Rangefinder for Operation at 5.8GHz**

#### **Detailed Component Changes**

##### **Transmitter modifications**

C3=10pF

Shunt C6 with 1000pF 0805 chip cap with ground end soldered to SMA connector

C5 deleted, and replaced with 1.25cm long parallel wires (coupled-line resonators)

R4 deleted

Delete 5nH PCB trace inductor in shunt with output at SMA

Add 1.1cm wire to ground and dressed in parallel to the coupled line resonators (5.4GHz trap)

The resonators and trap should be tuned while monitoring the transmitted output on a spectrum analyzer. The resonator coupled to the GaAsFET drain fine-tunes the oscillator. All three wire resonators should be designed into the PCB as microstrips.

A brass shield was soldered over the transmitter PCB.

##### **Receiver modifications**

C8=1.5pF

C4=100pF

Delete R6 and the trace inductor connected to the ground end of R6.

Add a 4nH inductor between C6 and CR1 (input matching at 5.8GHz)

Set switch S1 open

CR1= HP HSMS 286F (lower cost)

A brass shield was soldered over the receiver PCB.

##### **Timing module modifications**

C19=.022uF NPO ceramic (lower dielectric absorption than a film capacitor)

C20,21= .01uF NPO ceramic

R18=100K

R15=10K

R17=2.2M

R37, 42, 45 = 470

R32=330K

C26=1uF

C27=.01uF

C28=560pF

C31=47pF

Shunt C51 with 1000uF, 6V Al electrolytic

Inadequate decoupling from on-board digital counters was creating excessive jitter at 60ft range.

R20 trimpot, adjust for max

U10,11,19,20 = TS272

The original TLC2262 op amps were dropping out on the cold temperature end. It is not clear whether this is a batch dependent problem with these op amps or whether the problem shows up at longer delays.

Tantalum thin film 8-resistor network (BI Technologies series 668A, available from Mouser at \$3.10 each in unit quantities):

R28=10K network

R31=10K network

R32=30K network (3 in series)

R29=5K network (2 in parallel)

One network resistor is left for making changes to R28,29,31,32 for scale factor changes, as desired.

### **Signal processor modifications**

Select jumper JP1 for envelope detection

Cut connection to U2 pin 6 (STC proportional to range)

C43=.01uF

C37=0.1uF

C31, 32=0.2uF

R57=10K

R64=33K

R65=15K

Add .01uF in shunt with R55 (second order envelope detector filtering)

U12=TS271 (original op amp, CLC401, is too drifts for slow risetime signals).

Stretch reset pulse:

R56=1meg

Shunt R56 with a 220 ohm in series with a 1N4148 diode, anode facing U9A

Connect .01uF from U9A pin 1 to gnd

### **Antenna modifications**

Remove three damping resistors, and ensure that the feed section geometry is configured for 50 ohms.

REVISIONS					
ZONE	LTR	DESCRIPTION	DATE	DRAWN	APPROVED
/	0A	REVERSED INPUTS ON U2A	5/96	LUM	
/	0B	DEL 01R5, ADDED CR3, U1E	6/96	RDS	
/	0C	CH, CR1, MISC. CHANGES	7/96	RDS	

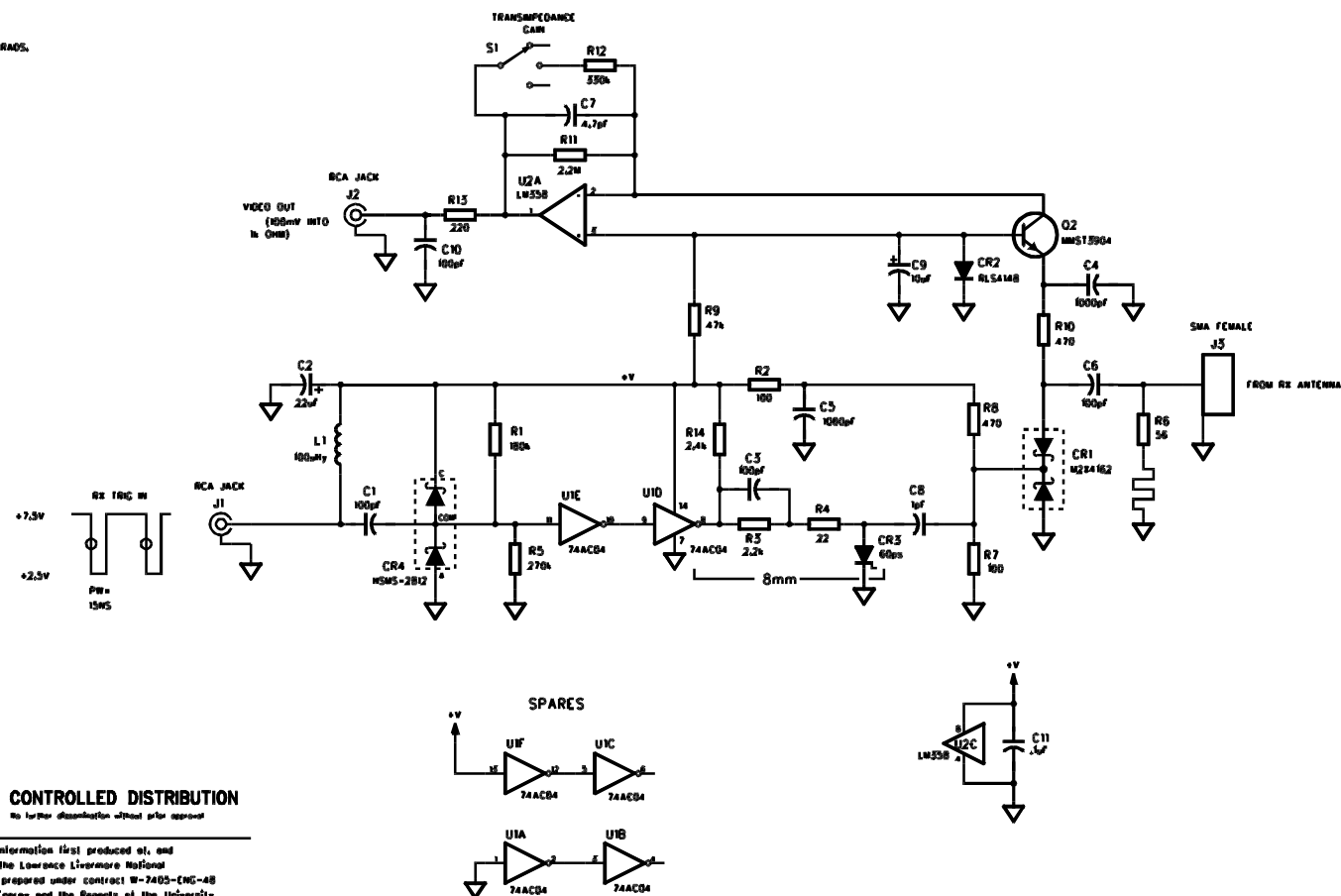
# NOTES: UNLESS OTHERWISE SPECIFIED:

## 1. FOR REFERENCE SEE:

LEA96-261732 ASSY  
LEA96-261734 PWB  
LEA96-261733 P/L

## 2. ALL RESISTOR VALUES ARE IN OHMS.

## 3. ALL CAPACITOR VALUES ARE IN MICROFARADS.



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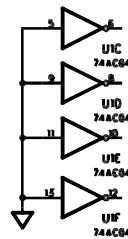
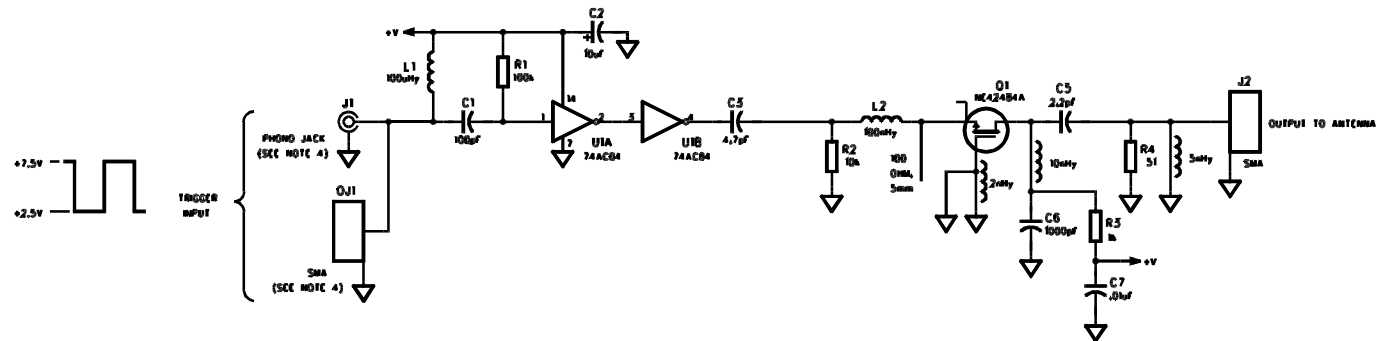
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DIMENSIONS IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES		DO NOT SCALE FROM DRAWING		APPROVALS ORIGINATOR P. WELSH 3/96 DRAWN M. LUM 3/96 CHECKED APPROVED		SIZE CAGE CODE DRAWING NUMBER REV C 14067 LEA96-261731 -0C	
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**NOTES: UNLESS OTHERWISE SPECIFIED:**


1. FOR REFERENCE SEE:  
LEA96-261762 ASSY  
LEA96-261764 PWB  
LEA96-261763 P/L
2. ALL RESISTOR VALUES ARE IN OHMS.
3. ALL CAPACITOR VALUES ARE IN MICROFARADS.
4. RIGHT ANGLE PHONO PLUG OR EDGE LAUNCH SMA  
MAY BE USED (BUT NOT BOTH).

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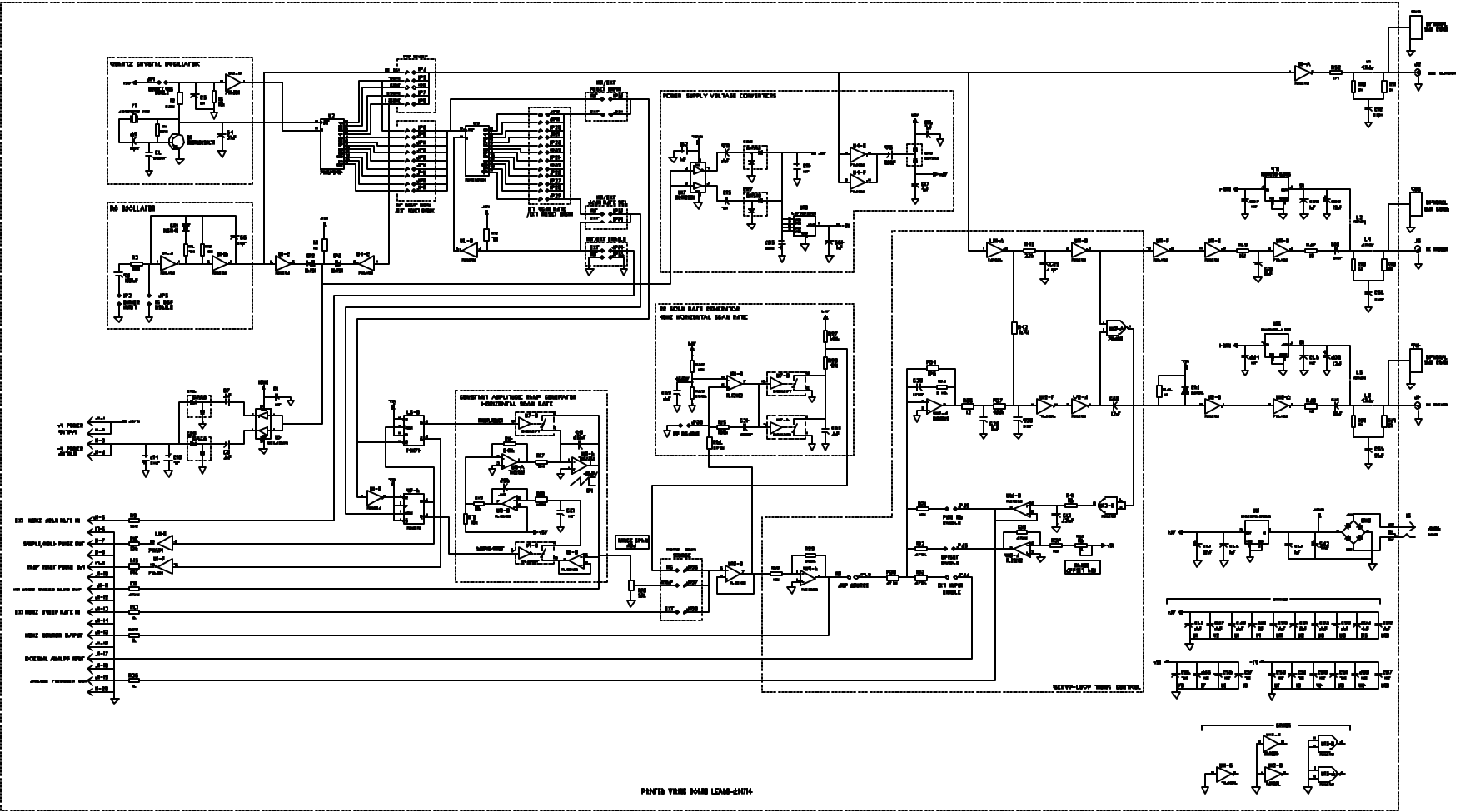
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			DIMENSIONING AND TOLERANCING IAW ANSI Y14.5M-1982	CONTRACT NO.	TITLE  <b>50 OHM PULSED RF TRANSMITTER - 6.5 GHz C.F. RADAR TECHNOLOGY - MODULAR MIR IMAGING DETECTION PROGRAM</b>					
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			CADD INFO	APPROVED						
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						SHEET 1 OF 1				

- NOTES: LAMAR SYSTEMS SPECIAL
- 1. FOR INVERTER USE:  
LEAD-26710 45W  
LEAD-26714 10W  
LEAD-26716 1/2 W
  - 2. ALL RESISTOR VALUES ARE IN OHMS
  - 3. ALL CAPACITOR VALUES ARE IN MICROFARADS

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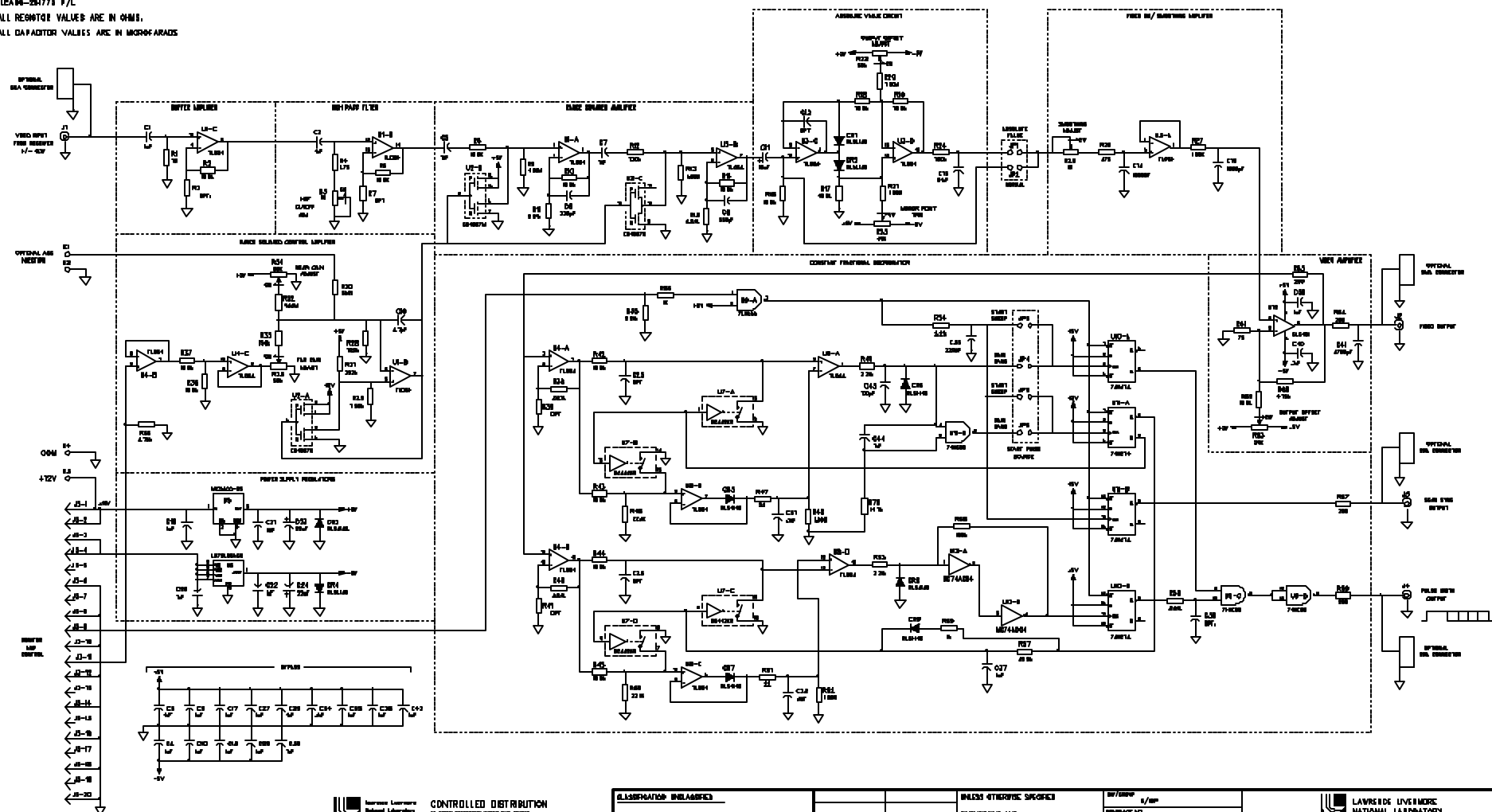
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1 FOR REFERENCE SEE:  
LEAD-2B4772 ASSY  
LEAD-2B4774 PWB  
LEAD-2B4778 P/L

2. ALL RESISTOR VALUES ARE IN OHMS.

3. ALL CAPACITOR VALUES ARE IN MICROFARADS

REVISIONS					
ZONE	LTR	DESCRIPTION	D/W	D/M/Y	APP'D
/	04	ADD FALSB CHANGES	0/00	000	
/	00	ADDED SOME OF THE SUPPLY WHEN CHANGING	0/00	000	



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 ANSI Y14.5M-1987

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NAME	DATE
R. BALLIM	5/

DATE	
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ANALOG SIGNAL PROCESSING BOARD  
RADAR TECHNOLOGY - MODULAR W/IN  
IMAGING DETECTION PROGRAM

SIZE	PAK CODE	DRUM NUMBER	REMARKS
D	14D67	LEA96-261771	D

**PAGE 1**

TITLE CLASSIFICATION UNCLASSIFIED