ALLEN-BRADLEY
BULLETIN 1336 PLUS
SPEED DROOP

APPLICATION NOTE # 1336S-14

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PURPOSE

The purpose of this document is to provide guidelines for wiring and control schemes for the Bulletin 1336 PLUS AC Drive. This document is to be used as a suggestion only. Users must ensure that installations meet applicable codes and are suitable for the existing conditions.

WHAT THIS NOTE CONTAINS

Digital programming of the Bulletin 1336 PLUS AC Drive allows Users to configure an automatic speed DROOP feature. This function will adjust the output frequency automatically with changes in load. As the load increases, the drive will decrease or DROOP the output frequency.

INTENDED AUDIENCE

This application note is intended to be used by personnel familiar with the hardware components and programming procedures necessary to operate the Bulletin 1336 PLUS.

WHERE IT IS USED

This feature is used where two or more drives / motor combinations are used to run one load. The diagrams, parameter settings, and auxiliary hardware used in this application note are designed to address specific issues in many different applications. Some changes by the Users may be necessary to apply the concepts of this document to a specific application.

TERMS AND DEFINITIONS

GROUP	Categorized block of parameters with related functions.
ELEMENT	Individual parameters within a given group.
[ ]	Denotes a parameter name

DESCRIPTION

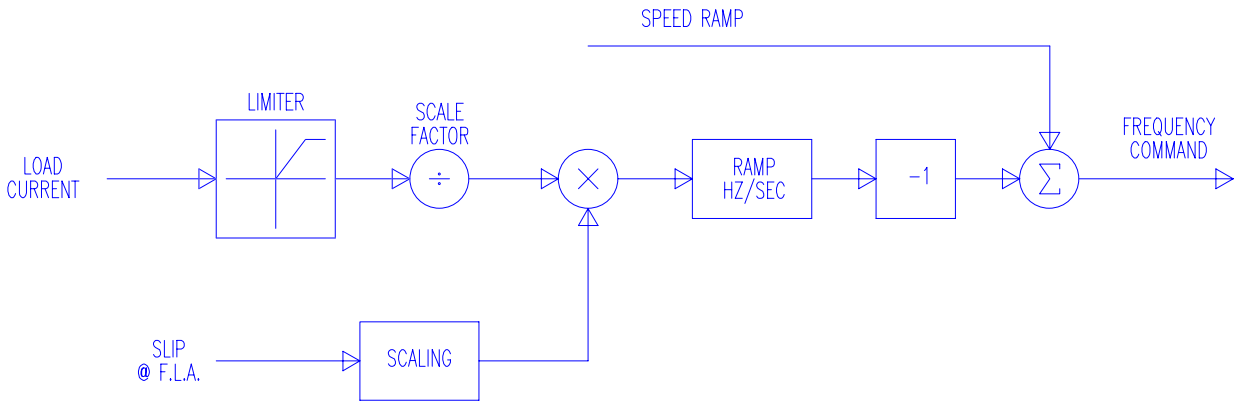
Induction motors are designed with an inherent slip characteristic. This refers to the rotor speed lagging the stator. For Discussion purposes, we will assume the following motor characteristics:

- Nema design B
- 460v / 60Hz
- 4 pole
- 6.25FLA
- 5HP
- 1750RPM

The Speed Droop function works as an open loop speed regulator that decreases the output frequency of the drive as the motor torque increases. The drive utilizes hardware and software to determine a value of torque current. Torque current is the component of fundamental current that is in phase with the fundamental voltage.

As motor torque current increases, the drive will decrease the output frequency to allow the motor to droop. As torque decreases, the drive will increase the output frequency.

Figure 1



APPLICATION CONSIDERATIONS

The Droop function is enabled by selecting *Speed Droop* as the speed control method. [Speed Control] is a parameter located in the FEATURE SELECT group. The amount of Droop that will be subtracted from the output frequency at full load is determined by the setting of the [Slip @ F.L.A.] parameter, also located in the FEATURE SELECT group. The response of the droop circuit can be adjusted by setting [Slip Comp Gain], 1 being the slowest and 40 the fastest.

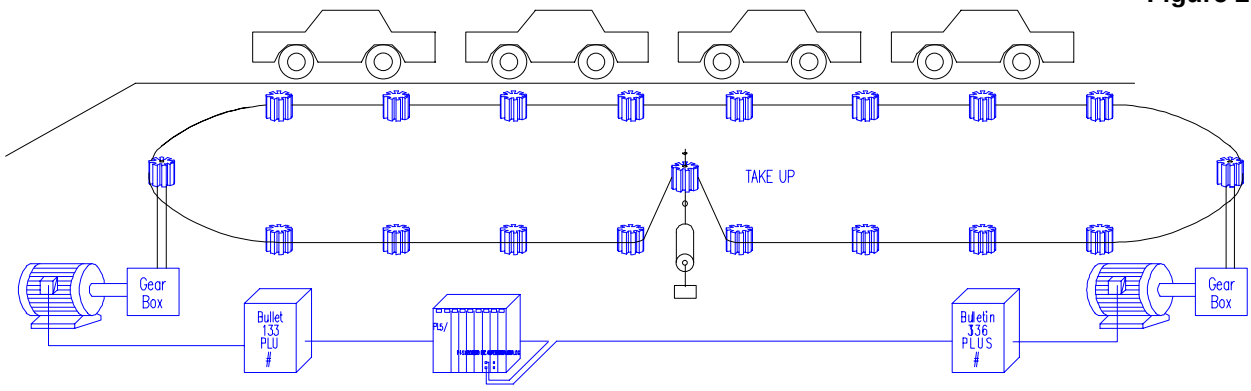
PARAMETER SETTINGS

NUMBER	GROUP	NAME	SETTING
77	Feature Select	Speed Control	Speed Droop
42	Feature Select	Slip @ F.L.A.	1 - 10hz
195	Feature Select	Slip Comp Gain	1 - 40

The DROOP feature is used in applications that have two or more motors that are mechanically connected via the load. Each drive must control only one motor for the function to work properly. The control source should supply all of the drives with an identical speed reference. This setup will allow the system load to be shared by each motor.

AUTOMOTIVE CHAIN CONVEYOR

Figure 2



APPLICATION EXAMPLE

Figure 2 shows a typical example for the Speed Droop feature. The chain conveyor shown above is used to transfer car bodies through the final assembly area. This application is usually a 5-15hp motor with a 250:1 (typical) gear reduction. Since the motors are mechanically interlocked, they will need to load share. The "take-up" adjusts the tension of the chain but does not directly affect the load of an individual motor. Therefore, the drive must adjust the output frequency based on load changes.

To accomplish this, the PLC or other controller, will control the speed command being sent to the drives. Both drives can be programmed for droop operation. Or the lead drive may be used as the “speed regulator” with the second drive used as a “torque helper” to share the load. Since the 1336S does not have a torque control mode, the speed regulator will be used to shed the load of an individual motor as the system cycles through the process.

When a car is finished and removed from the line, the load on drive #1 will decrease. At this time, another vehicle is added to the conveyor causing drive #2 to see an increase in load. Drive/motor #2 will decrease its' output frequency causing more of the load to be taken by drive/motor #1.