

Bailey[®] command series[®]

Configuration and Tuning Terminal, CTT□2

This instruction update provides information on the CTT12 version of the Configuration and Tuning Terminal. The CTT12 is the same as the CTT02 except that the CTT12 includes an application cartridge. The application cartridge is a pre-engineered cartridge for Type CLC Loop Command Controllers and contains PID configurations for Single Loop, Dual Loop, Cascade Loop and Ratio Loop. This update also includes information on the new FAST TUNE feature for Type CLC Loop Command Controllers and for Type CBC Batch Command Controllers that were originally configured using EASY STEP PLUS. FAST TUNE allows users to easily tune the function codes associated with a PID configuration without actual knowledge of specific block locations.

Integrate the attached pages into your instruction manual in accordance with the following instructions:

1. Replace pages iii/iv through vii/viii.
2. Replace pages 1/2 through 7/8.
3. Replace pages 11/12.
4. Replace pages 27/28 through 29/30.
5. Insert pages 30A/30B.
6. Replace pages 31/32.
7. Replace pages 45/46.
8. Replace pages B-11/B-12.
9. Replace pages C-35/C-36 through C-37/C-38.

After the update has been added, insert this page of update instructions into the front of the manual immediately behind the front cover.

Preface

This product instruction provides installation, operation and configuration information for the Configuration and Tuning Terminal, CTT02. This document is intended as a supplement to Product Instructions for all Bailey Command Series equipment.

NOTE: Throughout this Product Instruction, the module or equipment being used with the CTT02 will be referred to as the "target unit". Refer to **ASSOCIATED DOCUMENTS** for a list of the target units and their applicable Product Instruction number. The user should thoroughly read and understand the information in this document before attempting to operate the equipment.

There are Appendices at the back of this Instruction Book. One for each target unit. Each Appendix contains a configuration example (operational sequence) and an example keystroke procedure necessary to configure the target unit.

NOTE: This documents is also applicable to the Type CTT12 Configuration and Tuning Terminal. All the procedures contained within this Product Instruction for the CTT02 are also applicable to the CTT12. The CTT12 is a CTT02 that has an application cartridge. Use of the application cartridge available from Bailey is covered in the application guide listed under **ASSOCIATED DOCUMENTS**.

ASSOCIATED DOCUMENTS

Additional information is given in the following publications.

- Function Code Application Manual, I-E93-900-20.
- CLC01/02 Loop Command[®] Controller Product Instruction, I-E92-500-1.
- CLC03/04 Loop Command[®] Controller Product Instruction, I-E92-500-7.
- Sequence Command[®] Controller Product Instruction, I-E92-500-4.
- Batch Command[™] Controller Product Instruction, I-E92-500-3.
- Configuration Port Module Product Instruction, I-E93-903-2.
- Application cartridge Application Guides (for use with Loop Command Controller only):
 - Single Loop Configuration P-E92-501-2-001
 - Standard Cascade Configuration P-E92-501-2-002
 - Station Ratio Control Loop Configuration P-E92-501-2-003
 - Dual Loop Configuration P-E92-501-2-004

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Safety Summary

GENERAL WARNINGS

WARNING

The equipment described herein may be used only in the those classes of hazardous locations identified on the nameplate.

AVERTISSEMENT

L'équipement décrit par cette notice ne peut être installé que dans les emplacements spécifiés sur la plaque signalétique de l'appareil.

WARNING

Any substitution of components may impair safety and performance.

AVERTISSEMENT

La substitution de composants peut compromettre la performance de l'appareil et son accréditation concernant la sécurité.

SPECIFIC WARNINGS AND CAUTIONS

CAUTION

If a Batch or Sequence Command Controller other than the master Batch Command Controller is used to store the recipe data, make certain that Controller is placed into the CONFIGURE mode before entering the EASY STEP PLUS mode. The existing configuration in this unit will be lost. (p. 18)

AVERTISSEMENT

Si l'on utilise un contrôleur de traitement par lots ou de traitement séquentiel (Batch Command Controller ou Sequence Command Controller) autre que le contrôleur maître à des fins de stockage des données du procédé, s'assurer que le contrôleur est en mode de CONFIGURATION avant de passer au mode "EASY STEP PLUS". Sinon, la configuration de cet appareil serait effacée. (p. 19)

List of Effective Pages

Total number of pages is 171, consisting of the following:

Page No.	Change Date
iii through iv	January 15, 1992
v	Original
vi	January 15, 1992
vii	Original
viii	January 15, 1992
1	Original2
2	January 15, 1992
3	Original
4 through 7	January 15, 1992
8 through 10	Original
11	January 15, 1992
12 through 26	Original
27 through 28	January 15, 1992
29	Original
30 through 30B	January 15, 1992
31	Original
32	January 15, 1992
33 through 44	Original
45	January 15, 1992
46	Original
A-1 through A'-10	Original
B-1 through B-11	Original
B-12	January 15, 1992
B-13 through B-24	Original
C-1 through C-35	Original
C-36 through C-37	January 15, 1992
C-38 through C-64	Original
D-1	Original
Worksheets (17sheets)	Original

When an update is received, insert the latest changed pages and dispose of the superseded pages.

NOTE: On an update page, the changed text or table is indicated by a vertical bar in the outer margin of the page adjacent to the changed area. A changed figure is indicated by a vertical bar in the outer margin next to the figure caption. The date the update was prepared will appear beside the page number.

Introduction

PRODUCT DESCRIPTION

The Configuration and Tuning Terminal (CTT02) is an engineering and maintenance terminal for the Bailey Command Series™ product line. It provides a local means for configuration, tuning and diagnostics. A complete description of applicable function blocks, codes and specifications is given in Bailey **Function Code Application Manual I-E93-900-20**.

The CTT02 is a handheld device. A blank cartridge which is inserted in the bottom of the unit is provided for storing configurations. A cable connects to the Command Series unit and provides the necessary power and signal inputs (Figure 1). One end connects to the top of the CTT02 and the other plugs into the Command Series unit.

COMMUNICATIONS

The Command Series unit receives and transmits signals by way of the Module Bus. This system of communication allows the unit to act as a “stand-alone product” or as part of a larger system.

Module Bus

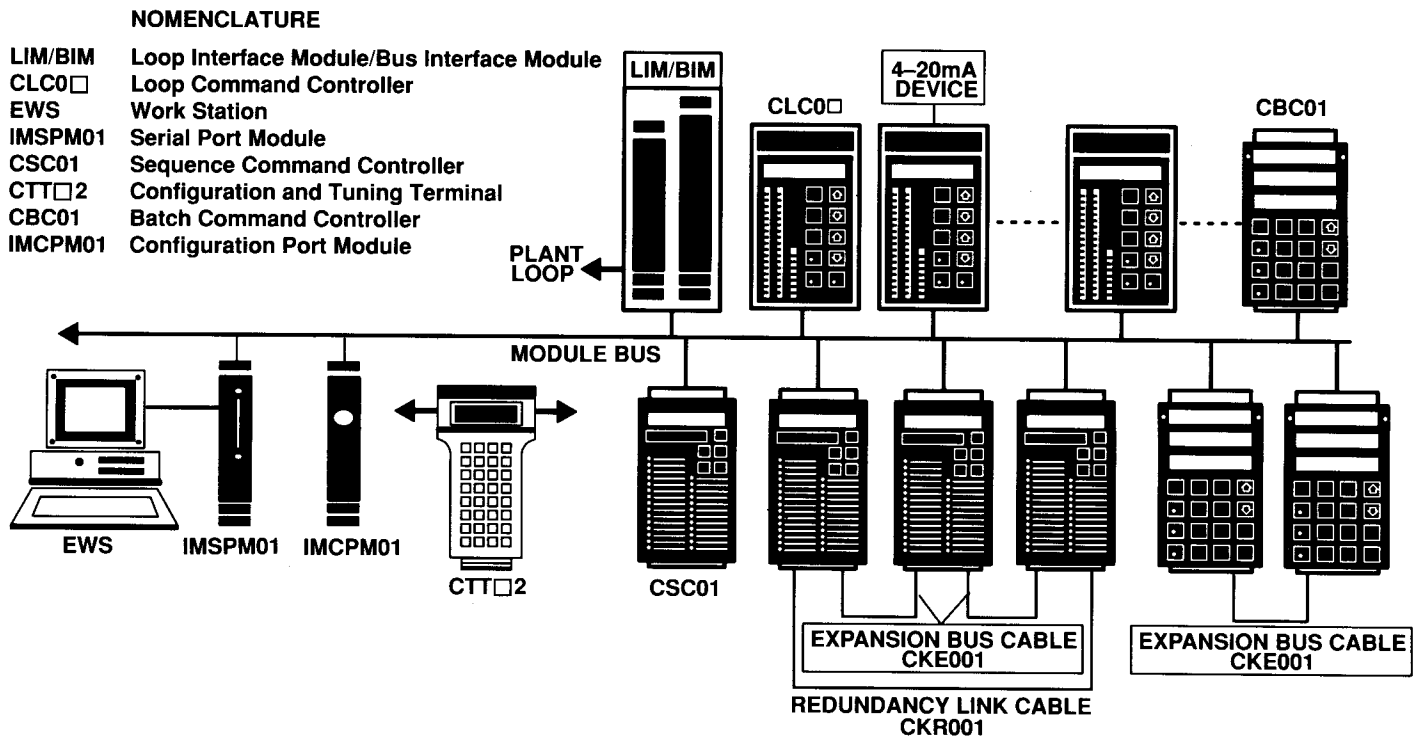
The Module Bus (Figure 2) is the local level communication bus and is required when using multiple Command Series units. It is the bi-directional communication link between each unit. A maximum of 32 active (or addressable) units can be grouped together. Each unit must have a valid address. Address values range from 0 to 30, with 31 typically being assigned to the CTT02.



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FIGURE 1 – Configuration and Tuning Terminal CTT02 and Typical Command Series Controller.

Introduction



B 1023

FIGURE 2 – Communications Loop Block Diagram

DESIGN DESCRIPTION

The Configuration and Tuning Terminal consists of a microprocessor section, front panel alphanumeric display, front panel keyboard, and a cartridge (Figure 3). The microprocessor section controls the operation of the CTT02 and executes the functions. In the course of operation, information is presented to the user on the front panel display.

The operations of the CTT02 have been designed to provide a maximum of information to the user. Prompts are given wherever possible and data is handled in familiar formats. Displays are used to indicate error or fault conditions, while simple, one word responses or indicators are used when operations are normal and expected.

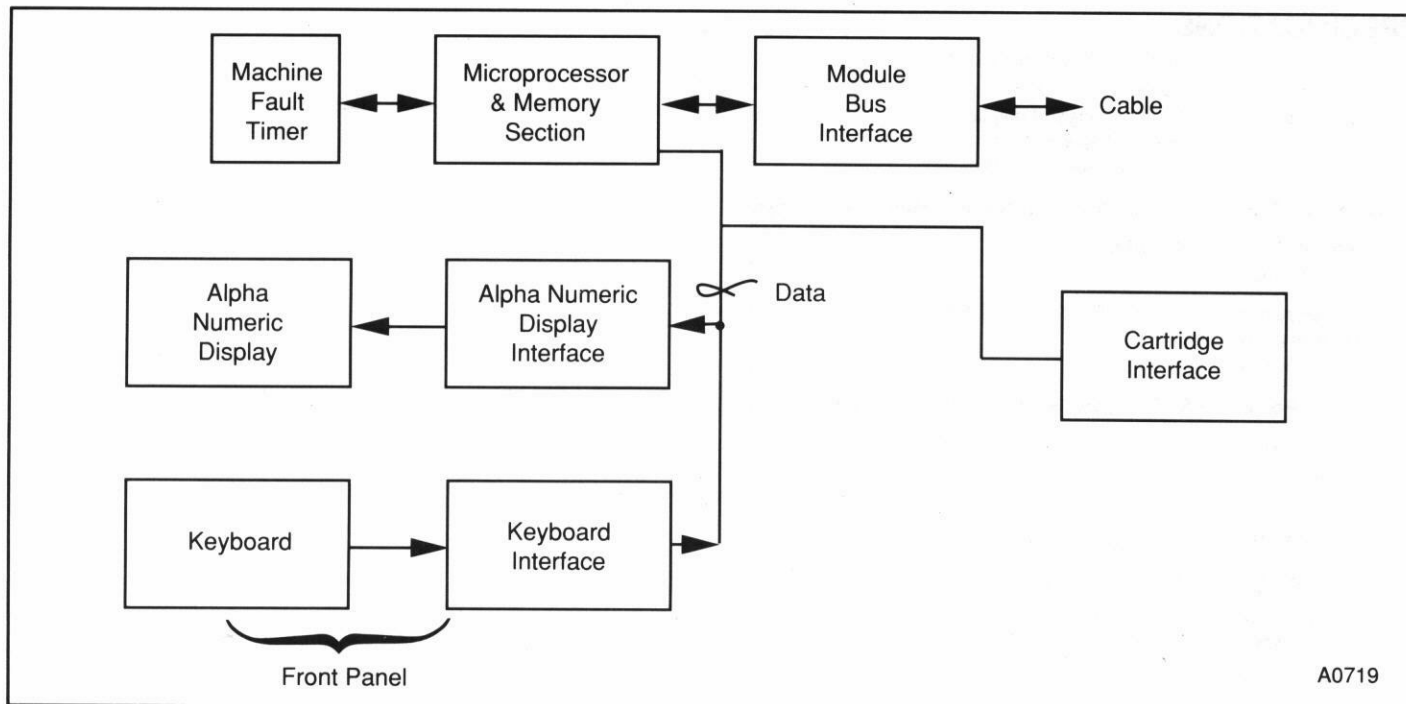
FACEPLATE DESCRIPTION

The CTT02 has 32 available keys, 12 of which are used in a numeric keypad (Figure 4). There are 12 operation keys which allow the user to follow step-by-step procedures for performing various functions. There are four function/cursor keys that aid in menu selection, allowing control algorithms to be added, modified and reviewed. An ON key, OFF key, Special Features key and ENTER key are also included. A large alphanumeric LCD readout display allows four lines, 16 characters per line for easy operator interface.

NOMENCLATURE

The appropriate nomenclature for the Configuration and Tuning Terminal is:

- CTT02 Standard Configuration and Tuning Terminal.
- CTT12 Standard Configuration and Tuning Terminal with Application Cartridge.



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FIGURE 3 – Block Diagram of Configuration and Tuning Terminal, CTT02



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FIGURE 4 – Configuration and Tuning Terminal Faceplate

Introduction

SPECIFICATIONS

TABLE 1 – Specifications

Display Format	LCD (liquid crystal display) Number of Rows: 4 Characters per Row: 16
Keyboard Type	Tactile feedback embossed membrane, 32 keys
Flexible Cord Length	1.8 m (6 ft.)
Operating Temperature Range	0°C to 50°C (32°F to 122°F)
Power	+5 VDC (±5%) at 85 mA max. (0.43 W)
Storage Temperature Range	-20° to +70°C (-4°F to +158°F)
Humidity	95%, noncondensing
Weight	0.454 kg (1 lb.)
Dimensions (hwxwd)	203 x 108 x 43 mm (8.00 x 4.27 x 1.71 in.)
Case Material	Lexan®
Certification	FM (Factory Mutual) approved for the following categories: Nonincendive for Class I, Division 2, Groups A, B, C, D. CSA (Canadian Standards Association) certification pending for the following categories: Nonincendive for Class I, Division 2, Groups A, B, C, D.
Accessories	NCPM01 , Configuration Port Module allows connection of the CTT02 to Bailey INFI 90™/ NETWORK 90® PCU rack. Storage Cartridge - Part No. 6637531-1. Blank cartridges available for storing configurations. Application Cartridge - Part No. 6637531-2. Pre-engineered configuration cartridge for Type CLC Loop Command Controller. Contains PID configurations for Single Loop, Dual Loop, Cascade Loop and Ratio Loop.

Specifications subject to change without notice.

Lexan® - Registered tradename of General Electric Co., Noryl Products Dept.

™ - Trademark of the Bailey Controls Co.

® - Registered trademark of the Bailey Controls Co.

Installation

RECEIVING AND HANDLING

The CTT02 is packaged in a single container which includes the handheld unit, the connecting cable and a blank cartridge for storing configurations.

Normal precautions for storage and handling of electronic equipment should be followed. Upon receipt of the shipment, the equipment should be examined for possible damage in transit. If damage is found or there is evidence of rough handling, a damage claim should be filed with the responsible transportation company. The nearest Bailey Sales Office should also be notified as soon as possible.

Remove the equipment from the shipping container and examine for damage. Carefully inspect the packing material, before discarding it, to make certain that all equipment, instructions and any paperwork have been removed. Careful handling will ensure satisfactory performance of your unit.

Storage should make use of original packing material and the container. The storage environment should be protected and free from extremes of temperature and high humidity as indicated in the environmental constraints listed in Table 1, **Specifications**.

SPECIAL HANDLING PROCEDURES FOR MOS DEVICES

Metal Oxide Semiconductor (MOS) devices are subject to damage by static electricity. Therefore, the following techniques should be observed during servicing, troubleshooting, and repair.

1. Most assemblies with MOS devices are shipped in a special anti-static bag. Keep the assembly in the bag as much as possible whenever the assembly is not in use.
2. Assemblies containing MOS devices should be removed from their anti-static protective containers only under the following conditions:
 - a. When at a designated static-free workstation or when the bag is grounded at the field site.
 - b. Only after conductive area of container has been neutralized.

- c. Only after firm contact with an anti-static mat and/or firmly gripped by a grounded individual.

3. Personnel handling assemblies with MOS devices should be neutralized to a static-free workstation by a grounding wrist strap that is connected to the station or to a good ground point at the field site.
4. Do not allow clothing to make contact with MOS devices. Most clothing generates static electricity.
5. Avoid touching edge connectors and components.
6. Avoid partial connection of MOS devices. Most devices can be damaged by floating leads, especially the power supply connector. If an assembly must be inserted in a live system, it should be done quickly. Do not cut leads or lift circuit paths when troubleshooting.
7. Ground test equipment.
8. Avoid static charges during maintenance. Make sure circuit board is thoroughly clean around its leads but do not rub or clean with an insulating cloth.

NOTE: An anti-static kit (ESD Field Service Kit, Bailey Part No. 1948385-1) is available for personnel working on devices containing MOS components. The kit contains a static-dissipative work surface (mat), a ground cord assembly, wrist bands and alligator clip.

INSTALLING THE CTT02

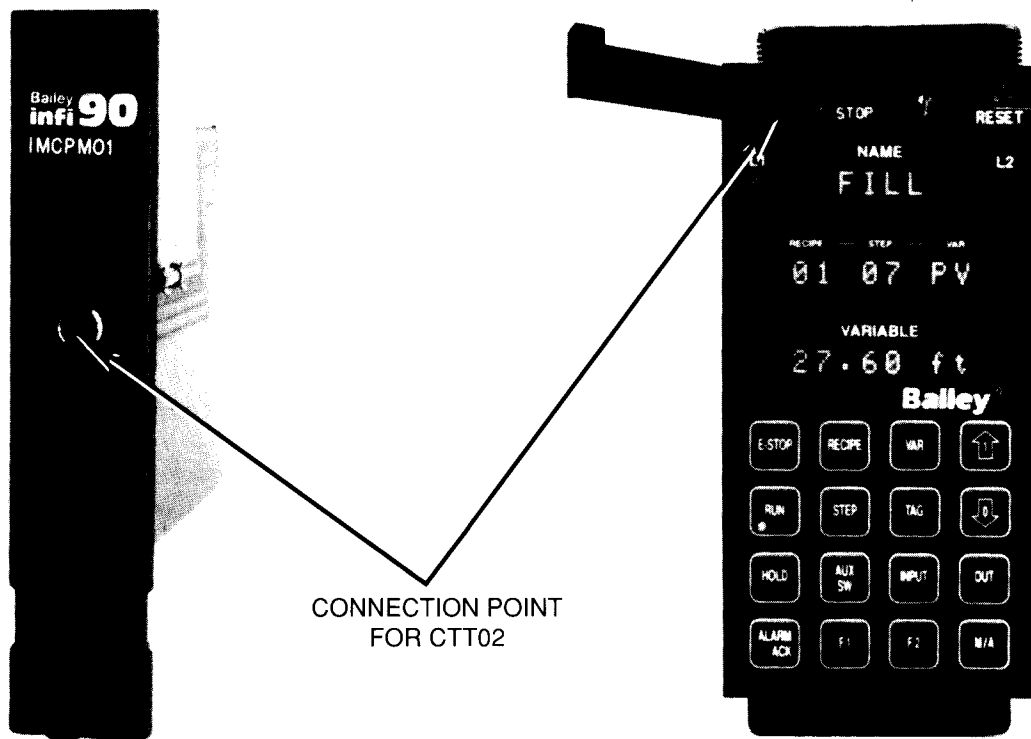
Installation of the CTT02 consists of connecting the handheld unit to the local module bus or to a Command Series target unit that requires configuration, tuning or diagnostic procedures.

To connect to a local module bus and interface with a Bailey NETWORK 90 or INFI 90 system, a Configuration Port Module (NCPM01) is required. This module occupies one slot in a standard Module Mounting Unit (MMU). The NCPM01 printed circuit card routes power and communication signals from the MMU to a five-pin receptacle on the faceplate of the NCPM01. The CTT02 flexible cable plugs into this receptacle (Figure 5).

Installation

IMCPM01 CONFIGURATION PORT MODULE
(INTERFACE TO INFI 90/NETWORK 90 SYSTEM)

COMMAND SERIES
TARGET UNIT



A0721, A1021, A1022

FIGURE 5 - Connecting the CTT02 to a Typical Target Unit or to a Configuration Port Module (IMCPM01)

To connect to a Command Series target unit, swing open the legend/access door on the front of the Controller faceplate and plug the CTT02 connector into the connector at the left side of the Controller (Figure 5).

Installing and Removing Cartridges

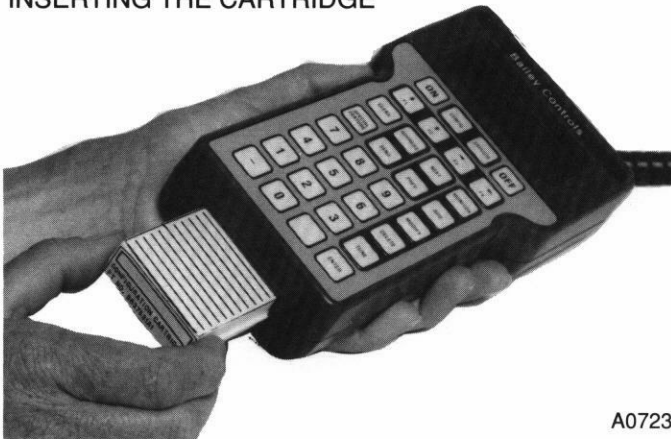
CONFIGURATION STORAGE CARTRIDGES. A blank cartridge is provided with the CTT. It is inserted in the bottom of the CTT02 housing and provides storage for configurations. The cartridge must be installed during uploading or downloading of configurations to the target unit. Use the following procedure for installation and removal.

APPLICATION CARTRIDGE. If a Type CTT12 was ordered, a custom application cartridge has been

provided with your unit. Use the following procedure for installation and removal.

1. Installation or removal of the configuration storage or application cartridge while the CTT is under power is not recommended.
2. The cartridge is polarized and can only be installed one way.
3. Grasp the cartridge between your thumb and forefinger and insert into the opening in the bottom of the CTT housing (Figure 6).
4. Press firmly into place to ensure good connection.
5. When removing, place your thumb on the top of the cartridge and your forefinger on the bottom and pull the cartridge straight out of the housing.

INSERTING THE CARTRIDGE



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REMOVING THE CARTRIDGE



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FIGURE 6 - Installing and Removing Cartridges

Changing the Module Bus Address of the CTT02

The module address of the CTT02 has been factory set to 31 prior to shipment. If it is necessary to check or change that setting, complete the following procedure.

1. Press the ON key on the faceplate of the CTT02. The following screen will appear:

```
CTT02 HANDHELD
* Rev. B_0 *
Bailey Controls
Company
```

2. Press F3 and the following screen will appear:

```
CURRENT CTT02
MODULE ADDRESS
IS: XX
NEW ADDRESS:
```

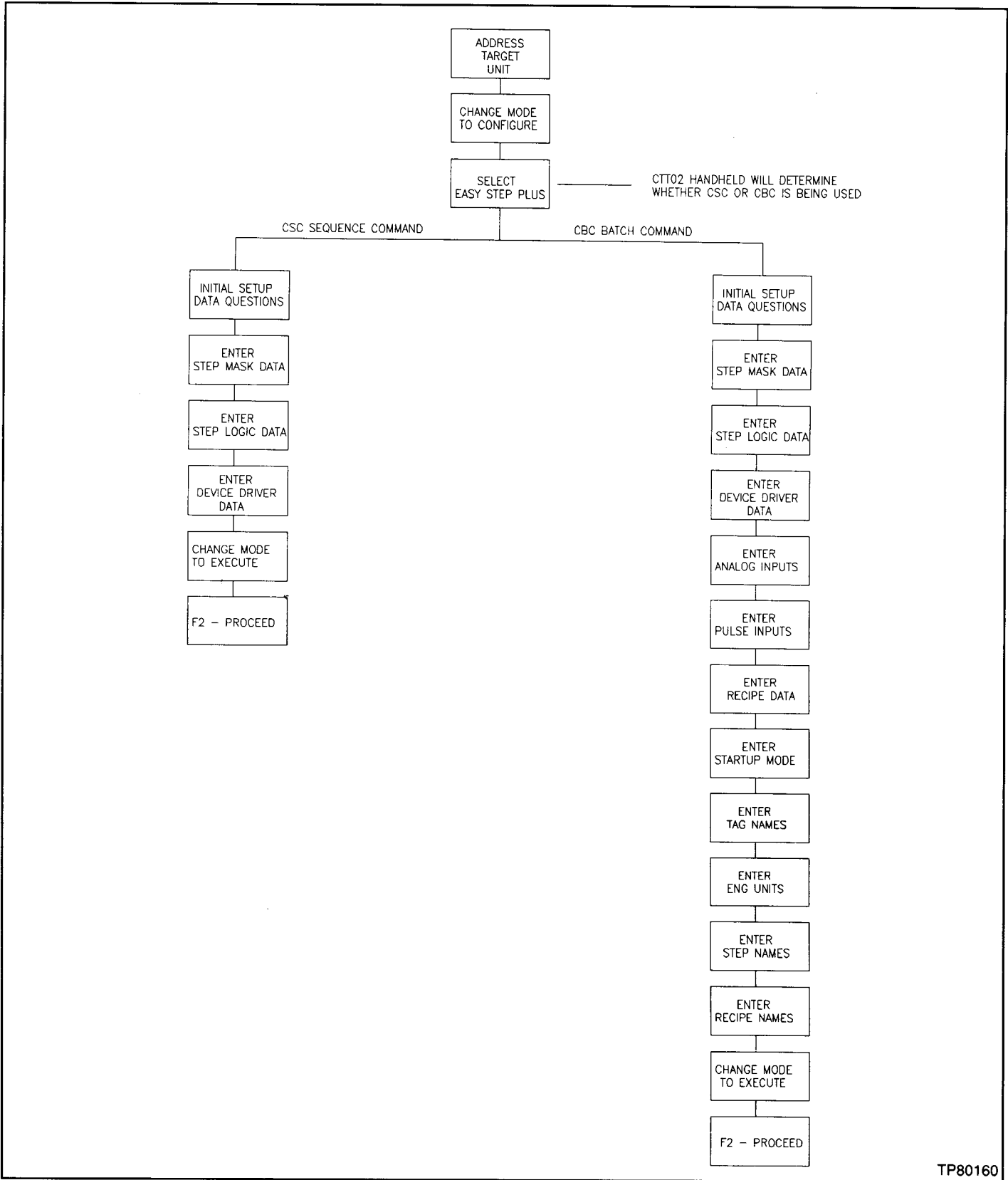
Range = 0-31

Enter new address and press ENTER. The next screen will be:

```
CTT02 HANDHELD
* Rev. B_0 *
Bailey Controls
Company
```


TABLE 2 – Keyboard Functions (continued)

Pushbutton Legend	Definition	Description
<p>SECOND FEATURES MENU</p> <p>F1 - CBC UTILITIES - Provides various features to simplify configuration of a Batch Command Controller.</p> <p>F2 - CALIBRATE CBC - Allows the user to calibrate the Batch Command Controller for thermocouple, RTD or millivolt inputs.</p> <p>F3 - APPLICATION CARTRIDGE - Pre-engineered configuration cartridge for Type CLC Loop Command Controllers based on user application. Reference ASSOCIATED DOCUMENTS section for number of application guide.</p> <p>F4 - FAST TUNE - Provides easy, fast tuning with Type CLC Loop Command Controllers or Type CBC Batch Command Controllers with EASY STEP for commonly used PID configurations. Software locates PID blocks for the user.</p>		
MISCELLANEOUS PUSHBUTTONS		
ON	On	Turns CTT02 on.
OFF	Off	Turns CTT02 off.
FUNCTION PUSHBUTTONS		
<p>The pushbuttons have multiple functions. In addition to the functions described below, they are also used in the sub-menus when the SPECIAL FEATURE key is depressed. The arrow portion of the keys also allows the user to scroll up, down, to the left and right during certain steps of the configuration procedure.</p>		
F1	Change Block/Status Request	Allows the selection of a new block number in DELETE mode.
F2	Confirmation/SELECT	Used to confirm CONFIGURE, EXECUTE, or SEND operations and also to select current block for DELETE operations.
F3	Specification Selection	Allows the operator to select the desired specification for display when in the TUNE, MODIFY and ADD modes. In ADDRESS mode, pressing F3 will display the status bytes.
F4	Next Tunable/Diagnostics	In TUNE mode, F4 is used to index the specifications to the next tunable spec of a specific block. In ADDRESS mode, pressing F4 displays any errors existing in the target unit.



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FIGURE 7 – EASY STEP PLUS Submenus for Sequence and Batch Command Controllers

the SPECIAL FEATURE key. This feature allows the user to dump the configuration in the target unit to the RS-232 port located on the back of the Controller. This port can be interfaced to a serial device such as a printer or terminal.

Once the CONFIGURATION DUMP is selected using the F4 key, the following display appears:

```
CONFIGURATION
DUMP
F1 - PROCEED
F2 - ABORT
```

If F1 is selected, the target unit will begin to dump its configuration to the RS-232 port and the CTT02 will return to the main status menu.

If F2, ABORT, option is selected, the CTT02 will return to the main status menu.

NOTE: If the target unit is placed in the EXECUTE mode while a configuration dump is in progress, the dump will be aborted.

CBC UTILITIES (Batch Command Controllers Only)

The CBC Utilities is selectable through the SPECIAL FEATURE key and is listed under the second features menu (refer to Table 2). This feature allows those users not using EASY STEP PLUS to enter data for the configuration process. Press the SPECIAL FEATURE key. The first feature menu will be displayed: F1 - UP/DOWNLOAD, F2 - EASY STEP PLUS, F3 - SET TIME and F4 - CONFIGURATION DUMP. Press the NEXT key and the second feature menu will be displayed. The following screen will appear:

```
F1 - CBC UTILITIES
F2 - CALIBRATE CBC
F3 - APP CARTRIDGE
F4 - FAST TUNE
```

Pressing F1 - CBC UTILITIES will cause the following screen to appear:

```
F1 - TAG NAMES
F2 - ENG UNITS
F3 - STEP NAMES
F4 - RECIPE NAMES
```

Tag Names and Engineering Units differ in that for EASY STEP PLUS you will get a submenu that will allow you to select between TAGS or ENG UNITS for master/slave or backup units.

```
SET NAMES FOR:
F1-MASTER/SLAVE
F2-BACKUP UNIT
(SELECT ONE)
```

Select F1 to set the TAG NAME or ENG UNITS for the Batch Master or Slave unit, modifying Block 2046.

Select F2 to set the TAG NAMES or ENG UNITS for the Batch Backup, modifying the ASD (ASCII String Descriptor) at Block 2045.

Once the data has been entered, the Tag Name or Eng. Unit screen will appear that is shown in the section **Entering EASY STEP PLUS Specific Details**.

Step Names and Recipe Names differ in that for EASY STEP PLUS these are fixed blocks at a specific location and for CBC Utilities these functions will be editing ASCII String Descriptor Blocks that can be placed in any location. Because these blocks are not fixed, the following screen will appear:

```
ENTER BLOCK
NUMBER OF 1ST
ASCII STRING
DESCRIPTOR:
```

Once the block is entered, the Step Name or Recipe Name screen will appear that is shown in the section **Entering EASY STEP PLUS Specific Details**. The information can then be entered as described in that section.

NOTE: When using CBC Utilities, it is necessary for the user to link the start of the ASCII String Descriptor Blocks into the ASD spec of the Batch Station.

CALIBRATE CBC (Batch Command Controllers Only)

NOTE: Refer to the Batch Command Controller Instruction Book, E93-500-3 for complete information on calibration.

Configuration

The CBC Calibrate function is selectable through the SPECIAL FEATURE key and is listed under the second features menu (refer to Table 2). This feature allows the user to calibrate the Batch Command Controller thermocouple, RTD or millivolt inputs. Press the SPECIAL FEATURE key. The first feature menu will be displayed: F1 – UP/DOWNLOAD, F2 – EASY STEP PLUS, F3 – SET TIME and F4 – CONFIGURATION DUMP. Press the NEXT key and the second feature menu will be displayed. The following screen will appear:

```

F1 – CBC UTILITIES
F2 – CALIBRATE CBC
F3 – APP CARTRIDGE
F4 – FAST TUNE
    
```

1. Press F2, CALIBRATE CBC. The following screen will appear:

```

**CALIBRATION**
ENTER CBC I/O SLAVE
ADDRESS: _____
INPUT #: _____
    
```

(Select 1 – 15)
(Select 4, 5 or 6*)

* – Of the six analog inputs on the CBC01, only analog inputs No. 4, 5, and 6 can accept direct temperature inputs, i.e., thermocouples, RTD's, or millivolt inputs.

2. Enter the CBC01 I/O Slave address. Press ENTER and then enter the input number of the point to be calibrated. Once entered, the following screen will appear:

```

STANDBY
PROCESSING
CALIBRATION DATA
    
```

3. The next screen(s) to appear are dependent on the input selection; thermocouple, mV or RTD. The specs inputted during configuration for the Analog Input Definition (Function Code 182) have determined your input and, therefore, have also determined the correct screen(s).

Thermocouple/mV Inputs

The screen shown in Step 1 will only appear if the input is a thermocouple. Proceed to Step 2 if the input is mV.

1. Enter the ambient temperature at the CBC01's terminal block in degrees C.

```

ENTER AMBIENT TEMP
AT CBC TERMINAL
BLOCK IN°C:
(OR F1 TO ABORT)
    
```

2. Connect the 0 mV precision low signal value (Table 6) to the temperature/mV input terminals (Figure 9).

```

APPLY 0 mV TO
CBC INPUT # X
THEN PRESS ENTER
(OR F1 TO ABORT)
    
```

where X is the input selected

TABLE 6 – Temperature/mV/RTD Calibration Signals, Batch Command Controllers

Measurement Device Type	Signal	
	Precision Low Value	Precision High Value
TC/mV	0 mV	80 mV
RTD	100 ohms	400 ohms

NOTE: Signals applied should be within $\pm 0.01\%$ of the values listed.

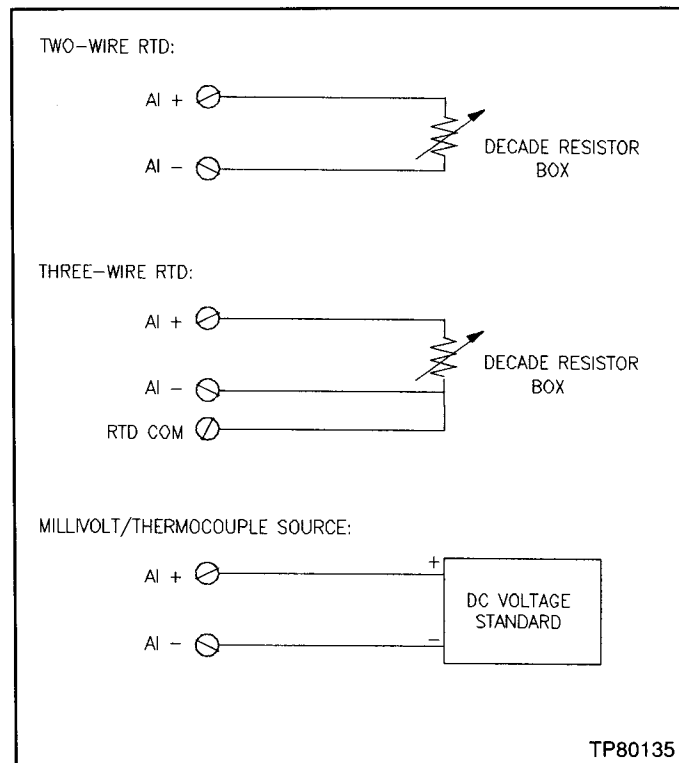


FIGURE 9 – Calibration Connections, Batch Command Controller

3. Wait for the Batch Command Controller to read the calibration signal and perform the necessary calculations. The following screen will appear:

```
STANDBY
PROCESSING
CALIBRATION DATA
```

NOTE: This screen could be displayed for 30 to 60 seconds while the calculations are being completed before the next screen appears.

4. The CTT02 will prompt you when to proceed. Connect the precision high signal value (Table 6) to the temperature/mV input terminals.

```
APPLY 80 mV TO
CBC INPUT # X
THEN PRESS ENTER
(OR F1 TO ABORT)
```

5. During the necessary calculations by the CBC01, the following screen will again appear on the CTT02:

```
STANDBY
PROCESSING
CALIBRATION DATA
```

NOTE: This screen could be displayed for 30 to 60 seconds while the calculations are being completed before the next screen appears.

6. Once the procedures are complete, the following screen will appear:

```
CAL COMPLETE
RECONNECT FIELD
INPUT # X
(F2 TO CONTINUE)
```

7. Press F2 to continue:

```
F1 – CALIBRATE ANOTHER
INPUT
F2 – EXIT CAL MODE
```

RTD Inputs

1. Connect the 100 ohms precision low value (Table 6) to the temperature/mV input terminals (Figure 9).

```
CONNECT 100 OHMS
TO CBC INPUT # X
THEN PRESS ENTER
(OR F1 TO ABORT)
```

where X is the input selected

2. Press ENTER and the following screen will appear:

```
STANDBY
PROCESSING
CALIBRATION DATA
```

3. Connect the 400 ohms precision high value (Table 6) to the temperature/mV input terminals.

```
CONNECT 400 OHMS
TO CBC INPUT # X
THEN PRESS ENTER
(OR F1 TO ABORT)
```

4. Press ENTER and the STANDBY screen will again appear. Once the procedure is complete, the following screen will appear:

```
CAL COMPLETE
RECONNECT FIELD
INPUT # X
(F2 TO CONTINUE)
```

5. Press F2 and the following screen will appear:

```
F1 – CALIBRATE ANOTHER
INPUT
F2 – EXIT CAL MODE
```

Once calibration for a specific analog input is invoked, the output of the batch I/O block associated with the analog input holds its last value all through the calibration process. The output of batch I/O starts updating its value as soon as the calibration is either finished successfully or is aborted.

During calibration, a number of errors may occur. The CTT02 Configuration and Tuning Terminal displays a brief description of these errors. Refer to Table 7 for a description of the calibration error codes.

Configuration

APPLICATION CARTRIDGE (Loop Command Controllers Only)

The Application Cartridge feature is selectable through the SPECIAL FEATURE key and is listed under the second features menu (refer to Table 2). This feature provides a simplified method of configuring a Loop Command Controller when using some common PID configurations. Four configurations are available on one cartridge at the present time: Single Loop, Dual Loop, Cascade Loop and Ratio Loop. These pre-engineered configurations allow the user to select a configuration to meet the application, answer a few questions, and have the controller up and running in minimal time. This software tool also provides flexibility to the more advanced user by using the cartridge as a starting point and then manually adding the functionality needed to customize. Refer to the **ASSOCIATED DOCUMENTS** section for a listing of the application guide available. This guide will provide the user with the screens and procedures.

FAST TUNE (Loop Command/Batch Command Controllers only)

NOTE: This feature will function with all Type CLC Loop Command Controllers and Type CBC Batch Command Controllers that were originally configured using the EASY STEP PLUS function.

The FAST TUNE feature is selectable through the SPECIAL FEATURE key and is listed under the second features menu (refer to Table 2). This feature allows Loop and Batch Command Controller users to easily tune the function codes associated with a PID configuration without actual knowledge of specific block locations. Another advantage is that the target unit may be tuned in either the CONFIGURE or EXECUTE mode.

The general types of configurations currently considered tunable using this feature are:

1. Single Loop
2. Dual Loop
3. Cascade Loop
4. Ratio Loop

Other configurations can be tuned using FAST TUNE if they meet the requirements listed under **FAST TUNE Limitations**.

The standard questions/information needed to tune the single control loop are the following PID parameters:

K, Ki, Kp, and Kd

The dual control loop is similar to the single control loop with individual PID blocks identified as LOOP 1 and LOOP 2.

The cascade control loop is the same as the dual control loop except its individual PID blocks are identified as PRIMARY and SECONDARY.

The ratio control loop is the same as that listed under the single control loop questions/information.

FAST TUNE Limitations

1. The configuration must not contain more than two PID blocks.
2. A PID FCODE cannot exist without an associated M/A station FCODE. The associated FCODES are PID Error Input (18), PID - PV and SP (19), and/or Advance PID Controller (156) with M/A station FCODES Basic (21), Cascade (22) and Ratio (23).

FAST TUNE Executable Code

An executable code provides the method in which the PID parameters are located and tuned. Once FAST TUNE is selected, the CTT must search the target module configuration for PID function codes. If the search determines that the configuration contains more than two PID's or there is a PID not associated with an M/A station FCODE, this feature cannot be used. A screen will appear with an error message. If no error message is generated, execution continues.

FAST TUNE Procedures

1. Press F4 - FAST TUNE.

```
F1 - CBC UTILITIES
F2 - CALIBRATE CBC
F3 - APP CARTRIDGE
F4 - FAST TUNE
```

2. If the search determines that the configuration does not meet the requirements, the following screen will appear:

```
*** ERROR ***
FAST TUNE WILL
NOT WORK WITH
THIS CONFIG.
```

3. If the configuration is acceptable, the following screen will appear:

```
LOOP 1      FTUN
Enter Loop Param:
FACTOR      (GAIN)
           1.00
```

The tag labels (Loop 1, Loop 2, PRIM, SECND) will appear depending on the type of configuration in your controller. The value for the factor (gain) (which is 1.00 in the preceding example) is the spec default value from the target configuration. That value can be changed or accepted as is.

4. When you are satisfied with the spec value, press ENTER to confirm. At that time, the following screen will appear:

```
LOOP 1   FTUN
Enter Loop Param:
PROPORTIONAL
      1.00
```

5. After the spec values for Proportional have been accepted or changed, similar screens will appear for Integral and for Derivative with their associated spec values.

6. Continue this process until all data has been confirmed. When the final ENTER has been completed, the following screen will appear:

```
Review Choices
or Update ?
F1 - REVIEW
F2 - UPDATE
```

7. Press F1 to review the previous parameter changes.

8. Press F2 to write the tuned specs to the target block. If another PID block was determined, then this FAST TUNE procedure will be repeated for either LOOP 2 or the SECONDARY LOOP.

9. After the procedure is completed, the software exits from FAST TUNE with the following screen displayed:

```
You Are Now
LEAVING
FAST TUNE
<-><-><-><->
```

10. After a short delay, the display returns to the module address screen.

Configuration

Diagnostics

Error Messages

An example of their use and a summary of the Error Messages is given in Table 7.

Error messages are displayed whenever an incorrect entry occurs using the Configuration and Tuning Terminal.

TABLE 7 – Error Messages

GENERAL ERROR MESSAGES

Display	Error Description	Recovery
SEND NOT ALLOWED	Send not allowed.	Enter correct block, module, or mode action.
ABORTED	Action aborted by user.	Proceed with intended action.
UNIT NOT IN CONFIGURE MODE	Unit not in CONFIGURE mode.	The action requested first requires the unit to be placed in the CONFIGURE mode.
VACANT	Vacant	No unit present or responding at that address location. Enter new address, check target unit, or check wiring. Target unit may be in an error state and need to be reset. Consult target unit Instruction Book.
****ERROR****	Error in the environment area of the screen.	Press CLEAR to return to selections, or give proper response to proceed.
****FAILED****	BIM (Bus Interface Module) has failed.	Check LIM/BIM pair.
ENTRY MUST BE AN INTEGER FROM 0-31 AND CAN NOT BE CTT ADDRESS	Entry must be an integer from 0 – 31 and can not be the address assigned to the CTT02 unit.	Follow instructions as stated.
BUSY	Target busy with another task. It will respond after current task is completed.	Wait for target unit to respond.
NO BLOCK PRESENT	No block present at that location.	Check block number.
BLK NOT DELETED	Block not deleted.	Check target unit configuration and function code list. Try again.
NOT CONFIRMED	Block not verified.	Check target unit configuration and function code list. Try again.
BLOCK ASSIGNED	Block assigned.	Check configuration – block already assigned.
OUT OF RANGE	Out-of-range.	Block # out of range of addressable blocks. Check block number.
BAD F CODE & BLOCK	Bad Function Code and Block	Block and/or function code not available in addressed unit.
INVALID FNC CODE	Invalid function code.	Function code not available in addressed unit. Check function code number.
MODE CONFLICT	Target unit not in proper mode for command to take place.	Check target unit DIP switches for proper settings. Put target unit into proper mode for command.
****ERROR**** UNIT MUST BE IN EXECUTE MODE TO SET TIME & DATE	The target unit must be in the EXECUTE mode to set the time and date.	Change target unit to EXECUTE mode to set the time and date.

Diagnosics

Display	Error Description	Recovery
****ERROR**** UNIT MUST BE IN CONFIG MODE FOR EASY STEP PLUS	The target unit must be in the CONFIGURE mode to use EASY STEP PLUS	Change target unit to CONFIGURE mode to use EASY STEP PLUS
****ERROR**** NO RESPONSE (OR F1 TO END)	Unable to communicate with target unit.	Check address of target unit. Enter correct address.
****ERROR**** EASYSSTEP PLUS MAY ONLY BE USED WITH BAT. & SEQ.	The EASY STEP PLUS feature can only be used with Batch and Sequence Command Controllers.	Select address of desired Batch or Sequence Command Controller.
* TARGET CONFIG. * * WILL BE LOST * F1 - PROCEED F2 - EXIT	Appears immediately after the user selects a fixed configuration from the APP CARTRIDGE menu screen.	Proceed or exit.
** MATH ERROR ** ENTER PREVIOUS AI VALUES AGAIN F1 - CONTINUE	Appears immediately after a math error is determined, e.g., divide by zero. (App cartridge only.)	Enter Analog Input values again.
Must Have An APPLICATIONS CARTRIDGE for this choice.	Appears after SPECIAL FEATURES Menu 2 choice of F3 - APP CARTRIDGE if an application cartridge is not present in Type CTT02/12.	Insert applications cartridge and repeat procedure.
****ERROR**** FAST TUNE will not work with this config.	Configuration in target unit does not meet requirements.	Refer to Fast Tune in CONFIGURATION section and note limitations. If unable to use FAST TUNE, use standard keystroke sequence on CLC or EASY STEP for CBC units.

UPLOAD/DOWNLOAD ERROR MESSAGES

Display	Error Description	Recovery
****ERROR**** OUT OF MEMORY STOPPED STORING AT BLOCK # XXXX	The user has used all the memory in the CTT02 available for configuration storage. XXXX is the last block stored.	Delete a previously stored configuration from the CTT02 and the configuration recently uploaded. Try uploading again or use another cartridge.
****ERROR**** NO MORE MEMORY AVAILABLE TO STORE CONFIG.	The user has used all the memory in the CTT02 available for configuration storage.	Delete a previously stored configuration from the CTT02 or use another cartridge.
****ERROR**** UNIT MUST BE IN CONFIGURE MODE TO DOWNLOAD	The target unit must be in the CONFIGURE mode to download.	Change to CONFIGURE mode.
****ERROR**** MODULE TYPE MISMATCH	The type of target unit you are attempting to download to is of a different type than the configuration stored. Example: Type of configuration stored is a Loop Command configuration and you are trying to download to a Sequence Command.	Select correct target unit. Try again.
****ERROR**** THERE ARE NO CONFIGURATIONS PRESENTLY STORED	No configurations are presently stored in the CTT02 cartridge.	Add configurations. Maximum of 32 configurations can be stored in the CTT02 cartridge.
XXXXXXXXXXXXX ERROR DETECTED AT BLOCK #XXXX DOWNLOAD ABORTED	An error was detected during the download operation at block #XXXX. First line of message displays the problem encountered.	Check stored configuration at Block #XXXX and see Note ¹ .
****ERROR**** CONFIGURATION BY THE SAME NAME ALREADY EXISTS	Configuration ID name already exists.	Choose another ID name or delete previous configuration by the same name.
ERROR CARTRIDGE NOT INSERTED	Cartridge not installed in CTT.	Install cartridge in CTT.
ERROR DELETION HALTED CARTRIDGE ERROR AT CF:XXXXXXXX	Appears whenever the deletion process of a configuration within the cartridge cannot be verified.	User should SAVE the remaining configurations in the cartridge to another cartridge and initialize the errant cartridge.

NOTE ¹ - Download error will be detected when a stored configuration in an enhanced Loop Command (CLC02) is downloaded to a basic Loop Command (CLC01). The CLC02 has advanced math functions, and therefore has additional function codes that the CLC01 does not have.

Service and Replacement

No periodic maintenance is necessary for the Configuration and Tuning Terminal.

The flexible cord, Part No. 1948517-1, on the CTT02 is the only replaceable part. CTT02 replacement and company services are available for special maintenance requirements.

Replacement or additional blank cartridges, Part No. 6637531-1, are also available.

Replacement or additional application cartridges, Part No. 6637531-2, are also available.

Step Logic Definition

STEP # 5

STEP NAME Filter 2 on Line

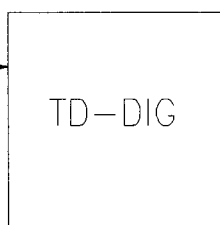
STEP ACTIVE BOOLEAN INDICATOR LOCATED AT BLOCK OUTPUT # 225

NOTE: If using EASY STEP PLUS the block output # = 350 + STEP # (Batch)
 = 220 + STEP # (Sequence)

STEP
INDICATOR

FUNCTION
CODE #126
"RDEMUX"

S1



T = 2 HRS

(35)

STEP
DONE
TRIGGER
SELECT

FUNCTION
CODE #119
"BMUX"

Description: Wait for 2 hours.

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Appendix B

Sequence Command Controller – EASY STEP PLUS KEYSTROKE SEQUENCE

Objective	Keystrokes	Display	Comments
1) Address target unit	ADDRESS	ENTER MODULE ADDR>	
	5, ENTER	MODULE - 5> TYPE - SEQ CMD MODE - CONFIGURE F4 - diagnostics	Target unit to be selected. See *Possible Response for this line.
	*Possible Response	{ MODE - CONFIGURE OR MODE - EXECUTE OR MODE - ERROR	The target unit is already in the CONFIGURE mode. If true, disregard Objective 2) and proceed to Objective 3).
			The target unit is in the EXECUTE mode. A mode change is required before configuration can be started. Proceed to Objective 2).
2) Changing Mode of Target Unit to CONFIGURE	CONFIGURE	MODE CHANGE TO CONFIGURE MODE CLEAR - ABORT F2 - PROCEED	
	F2	MODE - CONFIGURE	Verification that the target unit is now in the CONFIGURE mode.
3) Selecting EASY STEP PLUS	SPECIAL FEATURE	F1 - UP/DOWN LOAD F2 - EASY STEP PLUS F3 - SET TIME F4 - CONFG DUMP	
	F2	F1 - BEGIN NEW CFG F2 - EDIT OLD CFG	Only appears if target configuration was configured with EASY STEP PLUS.
	F1	CONFIG IN SEQ CMD WILL BE LOST F1 - PROCEED F2 - ABORT	Appears for all new configurations using EASY STEP PLUS.

AUXILIARY LOGIC REQUIRED

Alarm Output

It is desirable to generate an alarm signal if any alarm conditions are indicated by the configuration or the Controller is forced into the E-STOP step. Some auxiliary logic will have to be added to accomplish this. Refer to Figure C3.

Batch Report

A batch report will be generated using a printer connected to the RS232 port. Exception Report blocks (Function Codes 30 and 45) must be configured and tied to

the parameters to be logged in the batch report. The points chosen for this example are:

1. Recipe number.
2. Total product output for batch.
3. Recipe parameter used.
4. Alarm summary flag.

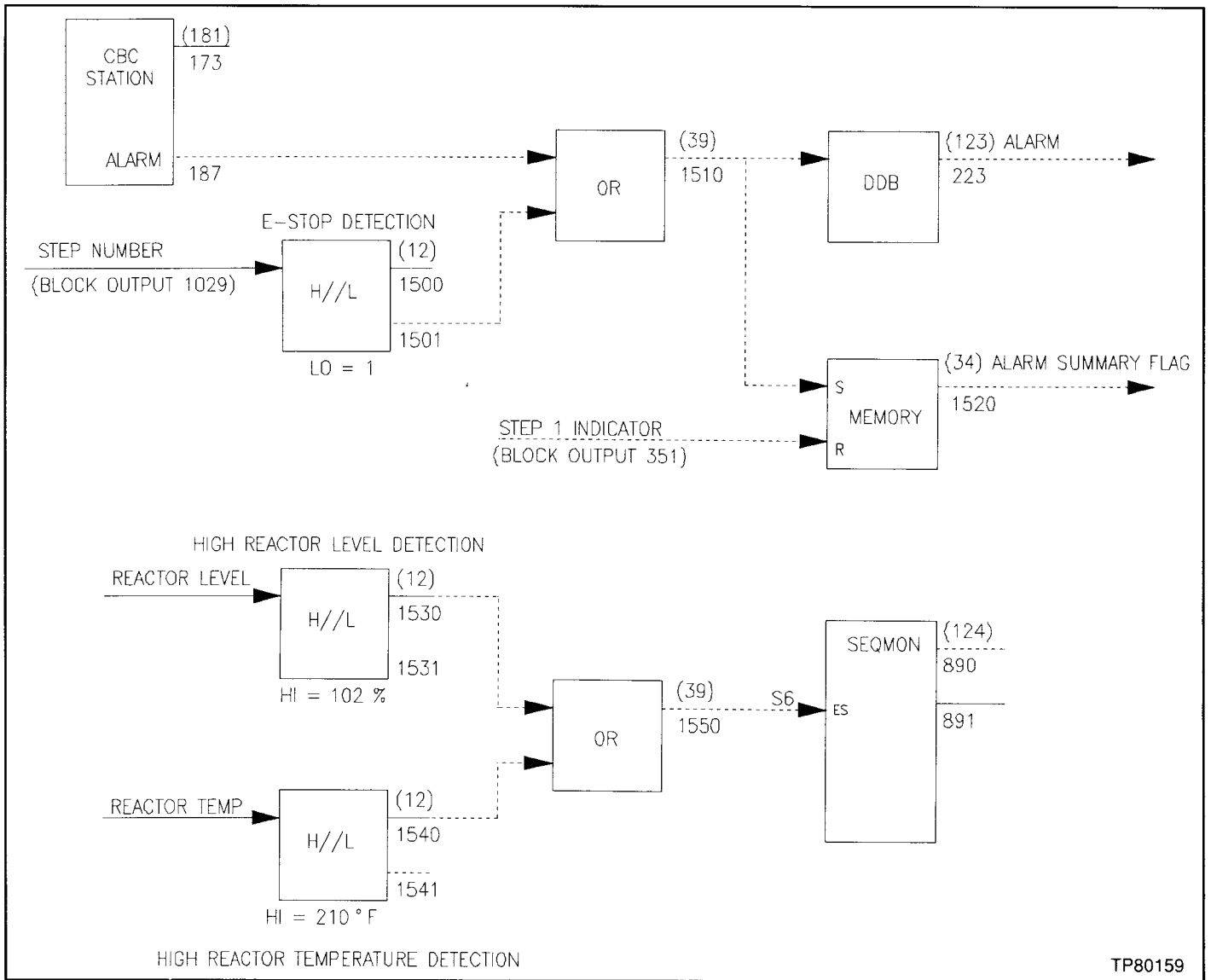


FIGURE C3 – Auxiliary Logic for Alarm Outputs

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Appendix C

Batch Command Controller – EASY STEP PLUS KEYSTROKE SEQUENCE

Objective	Keystrokes	Display	Comments
1)Address Target Unit	ADDRESS	<div style="border: 1px solid black; padding: 5px; width: fit-content;"> ENTER MODULE ADDR > </div>	
	4, ENTER	<div style="border: 1px solid black; padding: 5px; width: fit-content;"> MODULE – 4 TYPE – BATCH CMD MODE – CONFIGURE F4 – diagnostics </div>	<p>Target unit to be selected.</p> <p>See *Possible Response for this line.</p>
	* Possible Response	<div style="display: flex; align-items: center;"> <div style="font-size: 4em; margin-right: 10px;">}</div> <div> <p>MODE – CONFIGURE</p> <p>MODE – EXECUTE</p> <p>MODE – ERROR</p> </div> </div>	<p>The target unit is already in the CONFIGURE mode. If true, disregard Objective 2) and proceed to Objective 3).</p> <p>The target unit is in the EXECUTE mode. A mode change is required before configuration can be started. Proceed to Objective 2).</p> <p>The target unit is in the ERROR mode. A mode change is required before configuration can be started. Proceed to Objective 2).</p>
2)Changing Mode of Target Unit to CONFIGURE.	CONFIGURE	<div style="border: 1px solid black; padding: 5px; width: fit-content;"> MODE CHANGE TO CONFIGURE MODE CLEAR – ABORT F2 – PROCEED </div>	
	F2	<p>MODE – CONFIGURE</p> <p style="text-align: center;">or</p> <p>MODE – EXECUTE</p> <p style="text-align: center;">or</p> <p>MODE – ERROR</p>	<p>Verification that the target unit is now in the CONFIGURE mode. Proceed to Objective 3).</p> <p>NOTE: Also address the Sequence Command Controller being used to store the recipe data and put it in the CONFIGURE mode before entering the EASY STEP PLUS mode.</p> <p>Action depends upon status or error message meaning. Proceed based on these.</p>
3)Select EASY STEP PLUS.	SPECIAL FEATURE	<div style="border: 1px solid black; padding: 5px; width: fit-content;"> F1–UP/DOWNLOAD F2–EASYSTEP PLUS F3–SET TIME F4–CONFIG. DUMP </div>	
	F2	<div style="border: 1px solid black; padding: 5px; width: fit-content;"> F1 – BEGIN NEW CFG F2 – EDIT OLD CFG </div>	<p>Appears only if there is an old configuration configured with EASY STEP PLUS</p>

Batch Command Controller – EASY STEP PLUS KEYSTROKE SEQUENCE (continued)

Objective	Keystrokes	Display	Comments
	F1	<div style="border: 1px solid black; padding: 5px;"> CONFIG IN BATCH CMD WILL BE LOST F1 – PROCEED F2 – ABORT </div>	Otherwise, this screen appears for any new configuration using EASY STEP PLUS.
4)Enter the data when prompted by the CTT02.	F1	<div style="border: 1px solid black; padding: 5px;"> EZ ENTER # OF BATCH COMMAND UNITS (1-2): </div>	
	1,ENTER	<div style="border: 1px solid black; padding: 5px;"> EZ ENTER # OF SEQUENCE COMMAND UNITS (0-4): </div>	
	1,ENTER	<div style="border: 1px solid black; padding: 5px;"> EZ ENTER # OF STEPS (1-32): </div>	
	12,ENTER	<div style="border: 1px solid black; padding: 5px;"> EZ ENTER # OF CBC DIGITAL INPUTS (0-2):* </div>	*The input and output ranges on the 4th line of the screens will vary depending on the number of Batch and/or Sequence units used in the process.
	2,ENTER	<div style="border: 1px solid black; padding: 5px;"> EZ ENTER # OF CSC DIGITAL INPUTS (0-16):* </div>	
	16,ENTER	<div style="border: 1px solid black; padding: 5px;"> EZ ENTER # OF CBC DIGITAL OUTPUTS (0-2):* </div>	
	2,ENTER	<div style="border: 1px solid black; padding: 5px;"> EZ ENTER # OF CSC DIGITAL OUTPUTS (0-12):* </div>	
	10,ENTER	<div style="border: 1px solid black; padding: 5px;"> EZ ENTER # OF HIGH LEVEL ANALOG INPUTS (0-6):* </div>	*The input and output values on the 4th line of the screens will vary depending on the number of Batch and/or Sequence units used in the process.
1,ENTER	<div style="border: 1px solid black; padding: 5px;"> EZ ENTER # OF LOW LEVEL ANALOG INPUTS (0-3):* </div>		

Appendix C

Batch Command Controller – EASY STEP PLUS KEYSTROKE SEQUENCE (continued)

Objective	Keystrokes	Display	Comments
	2,ENTER	<div style="border: 1px solid black; padding: 5px; text-align: right;">EZ</div> ENTER # OF PULSE INPUTS (0-2):*	
	1,ENTER	<div style="border: 1px solid black; padding: 5px; text-align: right;">EZ</div> ENTER # OF ANALOG LOOPS (0-2):	
	1,ENTER	<div style="border: 1px solid black; padding: 5px; text-align: right;">EZ</div> ENTER # OF RECIPES (0-32):	
	2,ENTER	<div style="border: 1px solid black; padding: 5px; text-align: right;">EZ</div> ENTER # OF RECIPE PARAM'S (0-10):	
	6,ENTER	<div style="border: 1px solid black; padding: 5px; text-align: right;">EZ</div> ENTER MODULE ADDRESS TO STORE RECIPES:	Enter address of target unit that will store recipe data, typically CBC or CSC.
	3,ENTER	<div style="border: 1px solid black; padding: 5px; text-align: right;">EZ</div> ENTER CSC SLAVE #1 I/O ADDRESS (2-30):	
	2,ENTER	<div style="border: 1px solid black; padding: 5px; text-align: right;">EZ</div> ENTER CSC SLAVE #1 STATION ADDRESS (0-7):	
	1,ENTER	<div style="border: 1px solid black; padding: 5px; text-align: right;">EZ</div> AUTO RESTORE? F1 – YES F2 – NO	
	F2	<div style="border: 1px solid black; padding: 5px;"> **STANDBY** □□□□□□□□ PROCESSING EASYSTEP DATA </div>	
		<div style="border: 1px solid black; padding: 5px;"> F1-STEP MASK F2-STEP LOGIC F3-DEVICE DRIVER F4-END </div>	