MORSE IDENTIFIER MODULE

MODEL TLN640-CDX

(Ref. Dwgs: 63D06059S
31H01333S)

GENERAL DESCRIPTION

The Motorola Morse Identifier Module, model TLN640-CDX is a specially designed module intended for use in MSR2000 type base stations and repeaters.

The TLN640-CDX can be jumpered to operate in many modes, depending on the particular application. Refer to the detailed description and the jumper tables for information on operation and possible mode jumper configurations.

2. DETAILED DESCRIPTION

Refer to drawing 63D06059S. The transmission cycle of the module is initiated whenever pin 9 or pin 13 of U1 is pulsed high. A momentary high on one of these inputs sets the bi-stable U1. If pin 2 of U3 is high (a wait condition does not exist) the high at pin 1 of U3 is inverted to produce a low on U3 pin 3. The low at pin 3 of U3 is applied to pin 3 of U5 and inverted. The low-to- high transition at pin 2 of U5 is applied to pin 13 of U2 and pin 12 of U2 via C3 and R6. The transmission delay timer, U2 delays the pulse from 0 to 20 seconds (adjustable via RV51). A low-to-high transition applied to pin 3 of U1B sets the flip-flop switching pin 1 of U1B high and pin 2 of U1B low.

If JU11 is jumpered AC, a low is applied to the base of Q4, turning it off during ID transmission. If JU11 is jumpered AB then Q4 is on during the ID transmission. Normally, JU11 is jumpered AB to provide a switched low at edge connector pin 22 to disable PL (Private-Line) during transmission.

The high at pin 1 of U1B is also applied to pin 14 of U7 where it is buffered. The high at pin 15 is then applied to the bases of Q3, Q5 and Q6, turning these transistors on. The switched low at the collector of Q3 is used to turn on LED DS2 for the duration of the ID transmission. The switched low from the collector of Q5 is applied to edge connector pin 21 to provide a RPTR PTT (Repeater Push-to-Talk) which is normally used to key the transmitter of the station.

In certain applications it may be necessary to provide a T1 OSC (Transmit 1 Oscillator) ground. The switched low at the collector of Q6 is available at pin 17 of the edge connector.

Integrated circuit U12 is an astable oscillator whose frequency is determined by potentiometer R25, and is used as a clock for the 4-bit binary counter U10 which counts from 0000 binary to 1111 binary. The outputs of U10 (pin 11, 12 and 13) control which input of U9 (pin 1, 2, 3, 4, 5, 6, 7, 9), an eight-input data selector, is connected to the output, pin 14 U9. When U10 has counted to 1111 binary, it starts again at 0000 binary and sets a carry bit at pin 15. This carry bit is connected to the clock input of U6, a 7-bit binary counter of which only 5 or 6 bits (jumper selectable by JU13 and JU3) are used. Counter U6 was originally set to zero. When the clock signal switched low, the count was updated.

The outputs of U6 are buffered by U7 to provide the 5-bit address information for the programmable read only memory (PROM) U8. When U6 has counted 16 carry bits, pin 3 switches high. If JU3 is jumpered AC, the high output is applied to pin 5 of the OR gate U4B. The high output of U4B is applied to the reset

input on U1A, and the reset input on U1B (via OR gate U4A). Similarly, if JU3 is jumpered AB, 32 carry bit pulses will be counted before resetting bistables U1A and U1B.

Whenever the output of U9 is high, Q1 saturates illuminating LED DS2 and turning on the 1.5 kHz astable oscillator, U11. The output of U11 is a square wave which is coupled to the exciter input of the transmitter via edge connector pin 9 and R19, R20 and R21. The square wave output level is adjusted by potentiometer R19. The square wave is used as the audible tone for the morse call sign.

The TLN640-CDX Morse Identifier Module also incorporates additional circuitry which allows triggering, resetting and attenuating of the morse ID for a given application using jumpers. Table 1 and 2 gives the jumper location for various modes of operation.

TABLE 1

JU1	AB	HIGH ON ENCODE INPUT PIN 14 ENABLES ID TRANSMISSION
	AC	LOW ON ENCODE INPUT PIN 14 ENABLES ID TRANSMISSION
JU3	AB	FOR 256 BITS
	AC	FOR 128 BITS
JU4	SEE TABLE 2	
JU5	SEE TABLE 2	
JU6	SEE TABLE 2	
JU7	SEE TABLE 2	
JU8	SEE TABLE 2	
JU9	SEE TABLE 2	
JU10	AB	IF INTERTRANSMISSION TIMER NOT USED (SEE TABLE 2)
	AC	IF INTERTRANSMISSION TIMER USED (SEE TABLE 2)
JU11	AB	PL DISABLE OUTPUT LOW DURING 1D TRANSMISSION
	AC	PL DISABLE OUTPUT HIGH DURING 1D TRANSMISSION
JU12	IN	FOR ID ATTENUATION DURING ID TRANSMISSION
	OUT	FOR NO ID ATTENUATION DURING ID TRANSMISSION
JU13	AB	SENDS LOWER 128 BITS (JU3 MUST BE AC)
	AC	SENDS HIGHER 128 BITS (JU3 MUST BE AC)
JU14	AB	FOR QUIETING IND
	AC	UNSQUELCH IND
JU15	SEE TABLE 2	

NOTE: On early version boards JU2 must be in position AB.

TABLE 2

MODE OF OPERATION	JU4	JU5	JU6	JU7	JU8	JU9	JU10	JU11
SEND ID AFTER LINE PTT, LOCAL PTT OR RPTR PTT. ID TRANSMISSION IS RESET BY A PTT. (INTERTRANSMISSION AND INACTIVITY TIMER NOT USED)	AB	AB	AB	AC	AB	AC	AB	AC
SEND ID EVERY 30 MINUTES, ID TRANSMISSION IS NOT RESET BY A PTT, QUIETING INDICATOR OR UNSQUELCHED INDICATOR	AB	OUT	AC	AB	AC	AC	AC	AC
SEND ID EVERY TIME THERE IS A PTT, PROVIDED 15 MINUTES HAS ELAPSED	AB	OUT	AC	AB	AC	AD	AB	AB
SEND ID ON EVERY PTT, (INTERTRANSMISSION & INACTIVITY TIMER NOT USED	AB	AC	AC	AB	AC	AC	AB	AC
SEND ID ON EVERY PTT, (INTERTRANSMISSION & INACTIVITY TIMER NOT USED, NO ID RESET)	AB	AB	OUT	AB	AC	AC	AB	AC
SEND ID EVERY 30 MINUTES, RESET AND WAIT IF A PTT, UNSQUELCHED INDICATION OR QUIETING INDICATION OCCURS DURING ID TRANSMISSION. ID IS THE RETRANSMITTED 0-20 SECONDS (ADJUSTABLE) AFTER THE INTERRUPT CONDITION HAS CLEARED	AB	AC	AB	AC	AB	AC	AC	AB
SEND ID EVERY 30 MINUTES, UNLESS PIN 3 IS HIGH, IF PIN 3 IS HIGH, RESET AND WAIT UNTIL IT SWITCHES LOW. ID IS THEN TRANSMITTED 0-20 SECONDS (ADJUSTABLE) AFTER PIN 3 SWITCHES LOW	AB	AB	AB	AB	AD	AC	AC	AD

ID transmission may be initiated several ways, depending upon the application and jumper status. Activating the test switch S1, momentarily switches pin 12 of U3C low, switching pin 11 high. The high on pin 11 is then applied to pin 9 of OR gate U4D. The output of OR gate U4D is then applied to pin 9 of flip- flop U1A, setting up the ID transmission sequence.

Similarly, a momentary high (or low, depending on the position of JU1) is applied to pin 13 of NAND gate U3C, which again sets up the transmission sequence.

Flip-flop U1A can also be set by a momentary high on the clock input, pin 13. This high can be generated by a switched hi or switched low at edge connector pin 19, 3, 8 or 2 (depending upon the position of JU5). If JU5 is out, pin 13 of U1A is held low.

An inactivity timer U13 and an intertransmission timer U14 can also be used to initiate ID transmission. The inactivity timer is normaly set for 15 minutes and the intertransmission time is normally set for 30 minutes. These timers may or may not be used depending upon the application and jumper status. Refer to Table 1 and Table 2 for jumper status when these timers are used.

Once the ID transmission sequence has begun (i.e., U1A has been set) it is possible to interrupt and reset the ID transmission by a switched high at pin 2 of NAND gate U3A. This will not reset U1A, thus allowing the ID transmission to begin again after the interrupt condition has cleared. The interrupt condition can be initiated by a switched hi or low at edge connector pins 19, 3, 8, 2, 20 or 4. Refer to Tables 1 and 2 for particular applications.

It is also possible to attenuate the ID transmission level by an adjustable amount (R23 adjusts this level) if an interrupt condition occurs during an ID transmission. The interrupt condition can be a switched low at edge connector pin 20 or a switched high at edge connector pin 4 depending upon the jumper configuration.

Programmable Read Only Memory

The integrated circuit U8 is a field programmable 256 bit, read only memory, organized as 32 words of 8 bits each. Data can be electronically programmed as desired, at any of the 256 bit locations. Prior to programming, the memory contains a high logic level output at all 256 bit locations. The programming procedure open circuits metal links which result in a low-logic level output at selected locations. The procedure is irreversable, and once altered, the output for that bit is permamently programmed to provide a low logic level.

Programming

The PROM is programmed such that the bit pattern in the PROM represents the station call sign in morse code. One high level "1" represents a "di" whereas three ones "111" represents a "dah". One "0" or low logic level is used as a space between successive "1"s or "di"s while three zeros "000" represents an inter-character space.

The rest of the circuitry scans through the "1"s and "0"s in sequence, gating on "1" and off "0", an audio oscillator. The oscillator output is the morse representation of the station call sign. The speed at which the memory is scanned determines the rate at which the call sign is transmitted.

The chart included with each module shows the "1", "0" representation of each character in the alphabet and each numeral. It also shows where each bit is programmed in the PROM U2.

3. INSTALLATION

The TLN640-CDX Morse ID Module is intended to be factory or field installed in Motorola MSR2000 Base and Repeater Stations. The Morse ID Module should be installed in the last position in the chassis, ie. closest to the left hand side when looking at the radio from the front (position 12). Installation instructions have been included for most standard applications. Additional jumpers may be required for certain special applications, in which case this information will be included in the station manual.

The following jumpers, JUSP1 and JUSP2, must be added in all stations.

JUMPER	MSR2000	
	FROM	*TO*
JUSP1	POS 12-9	POS 5-18
JUSP2	POS 12-21	POS 7-18

The following additional jumpers should be added if the function listed is required for the particular application.

FUNCTION	JUMPER	MSR2000 FROM	MSR2000 TO
R1 Unsquelched Indicator	JUSP3	POS 12-4	POS 7-5
Quieting Indicator (For Repeaters Only)	JUSP4	POS 12-20	POS 7-9
PL Disable	JUSP5	NOT REQUIRED	NOT REQUIRED
Remote Repeater P-T-T	JUSP6	POS 12-3	POS 7-15

4. ADJUSTMENTS

1) Remove IC U8 and key the station by grounding the RPT PTT pin. Adjust level control R19 for desired transmitter deviation (normally $\pm$3 KHz).

2) Inject an unmodulated RF signal into the receiver input. Adjust RV3 for desired deviation. This will be the level the identifier drops to when the repeater is in use at the same time the call sign is being transmitted.

3) Adjust R51 for the desired transmission delay time (0-20 seconds).

4) Replace IC U2. Press the test button and adjust RV2 for the desired speed of the transmission which should be monitored on a receiver.

PROGRAM CHART

ADDRESS					OUTPUT							
E	D	C	B	A	0	1	2	3	4	5	6	7
0	0	0	0	0								
0	0	0	0	1								
0	0	0	1	0								
0	0	0	1	1								
0	0	1	0	0								
0	0	1	0	1								
0	0	1	1	0								
0	0	1	1	1								
0	1	0	0	0								
0	1	0	0	1								
0	1	0	1	0								
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1	1	1	0	0								
1	1	1	0	0								
1	1	1	1	0								
1	1	1	1	1								

CODE

A	10111000
B	111010101000
C	11101011101000
D	1110101000
E	1000
F	101011101000
G	111011101000
H	1010101000
I	101000
J	1011101110111000
K	111010111000
L	101110101000
M	1110111000
N	11101000
O	11101110111000
P	10111011101000
Q	1110111010111000
R	1011101000
S	10101000
T	111000
U	1010111000
V	101010111000
W	101110111000
X	11101010111000
Y	1110101110111000
Z	11101110101000
O	11101110111011101110111000
1	10111011101110111000
2	1010111011101110111000
3	101010111011101110111000
4	10101010111000
5	101010101000
6	11101010101000
7	1110111010101000
8	111011101110101000
9	11101110111011101000

parts list
TLN640-CDX

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R51	18-83452F23	Potentiometer, 500k
C1,6,8	21-82428B07	Capacitor, .01uF, 500V, Ceramic
C2,3,5, 11,12	23-82397D26	Capacitor, .1uF, ±10%, 35V
C4	23-84538G15	Capacitor, 7uF, ±10%, 15V
C7	08-82905G07	Capacitor, .1uF, ±10%Mylar
C9	23-82397D28	Capacitor, 47uF, ±20%, 20V Tantalum
C15	23-82397D36	Capacitor, 1uF, ±10%, 20V Tantalum
C13	23-82397D26	Capacitor, 1uF
C14	23-82397D36	Capacitor, 1uF, Tantalum
C16,17	08-82905G11	Capacitor, .22uF, Mylar
CR1-CR12	48-82392B03	Diode, Silicon
DS1,2	40-00003S	LED
Q1,3,4,5	48-869592	Transistor, NPN Darlington
Q2,7,8	48-869570	Transistor, NPN
Q6	48-869567	Transistor, NPN
U8	09-00035S01	IC Socket
	43-82721C01	Grommet (1 req'd)
	03-1943	Screw, 4-40 x 5/16 (2 req'd)
	43-84071C03	Captive Nut, 4-40 (2 req'd)
	45-83914G01	Nylon Guides (2 req'd)
	09-83497F01	8-Pin Connector (3 req'd)
S1	43-82721C01	Switch, Momentary (1 req'd)
U1	51-82884L10	I.C. MC14027
U2	51-82884L53	I.C. MC14538
U3	51-82884L05	I.C. MC14011
U4	51-84371K94	I.C. MC14071
U5	51-82884L02	I.C. MC14049
U6	51-82884L59	I.C. MC14040
U7	51-82884L01	I.C. MC14050
U8	51-82848M48	256 Bit PROM
U9	51-0004S01	IC MC14512
U10	51-0004S02	IC MC14161
U11,12	51-84320A45	I.C. 555 Timer
U13,14	51-82884L57	I.C. MC14541
U15	51-84320A47	Regulator, 5-Volt
R8,9,10, 11,12,13, 14,15	06-185A97	Resistor, 100k, 5%, 1/8W
R18	18-83083G04	Potentiometer, 1k
RV25	18-83311K08	Potentiometer, 50k
RV23	18-83311K03	Potentiometer, 1k
	84-00648S	PC Board
	64-01091S	Front Panel
	04-82418B89	Nylon Washer (2 req'd)
JU1,2,3, 4,5,6,7, 10,11,13, 14	28-84528K17	Plug, 4-pin
JU8,15	28-84528K16	Plug, 6-pin
JU9	28-84528K15	Plug, 8-pin
JU12	28-84528K23	Plug, 2-pin
JU1-15	09-84181L01	Jumper
	84-00648S	P.C. Board

NOTE 1: ALL UNLISTED RESISTORS ARE 5%, 1/4W

TOLERANCES UNLESS OTHERWISE SPEC.		INCHES	MILLIMETRES
ONE PLACE	(0.0)		±0.3
TWO PLACE	(0.00)	±.01	±0.13
THREE PLACE	(0.000)	±.005	–
HOLE DIA. VARIATION		±.003	±0.08
ANGULAR DIM.		±1°	±1°

SCALE — ALL DIMENSIONS IN MILLIMETRES/IN
DO NOT SCALE DRAWING.

+13.6V
DS1
R28 1K
Q1 M9592
R16 47K
+5V
256 BIT PROM
R8 100K R9 100K R10 100K R11 100K R12 100K R13 100K R14 100K R15 100K
U7
U8
U9 MC14512
U11 555
R17 820Ω
R18 4.7K
ASTABLE 1.2 KHz
C6 .01
C7 0.1
MC14050
JU3
JU
R22 680Ω
C10 47μF
9 MIC HI
RV19 1K
R20 750Ω
JU12
RV23 1K
ATTENUATION
R24 10K
Q2 M9570
U10 MC14161
R52 470Ω
R25 50K SPEED
R26 2.2K
U12 555
CLOCK
C8 .01
C9 33μF
22 PL DISAB
CR4
Q5 M9592
21 RPTR PT
R31 47K
U36
JU10
DS2
R27 1K
Q3 M9592
R29 47K
R30 47K
Q4 M9592
Q6 M9567
R32 10K
17 T1 OSC GN
18 TX OSC GN INPUT
1 - GND
12 +13.6V
MC14541
U14
R47 Rtc (12K)
R48 Rc (22K)
C14 Ctc (1μF)
TRANSMISSION ER NOTE 2)
U5d
R49 470K
U16 7805
C15 4μF
C16 .22
C17 .22

ISSUE	REVISION	DATE	APP'D
J	REVISED	JULY 5/83	
H	ADDED NOTES 5 & 6	8 SEPT '83	
G	R24 WAS 100K, C12 WAS 1μF REVISED M9592 VIEW & NOTES	25 JULY 83	
F	PINS 17 & 22 REVERSED. C17 DELETED JU2	JULY 18 83	
E	REVISED (VALUE OF R25)	JULY 5/83	
D	R53 ADDED.	JUNE '83	
C	REVISED	14 FEB 83	
B	REVISED	2 JAN '83	
A	REVISED	15 DEC 82	
O	ORIGINAL	MAY 27/82	

FOLLOWS: TIME (MIN) ≈ 1250 (Rtc Ctc) # RC ≈ 2 Rtc
FOLLOWS : TIME (MIN) ≈ 2500 (Rtc Ctc) # RC ≈ 2 Rtc

JUMPER INFORMATION

JUST THE TRANSMISSION DELAY TIME
O SECONDS
ONS.
IONS.

TOP VIEW
M9592
E C B
7805
1 2 3
FRONT VIEW

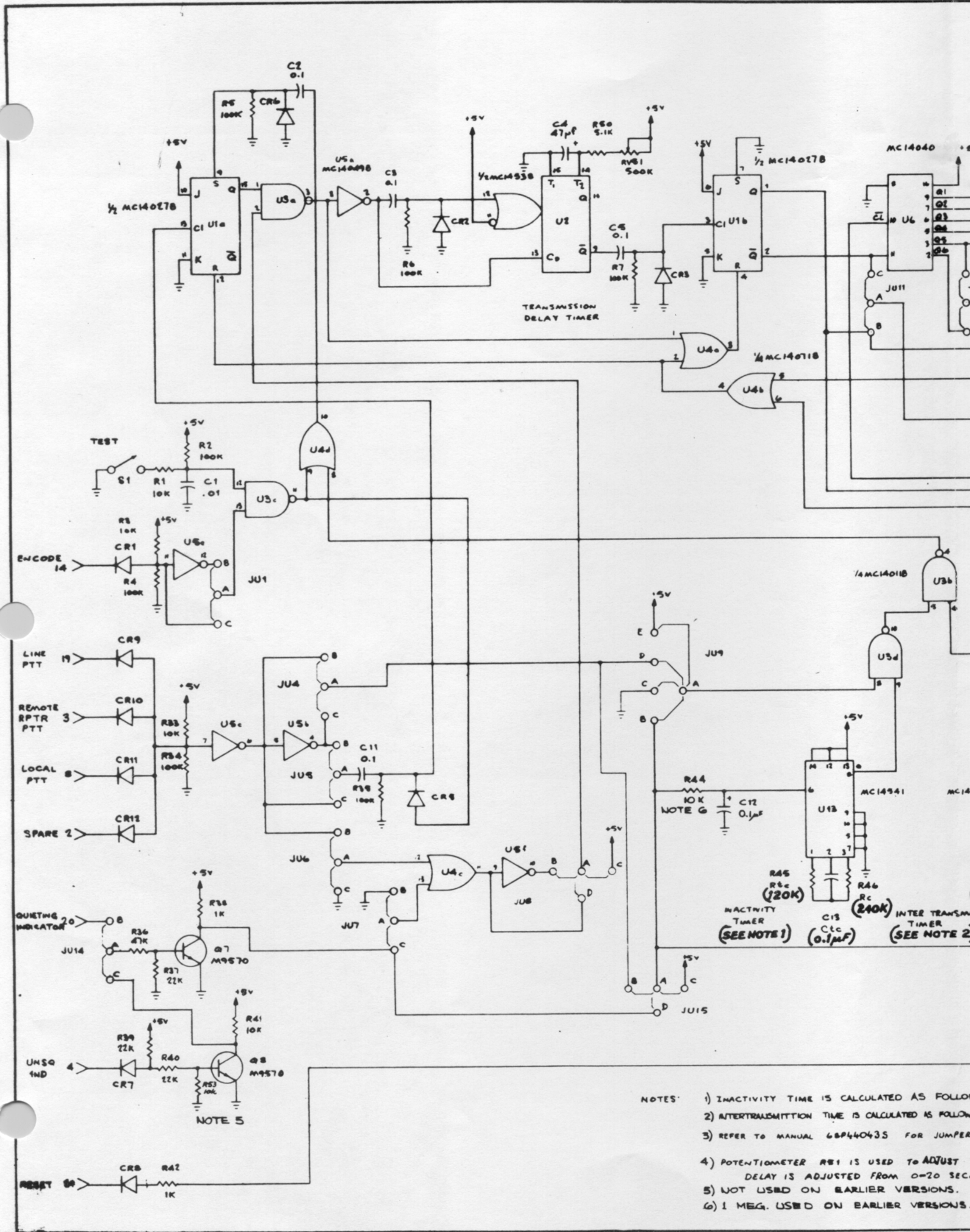
MORSE IDENTIFIER MODULE
MODEL TLN640-CDX

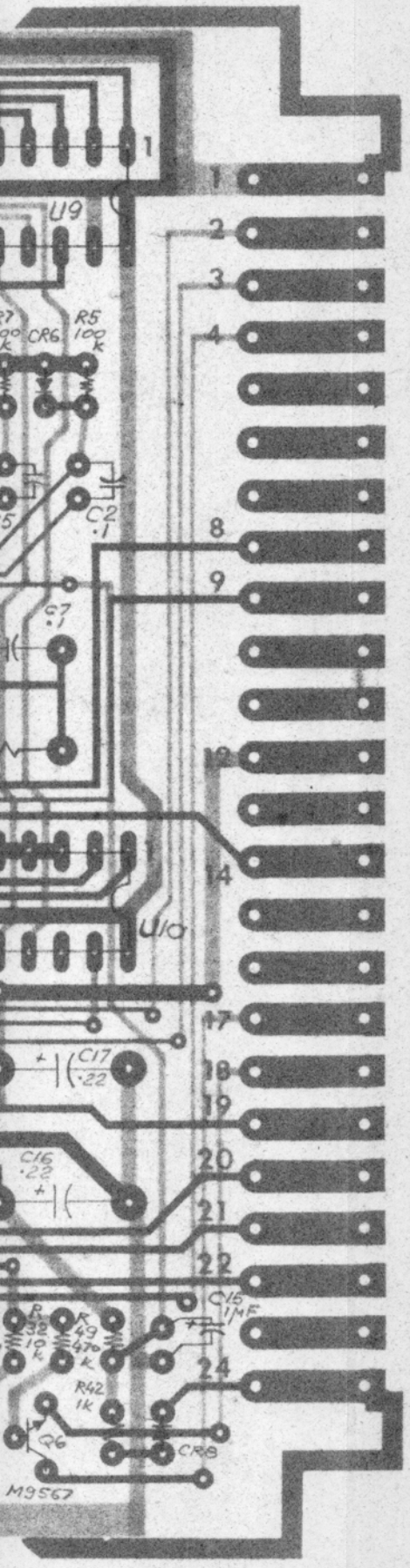
F.D.F.

REF.DWGS.
3ICO01333S

COMMUNICATIONS DIVISION
MOTOROLA CANADA LTD.
WILLOWDALE CANADA

DWN.	CKD.	DWG.NO.
JOHN DIGWEED		63D06059S


TRANSMISSION DELAY TIMER
INACTIVITY TIMER (SEE NOTE 1)
INTER TRANSM TIMER (SEE NOTE 2)
QUIETING INDICATOR
UNSQ IND
RESET
ENCODE 14
LINE PTT
REMOTE RPTR PTT
LOCAL PTT
SPARE
TEST
NOTE 5
NOTES:
1) INACTIVITY TIME IS CALCULATED AS FOLLO
2) INTERTRANSMITTION TIME IS CALCULATED AS FOLLOW
3) REFER TO MANUAL 68P44043S FOR JUMPER
4) POTENTIOMETER R51 IS USED TO ADJUST
DELAY IS ADJUSTED FROM 0-20 SEC
5) NOT USED ON EARLIER VERSIONS.
6) 1 MEG. USED ON EARLIER VERSIONS.



Q	SHT. 4 OF 4 RE-DRAWN	27JUN/86		
P	WAS 'C' SIZE; NO CIRCUITRY CHANGE	10SEPT 85	BM	
ISSUE	REVISION	DATE	APP'D	

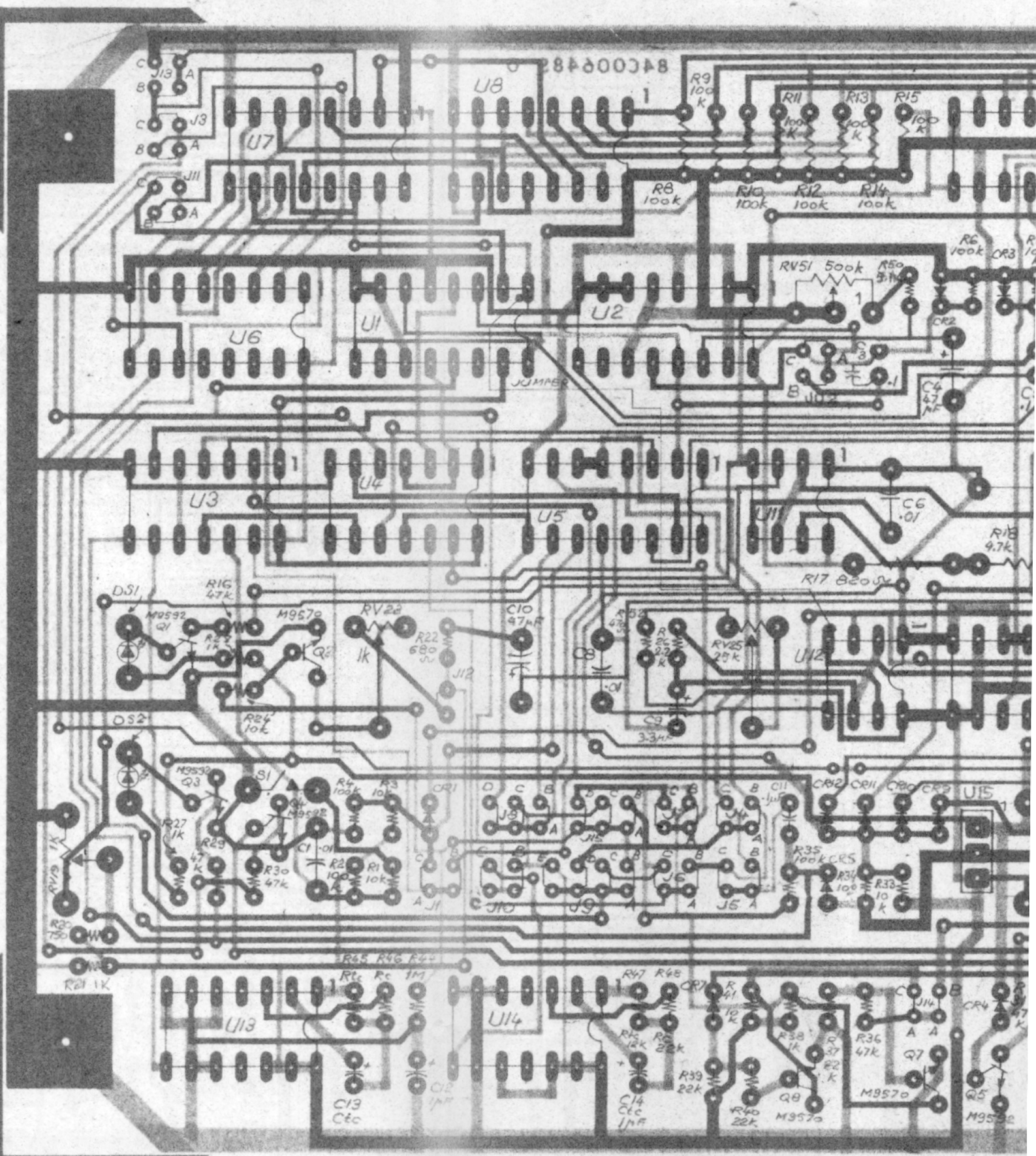
MORSE IDENTIFIER
TLN6400-CDX

F.D.F. OPP

REF. DWGS.
84C006485
63D060595

COMMUNICATIONS DIVISION
MOTOROLA CANADA LTD.
WILLOWDALE CANADA

DWN.	CKD.	DWG. NO. SHT. 1 OF 4
F. DUPUIS	B. Maingot	B1H01333S



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