TX-MLCD Mini-LCD Transmitter

Instruction Manual

Transmitters

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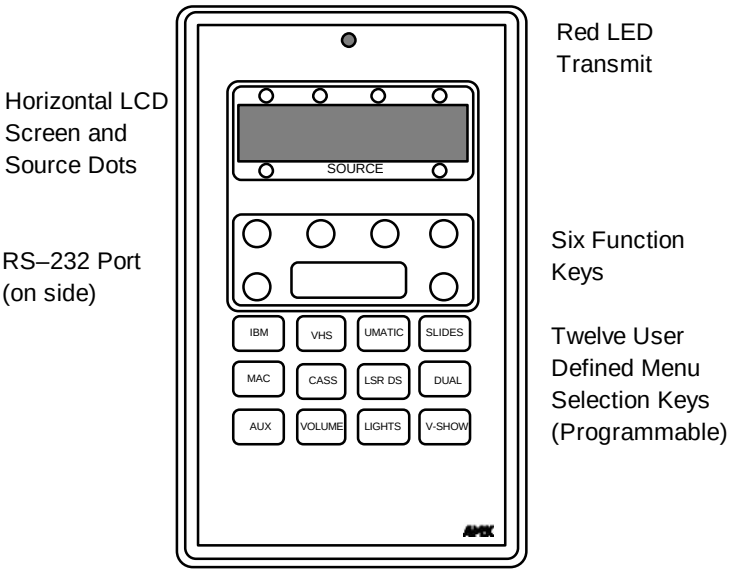
Introduction

Overview

The TX–MLCD (Figure 1) is a programmable Radio Frequency (RF) or Infrared (IR) wireless transmitter. Text for TX–MLCD menu functions is presented on a 2-line, 16 character, horizontal liquid crystal display (LCD). All TX–MLCD functions are under software control. The TX–MLCD is completely compatible with a subset of the AXCESS System programming language described in the programming section of this User Guide. Figure 1 is an illustration of the TX–MLCD panel arrangement.

Figure 1

TX-MLCD panel



Features

TX–MLCD features include:

- ***Twenty button matrix***— configured as needed by the user.
- ***LCD***— displays up two lines of 16 text characters each for the programmed menu selection key.
- ***Transmit LED***— indicates that an RF or an IR signal is being transmitted by the TX–MLCD. The choice of RF or IR is selected initial manufacture of the unit.

- ***RS–232 port***— used to program the TX–MLCD functions. The data rate is fixed at 1200 baud (bps).
- ***Portable***— the AMX TX–MLCD uses four AAA batteries for completely portable operation.

Operation

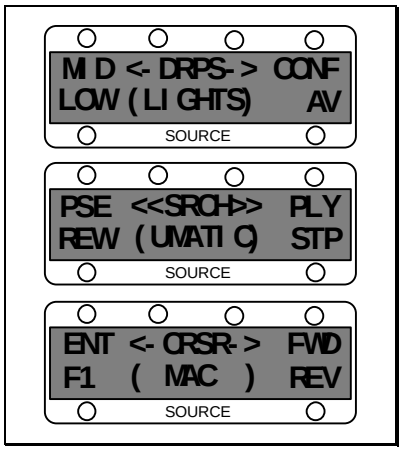
Once a program, like the example in the appendix, is loaded, your TX–MLCD provides complete menu selection of up to 12 control menus with up to 6 functions each. Menu selections allow you to control a wide range of devices with RF or IR signals according to your needs.

- RF or IR selection— The operating mode is determined at the time the equipment order is placed. RF or IR capability is factory installed in the unit at the time of assembly.
- Turn the TX–MLCD on— Press any button to activate the menu screen. The last selected menu will appear first. Press the desired menu selection button for the menu you want.
- Time out— A power saving feature. If no function key activity occurs for approximately 2 minutes, the screen will go dark. Press any key to return to the last selected menu.
- Control Function Menus— Press one of the 12 menu selection keys to activate a menu of six control functions.

Press one of the 6 circles to activate the corresponding function next to the dots above and below the display. Figure 2 shows a sample TX-MLCD with three of the twelve possible function menus.

Figure 2

Sample TX-MLCD menu options

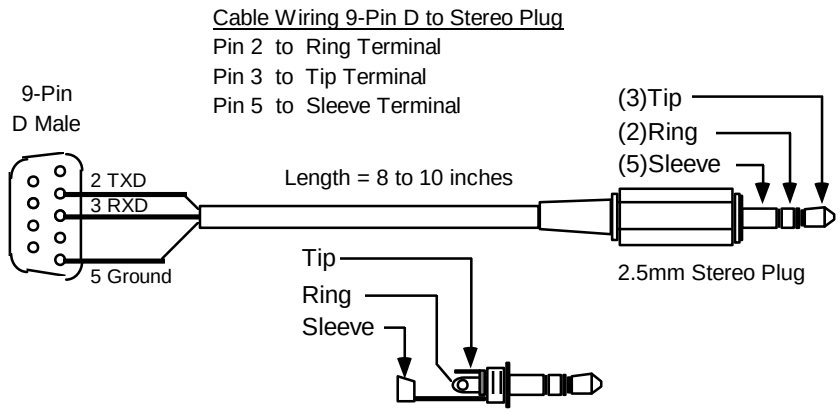


Wiring the TX-MLCD

Figure 3 shows how to connect the TX–MLCD RS–232 port to an AXCESS RS–232 cable for programming.

Figure 3

RS-232 adapter cable wiring diagram (AXCESS-to-TX-MLCD)



AXCESS Programming

Overview

You can use the AXCESS software to program all features of the TX–MLCD. A working knowledge of the AXCESS programming language is needed to thoroughly understand the operation of the TX–MLCD. Language features include screen control, character position control, and commands for implementing TX–MLCD functions. The following subset of the AXCESS Language commands are supported for the TX–MLCD:

CALL

CANCEL_ALL_WAIT

CANCEL_WAIT

DEFINE_CONSTANT

DEFINE_DEVICE

DEFINE_PROGRAM

DEFINE_START

DEFINE_VARIABLE

IF...ELSE

ITOA

OFF

ON

PUSH

PUSH_CHANNEL

RELEASE

SEND_STRING

TO

WAIT

all mathematical operators (+, -, *, /)

all logical operators (AND, OR, NOT, XOR)

all bitwise operators (BAND, BOR, BNOT, BXOR)

Programming Restrictions

AXCESS program restrictions include:

1. DEFINE_LATCHING, DEFINE_MUTUALLY_EXCLUSIVE, and DEFINE_TOGGLING are not supported. Similar functions are accomplished with combinations of ON, OFF, and IF... ELSE.
2. PULSE is not supported. A similar function is accomplished with combinations of ON, WAIT, and OFF
3. String support is limited:
   - No access to individual array elements
   - No string comparisons
   - Some string functions are not supported (e.g., LEFT_STRING, and so on.)
   - Maximum string length is 36 characters.
4. Concurrent WAITS—5 maximum.
5. Concurrent TOs—5 maximum.
6. Nesting of levels—3 maximum. With more than three, an internal stack overflow may occur resulting in erratic, undefined behavior.
7. Total memory size—4.5Kbytes. SOURCE–SEND will often need to be turned OFF resulting in the inability to RETRIEVE a program from the TX–MLCD. There may not be enough memory in the TX–MLCD to include the program source code and the compiled (executable) program.

Programming Basics

The following information is helpful when programming the TX–MLCD:

- TX–MLCD is assigned device code number one. To use channel and SEND_STRING commands for sending text to the LCD screen:

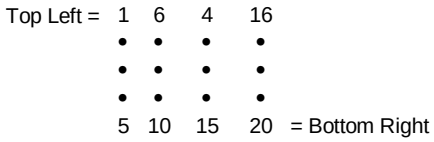
```
DEFINE_DEVICE
MLCD=1
```

- Use device code number zero to return characters from the TX–MLCD RS–232 port. Returning characters from TX–MLCD can be useful for debugging.

- A PUSH occurs in the program every time a button (key) is pressed. Figure 4 shows the button assignments.

Figure 4

Button assignments



- Turning on channels 1 through 254 enables transmission (RF or IR) of the respective radio code. The code example below transmits radio code 128 when button 1 is pressed.

```
PUSH[SK, 1]
  TO[SK, 128]
```

- Use SEND_STRING to send characters to the LCD screen. Characters will start at the current cursor position.

- Special SEND_STRING escape sequences are included in the TX–MLCD commands. When included within a SEND_STRING program instruction, the following character combinations will be treated as commands:

  — `"2"` moves the cursor to home (line one, column one)

  — `"9"` moves the cursor one position right

  — `"10"` moves the cursor one position down (to next line)

  — `"12"`, clears the screen and moves the cursor to home (line one, column one)

  — `"13"` moves the cursor to first of line (column one)

  — `"17,<line number>,<column number>"` moves the cursor to the specified line and column

- When a button is pressed, the TX–MLCD unit powers-up and runs through the DEFINE_START section. The DEFINE_START section is the part of the program where the text for each of the screens is setup and initialized. With the text already initialized, the main part (DEFINE_PROGRAM) of the program is shorter and simpler allowing you to flip from one screen to another with a SEND_STRING command.

Sample Program

Figure 5 is a sample demo AXCESS software program for a TX-MLCD. Refer to the *AXCESS Language Programming Guide* for complete programming instructions.

Figure 5

Sample AXCESS software program

```
PROGRAM_NAME='TXMLCD 6 BUTTON DEMO PROGRAM, RSH 04-29-91'
(*   DATE:04/28/92    TIME:16:53:22    *)
(*
   THIS IS A GENERIC PROGRAM THAT CREATES 6 VARIABLE FUNCTION
BUTTONS
   BUTTONS DENOTED WITH A * BELOW. THE REMAINING THREE ROWS ARE
USED
   FOR MENU SELECTIONS.
   BUTTON NUMBERING:
    1*  6*  11*  16*
    2*  7   12   17*
    3   8   13   18
    4   9   14   19
    5  10   15   20

   BUTTONS 7 AND 12 ARE NOT USED IN THIS PROGRAM.
   FUNCTION BUTTONS GIVE FEEDBACK 'WINK', A DASHED LINE, THAT
REPLACES
   THE FUNCTION TEXT AND THEN RESTORES IT ON RELEASE OF THE BUTTON.
   THE 12 MENU SELECTION BUTTONS TRANSMIT RADIO CODES 1-12 AND
OFFSET
   THE RADIO CODES THAT THE FUNCTION BUTTONS WILL THEN TRANSMIT.
FOR EXAMPLE, IF MENU SELECTION 1 IS PRESSED THEN FUNCTIONS 1-6 WILL
   TRANSMIT RADIO CODES 32-37 AND IF MENU SELECTION 2 IS PRESSED
THEN FUNCTIONS 1-6 WILL TRANSMIT RADIO CODES 40-45 AND SO ON.
*)

(***********************************************************)
(*          DEVICE NUMBER DEFINITIONS GO BELOW             *)
(***********************************************************)

DEFINE_DEVICE
MLCD = 1    (* TX MLCD IS ALWAYS DEVICE 1 *)

(***********************************************************)
(*               CONSTANT DEFINITIONS GO BELOW             *)
(***********************************************************)

DEFINE_CONSTANT

(***********************************************************)
(*               VARIABLE DEFINITIONS GO BELOW             *)
(***********************************************************)
```

```
DEFINE_VARIABLE
BA[4]          (* LCD VARIABLE FORMAT *)
BB[4]
BC[2]          (* BA  BC FILL BD  BF *)
BD[2]          (* BB  ( SOURCE )  BE *)
BE[4]
BF[4]
FILL[4]
SOURCE[6]
BTEMP[4]   (* FOR TEMPORARILY SAVING BA, BB, BC, BD, BE, OR BF *)
RC         (* RADIO CODE OFFSET AFTER MENU SELECTION *)

(***********************************************************)
(*              LATCHING DEFINITIONS GO BELOW              *)
(***********************************************************)

DEFINE_LATCHING

(***********************************************************)
(*       DEFINE CALLS GO BELOW                             *)
(***********************************************************)

DEFINE_CALL 'LCD'  (* UPDATE LCD SCREEN *)
  {
  SEND_STRING MLCD,"$0C"                (* CLEAR SCREEN AND MOVE
CURSOR HOME *)
  SEND_STRING MLCD,"BA,BC,FILL,BD,BF"      (* WRITE FIRST LINE *)
  SEND_STRING MLCD,"$11,2,1"               (* MOVE CURSOR TO LINE 2
COLUMN 1 *)
  SEND_STRING MLCD,"BB,'(',SOURCE,')',BE"  (* WRITE SECOND LINE *)
  }
(***********************************************************)
(*                STARTUP CODE GOES BELOW                  *)
 ***********************************************************

DEFINE_START

(***********************************************************)
(*            THE ACTUAL PROGRAM GOES BELOW                *)
(***********************************************************)

DEFINE_PROGRAM

PUSH[MLCD,3]
  {
  TO[MLCD,1]  (* MENU SELECTION 1 TRANSMITS RC 1, DELETE LINE IF
NOT NEEDED *)
  BA='    '  BC='  '   FILL='    '   BD='  '  BF='  ON'
  BB='    '         SOURCE=' IBM  '           BE=' OFF'
  CALL'LCD'
  RC=32       (* OFFSET FOR RADIO CODES, FUNCTIONS 1-6 WILL
TRANSMIT 32-37 *)
```

```
  }
PUSH[MLCD,4]

  TO[MLCD,2]  (* MENU SELECTION 2 TRANSMITS RC 2 *)
  BA='ENT '  BC='<-'   FILL='CRSR'   BD='->'  BF=' FWD'
  BB='F1  '          SOURCE=' MAC  '           BE=' REV'
  CALL'LCD'
  RC=40       (* FUNCTIONS 1-6 WILL NOW TRANSMIT 40-45 *)
  }
PUSH[MLCD,5]
  {
  TO[MLCD,3]
  BA='#1  '  BC='#2'   FILL='   '    BD='#3'  BF='  #4'
  BB='#5  '          SOURCE=' AUX  '           BE=' OFF'
  CALL'LCD'
  RC=48
  }
PUSH[MLCD,8]
  {
  TO[MLCD,4]
  BA='PSE '  BC='<<'   FILL='SRCH'   BD='>>'  BF=' PLY'
  BB='REW '          SOURCE=' VHS  '           BE=' STP'
  CALL'LCD'
  RC=56
  }
PUSH[MLCD,9]
  {
  TO[MLCD,5]
  BA='PSE '  BC='<<'   FILL='    '   BD='>>'  BF=' PLY'
  BB='REC '          SOURCE=' CASS '           BE=' STP'
  CALL'LCD'
  RC=64
  }
PUSH[MLCD,10]
  {
  TO[MLCD,6]
  BA='ON  '  BC='1-'   FILL='PRST'   BD='-2'  BF='  UP'
  BB='OFF '          SOURCE='VOLUME'           BE=' DWN'
  CALL'LCD'
  RC=72
  }
PUSH[MLCD,13]
  {
  TO[MLCD,7]
  BA='PSE '  BC='<<'   FILL='SRCH'   BD='>>'  BF=' PLY'
  BB='REW '          SOURCE='UMATIC'           BE=' STP'
  CALL'LCD'
  RC=80
  }
PUSH[MLCD,14]
  {
```

```
  TO[MLCD,8]
  BA='PSE '  BC='<<'   FILL='CHPT'   BD='>>'  BF=' PLY'
  BB='HOME'          SOURCE='LSR DS'           BE=' STP'
  CALL'LCD'
  RC=88
  }
PUSH[MLCD,15]
  {
  TO[MLCD,9]
  BA='MID '  BC='<-'   FILL='DRPS'   BD='->'  BF='CONF'
  BB='LOW '          SOURCE='LIGHTS'           BE='  AV'
  CALL'LCD'
  RC=96
  }
PUSH[MLCD,18]
  {
  TO[MLCD,10]
  BA='ON  '  BC='<-'   FILL='FOCS'   BD='->'  BF=' FWD'
  BB='OFF '          SOURCE='SLIDES'           BE=' REV'
  CALL'LCD'
  RC=104
  }
PUSH[MLCD,19]
  {
  TO[MLCD,11]
  BA='FWD '  BC='R<'   FILL='DUAL'   BD='>F'  BF=' FWD'
  BB='REV '          SOURCE=' DUAL '           BE=' REV'
  CALL'LCD'
  RC=112
  }
PUSH[MLCD,20]
  {
  TO[MLCD,12]
  BA='MENU'  BC=' <'   FILL='-  -'   BD='> '  BF='  ^ '
  BB='CNTU'          SOURCE='V-SHOW'           BE='  v '
  CALL'LCD'
  RC=120
  }
  (* FEEDBACK WINK ---- FOR FUNCTION KEYS *)
PUSH[MLCD,1]  (*BA*)
  {
  TO[MLCD,RC+1]
  BTEMP=BA       (* SAVE THE TEXT TEMPORARILY *)
  BA='--- '      (* REPLACE TEXT WITH --- *)
  CALL'LCD'
  }
RELEASE[MLCD,1]
  {
  BA=BTEMP       (* RESTORE THE TEXT *)
  CALL'LCD'
```

```
PUSH[MLCD,2]  (*BB*)
  {
  TO[MLCD,RC]
  BTEMP=BB
  BB='--- '
  CALL'LCD'
  }
RELEASE[MLCD,2]
  {
  BB=BTEMP
 CALL'LCD
  }
PUSH[MLCD,6]  (*BC*)
  {
  TO[MLCD,RC+2]
  BTEMP=BC
  BC='--'
  CALL'LCD'
  }
RELEASE[MLCD,6]
  {
  BC=BTEMP
  CALL'LCD'
  }
PUSH[MLCD,11]  (*BD*)
  {
  TO[MLCD,RC+3]
  BTEMP=BD
  BD='--'
  CALL'LCD'
  }
RELEASE[MLCD,11]
  {
  BD=BTEMP
  CALL'LCD'
  }
PUSH[MLCD,16]  (*BF*)
  {
  TO[MLCD,RC+4]
  BTEMP=BF
  BF=' ---'
  CALL'LCD'
  }
RELEASE[MLCD,16]
  {
  BF=BTEMP
  CALL'LCD'
  }
```

```
PUSH[MLCD,17]  (*BE*)
  {
  TO[MLCD,RC+5]
  BTEMP=BE
  BE=' ---'
  CALL'LCD'
  }
RELEASE[MLCD,17]
  {
  BE=BTEMP
  CALL'LCD'
  }
(*********************************************************)
(*                     END OF PROGRAM                    *)
(*        DO NOT PUT ANY CODE BELOW THIS COMMENT         *)
(*********************************************************)
```

Specifications

Overview

Figure 6 shows the TX-MLCD, and Figure 6 lists the specifications.

Figure 6

TX-MLCD Mini-LCD transmitter

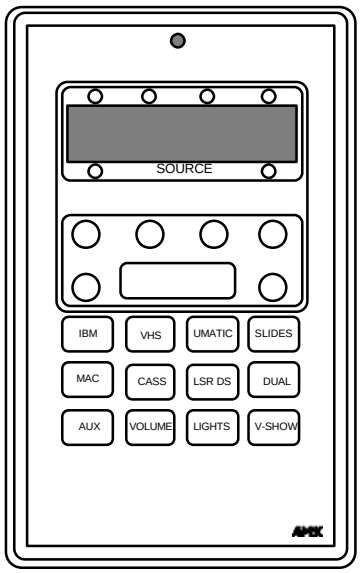


Figure 7

Specifications

Specifications	
Buttons	20 pushbuttons under Lexan faceplate
Display	2-line, 16-character per line LCD readout
IR transmission	Low-frequency (38 kHz)
Memory	25K
Includes	Four AAA, 1.5 V alkaline batteries
Enclosure	Molded black matte plastic
Dimensions	5.8" x 3.5" x 1.3" (14.6 cm x 8.9 cm x 3.2)
Weight	10.0 oz (283.5 g)

Technical Support

Overview

Before you call AMX for assistance, check your AXlink, power, and cable connections, and the integrity of your software operating system. Reload the software to see if something in the program is causing the problem. If the problem is not resolved, reload the program from a new copy of your master disk. If you still have a service problem, call AMX at (800) 222-0193 or (972) 644-3048 for technical assistance.

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