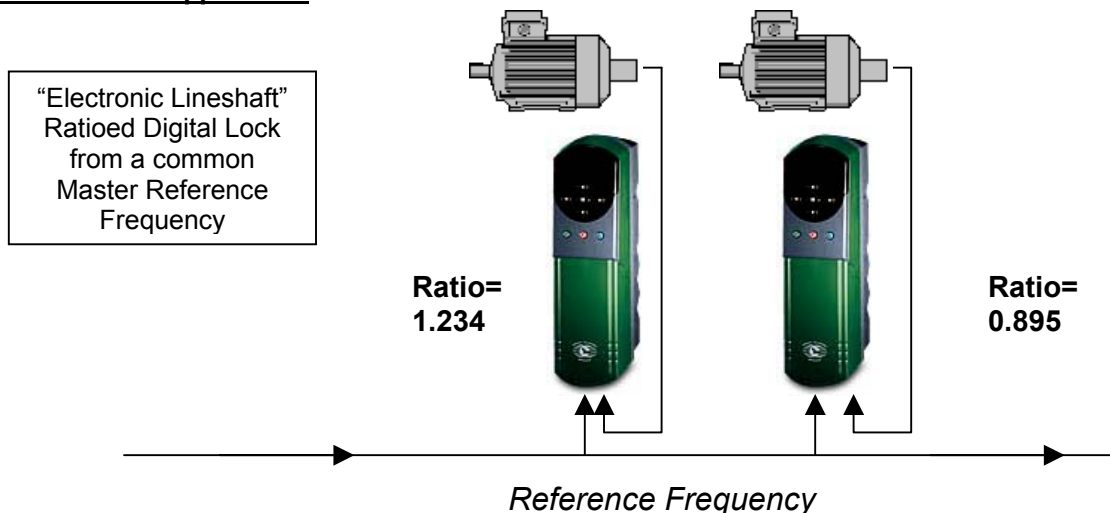**This Application Note is pertinent to the Unidrive Family**

Digital Locking Basics

The UD51 Second Encoder module provides the Unidrive with the ability to monitor speed and/or position of an additional encoder.   Typically this module would be used to enable the Unidrive (operating in the closed loop Vector or Servo modes) to follow an external frequency in Digital Lock with ratio adjustability. This application note will provide some basic information to get started with a Digital Lock application.

Typical Applications

Parallel Ratio Application

> "Electronic Lineshaft"
> Ratioed Digital Lock
> from a common
> Master Reference
> Frequency

Ratio=
1.234

Ratio=
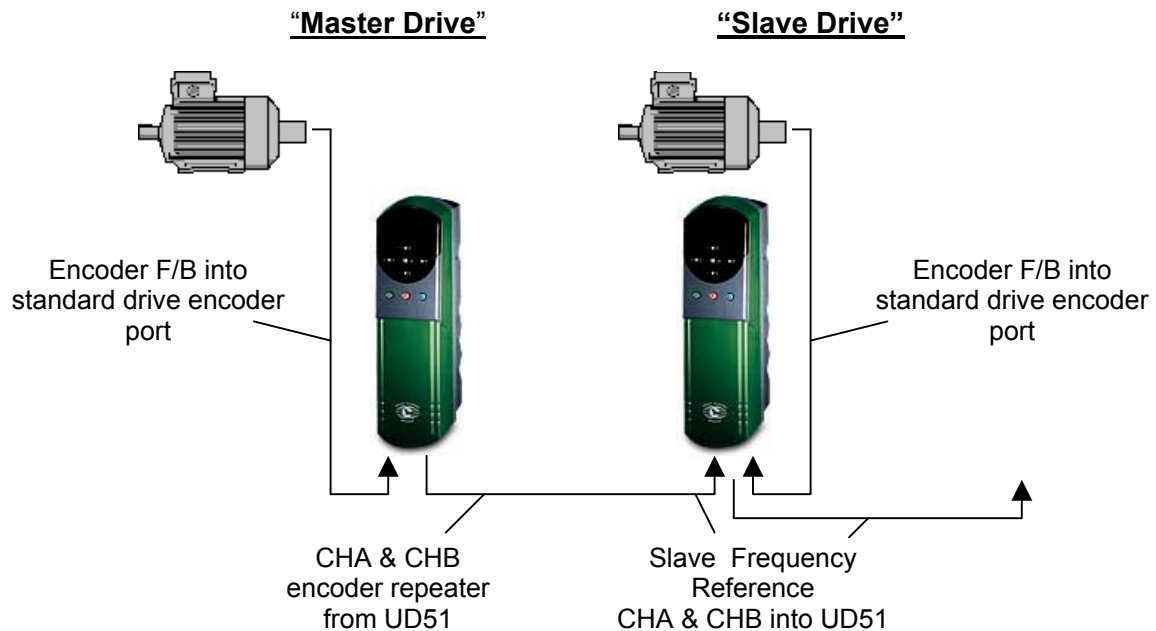0.895

Reference Frequency

The reference frequency could be a simple differential frequency (or frequency and direction) or a reference frequency from a quadrature source. In the example above, the master reference frequency would be repeated out of the 1st UD51 to the input of the next so that the reference source would experience only a single load.

The above application would be a "*parallel*" ratio control scheme where each drive is ratioed to a master line speed reference and would follow this line speed at its designated ratio but each drive ratio would be independent of each other.

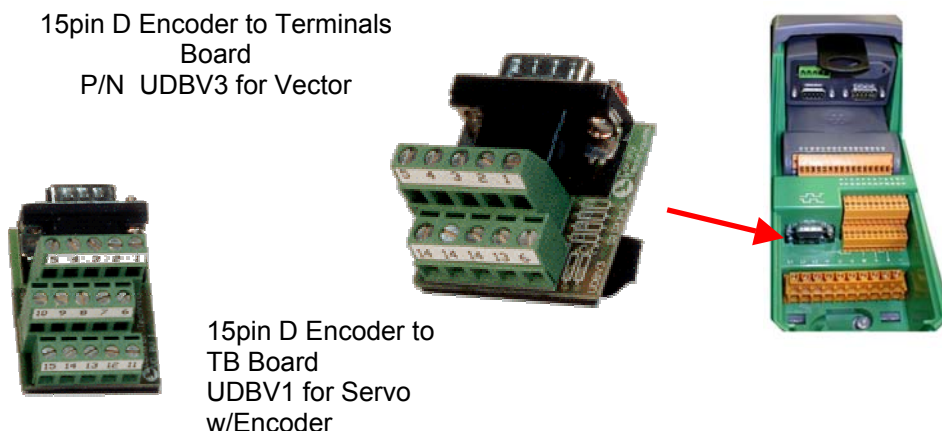For more information on the UD51 module, click on the link below:

www.emersonct.com/pdProducts/downloads/literaturePDF/pdCatalog2003/Unidrive.pdf

Master/Slave "Cascaded Ratio" Situations

"**Master Drive**"   "**Slave Drive**"

Encoder F/B into
standard drive encoder
port

Encoder F/B into
standard drive encoder
port

CHA & CHB
encoder repeater
from UD51

Slave Frequency
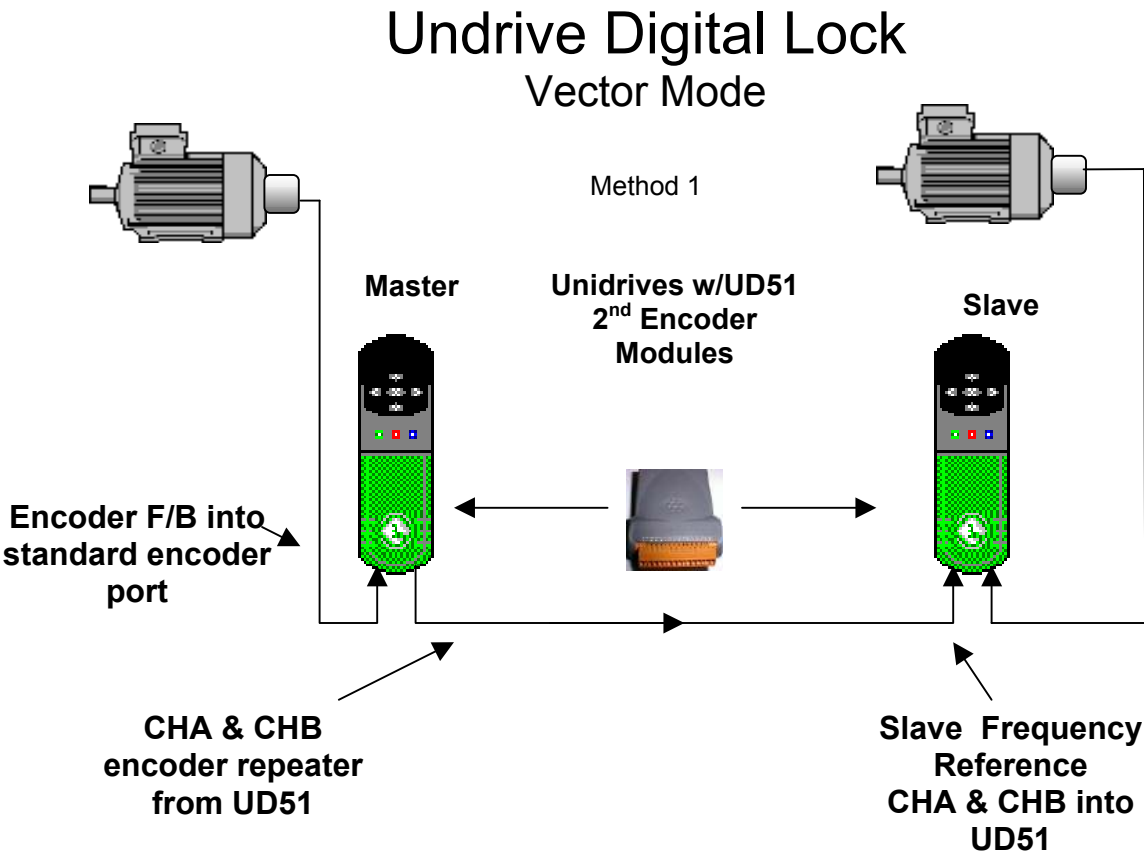Reference
CHA & CHB into UD51

In this example, the source could be from another machine section that has an
encoder as is desired to be followed such as a Master and Slave situation. The speed
of other drives further downstream are dependent upon the ratios of drives before it in
the cascaded ratio control method. The Master drive is using a UD51 to repeat the
motor encoder quadrature signals. The Slave drive has a UD51 to receive the
quadrature input. If desired, the slave can follow the master 1:1 or at some ratio
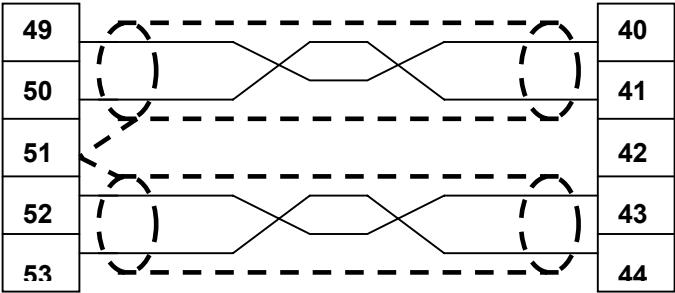(between 0.001-4.000) that can be controlled by the machine Operator.

Note: To facilitate wiring of the reference frequency into the Unidrives on-board
encoder feedback or reference input 15-pin D connector, an adapter board is available
as shown below that so that soldering is not necessary.

15pin D Encoder to Terminals
Board
P/N UDBV3 for Vector

15pin D Encoder to
TB Board
UDBV1 for Servo
w/Encoder

Listed below are a few notes concerning conceptual hook-up and initial setup of the Unidrive performing Digital Lock operating in the a closed loop mode with encoder feedback.

Undrive Digital Lock
Vector Mode

Method 1

Master   **Unidrives w/UD51
2nd Encoder
Modules**   **Slave**

**Encoder F/B into
standard encoder
port**

**CHA & CHB
encoder repeater
from UD51**

**Slave Frequency
Reference
CHA & CHB into
UD51**

UD51

49		40
50		41
51		42
52		43
53		44

Individually shielded twisted pair cable with
an over-all shield Belden 8777 or equiv

Available from Control Techniques Service
Center
– call 716-774-0093 ask for Tech Support
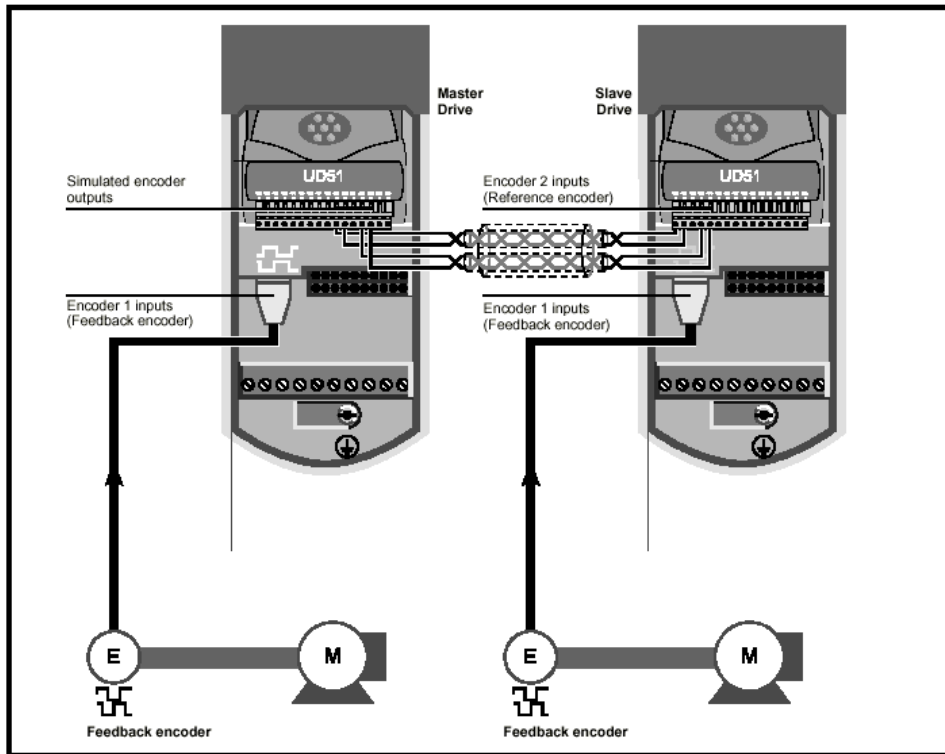
Undrive Digital Lock

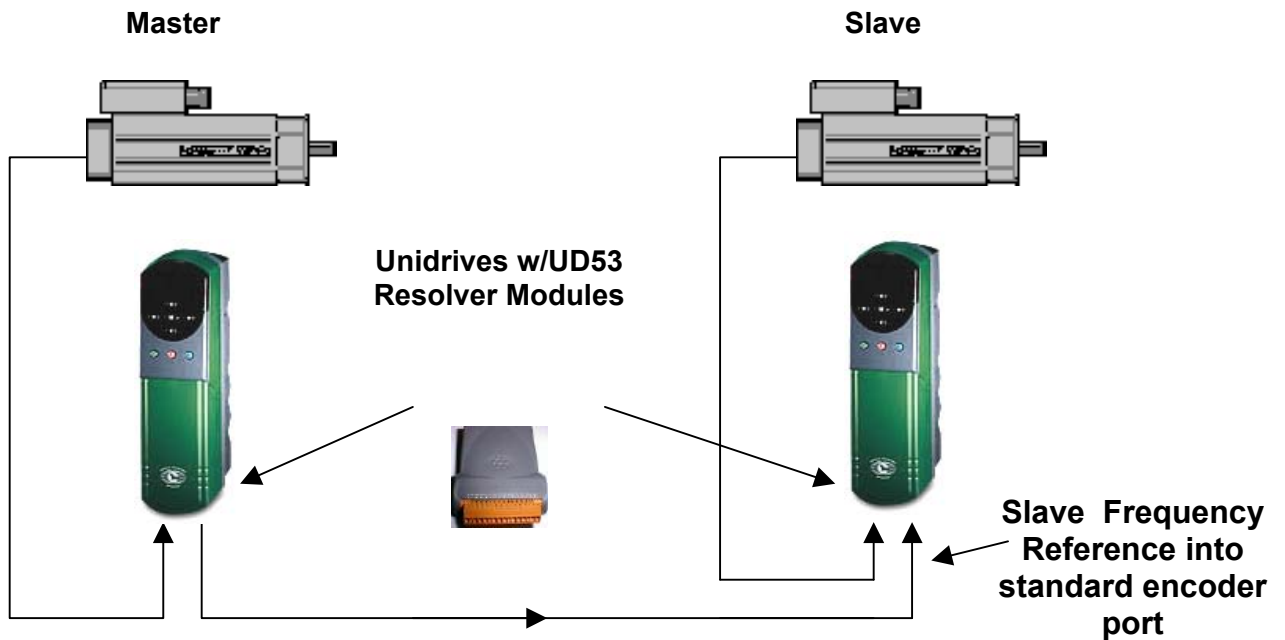**Figure 3–22 Master-slave signal connections for digital lock when encoders are used**

Initial Parameter Setting for Digital Lock

Parameter #	Value	Comment
2.02	0	Disable Accel Ramps
2.04	1	Fast Ramps- typically requires DB*
3.20	1	Directs Position Trim into Hard Reference via #3.19
13.08	Typically 1 for rigid lock	Digital Lock w/ Feed forward (*see #13.08 for details*)
13.07	1.000	Slave Ratio to Master (max 4.000)
13.09	0.1	Position Loop Gain
13.10	150	Position Trim Limit

- DB- dynamic braking resistor

Undrive Digital Lock
Motors w/Resolver F/B

Master   **Slave**

**Unidrives w/UD53
Resolver Modules**

**Slave Frequency
Reference into
standard encoder
port**

Master Frequency Reference using simulated output

Master
Drive

Slave
Drive

Resolver inputs
(Feedback resolver)

Simulated encoder
outputs

UD53

Resolver inputs
(Feedback resolver)

UD53

Encoder 1 inputs
(Reference encoder)

Individually shielded twisted
pair cable with an over-all
shield Belden 8777 or equiv

Available from Control
Techniques Service Center
– call 716-774-0093 ask for
Tech Support

R   M   R   M

Resolver   Resolver

Master-slave signal connections for digital lock when resolvers are used

Additional Information on Ratio Adjustment

For Inc/Dec Control of Ratio- click on link below: see Example 2

www.emersonct.com/pdProducts/downloads/appNotesPDF/ctan114.pdf

For Analog Control of Ratio- click on link below:
www.emersonct.com/pdProducts/downloads/appNotesPDF/ctan115.pdf

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