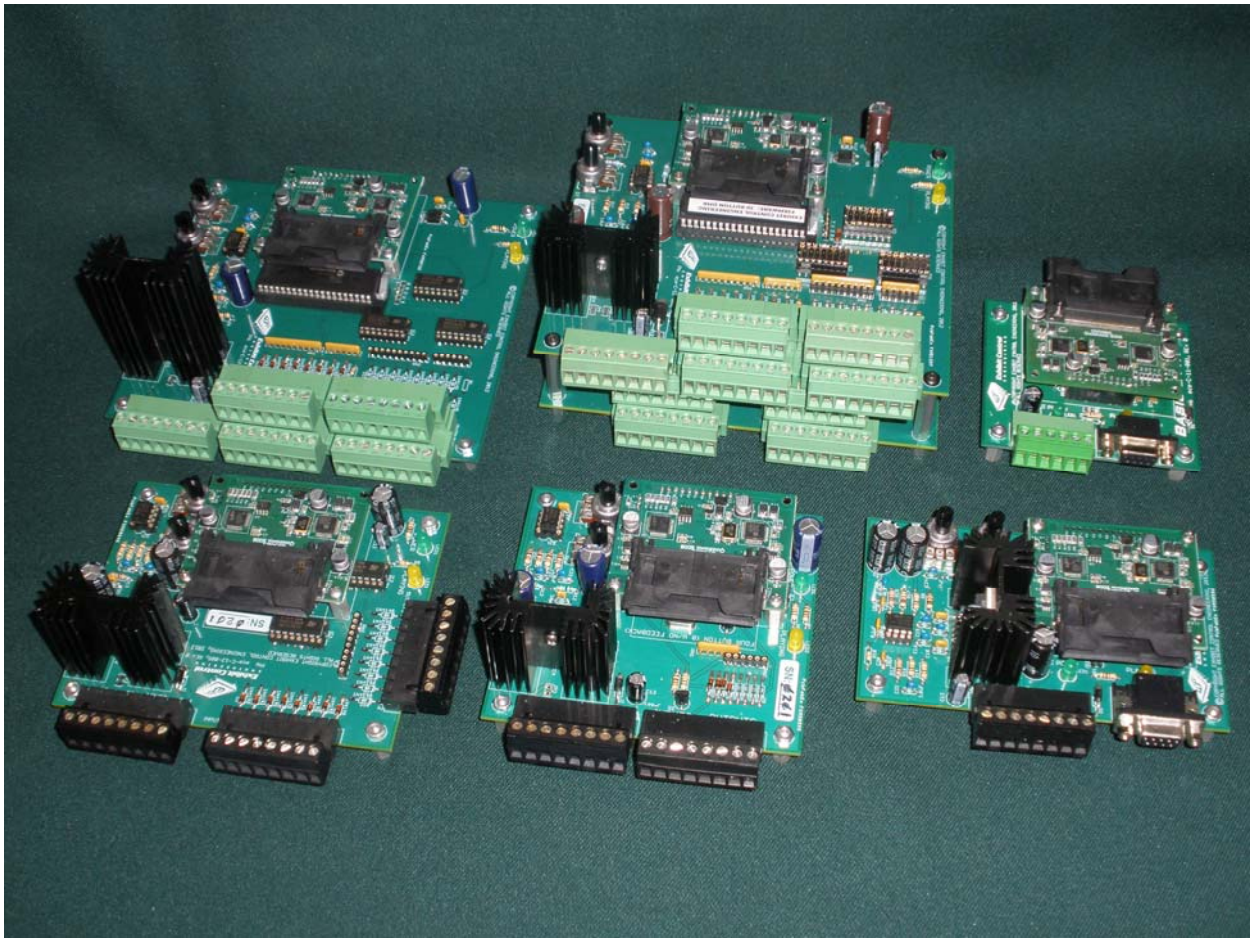
Economical
Digital Message Repeaters
(DMRs / mp3 Players)
for
The Museum and Exhibit Industries

by

Exhibit Control
ENGINEERING
102 Waterview Circle
Forest, VA 24551
(434) 385-4144
EMAIL: exhibit_control@yahoo.com
WEB: www.exhibit-control.net



ECE's BASIC DMR Series

(mp3 Player)

Overview

Exhibit Control Engineering has developed an economical series of DMR players. The first thing to go in our strategy to reduce costs was the metal enclosure. Our DMRs are bare circuit boards. We envisioned that they would be located in either an exhibit structure/kiosk or installed in an electronic rack, both of which provide protection for the electronics, eliminating the expense of a metal enclosure. The second strategy for reducing cost was to provide a number of versions of DMRs so the user isn't buying capability they don't need.

Description

The circuits and quality for all the DMRs are the same, only the method of control varies in each version of the Basic DMR. They play stereo mp3 files copied onto flash memory cards. Any version can either provide unbalanced line level audio or can have a 10W per channel amplified speaker level audio.

There are two basic types of control: serial and switch. With either type of control the following features can be provided: play one of 254 files; stop file playing; mute and un-mute both channels of audio; volume up or down; pause; resume and set and clear loop mode. Volume up and down can be accomplished by either up and down button controls or via a potentiometer. In the serial control mode you can also poll the player for its status and current volume. Serial control is via a very simple protocol that uses not more than two bytes of data.

For those DMRs that are controlled via switches (buttons), our DMR has a feature we don't believe is available on any other DMR: we can provide feedback for each button. We can provide a current sink of up 500ma at 30vdc for each button input. This is enough power pass-through to illuminate LEDs, power 12vdc lamps or trigger larger power relays to control light boxes or other binary electronic devices. Most commonly, they are used to activate LEDs in the illuminated buttons: all buttons are on when no audio (or the attract audio) is playing and then when a button is pressed to play its audio, it remains illuminated while the other button indicators are extinguished. Other scenarios could be specified for light boxes or other designs.

The amplifier circuit can easily provide 10 watts per channel. The circuit can actually provide up to 38 watts per channel. The challenge to obtaining the higher level of audio is providing an adequate sized heat sink (which we can provide) and finding a power supply that can provide the needed juice without inducing noise. We can provide a power supply for the 10W versions at

additional cost but are still looking for a suitable, more powerful supply for the greater audio outputs above 10W.

Versions of the Basic DMR:

Basic DMR Number 1: Not pictured – loops all files on the memory card, as long as it is powered. Most appropriate for audio sound-scapes or background audio. It looks like the unit Figure 1, but it doesn't have a serial port. There is no external control for this DMR. Volume adjustment must be accomplished via the attached amplifier. The version of this DMR with amplified audio looks like the unit in Figure 2 but without the serial port. On this unit, there are volume adjustment potentiometers, one for each channel.

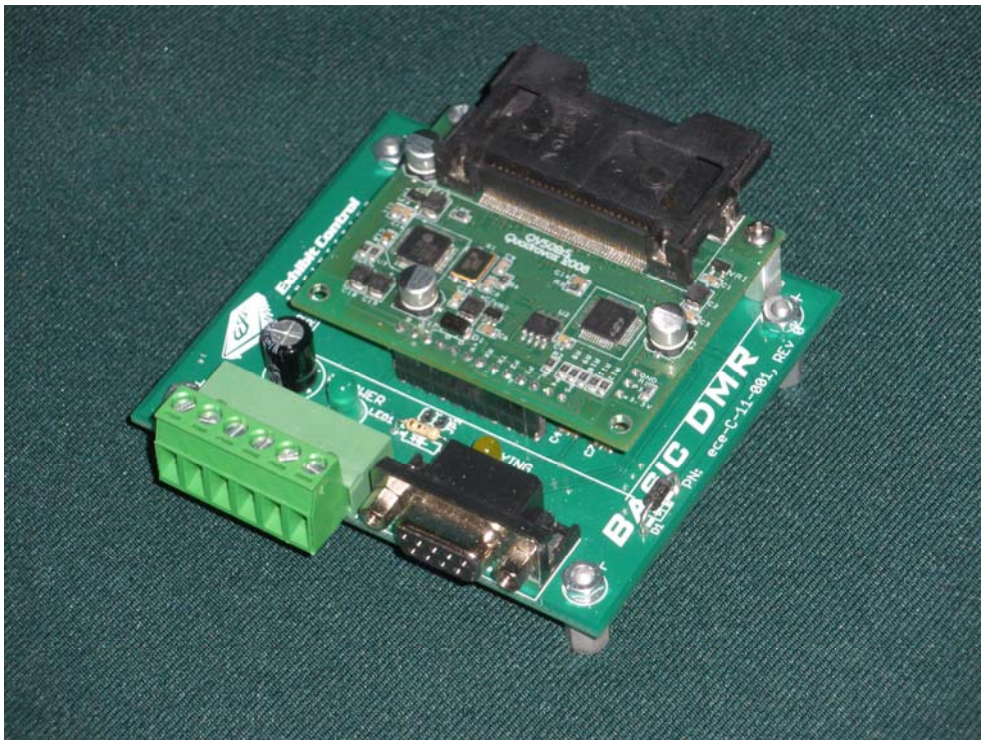


Figure 1 - Serially Controlled DMR

Basic DMR Number 2: Serially controlled DMR – Figure 1. This unit also has a tally output (low signal when it is playing, high when not playing a file). The version of this serial DMR with amplified audio is seen in Figure 2. The two

volume potentiometers can be used to limit the amount of maximum volume that can be achieved using the serially controlled volume strings.

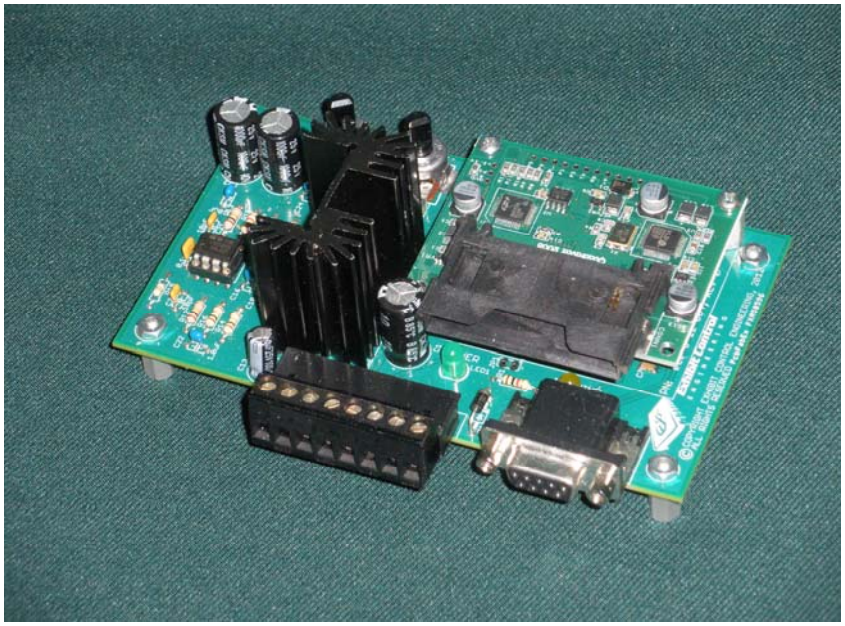


Figure 2 - Serially Controlled DMR with Amplifier

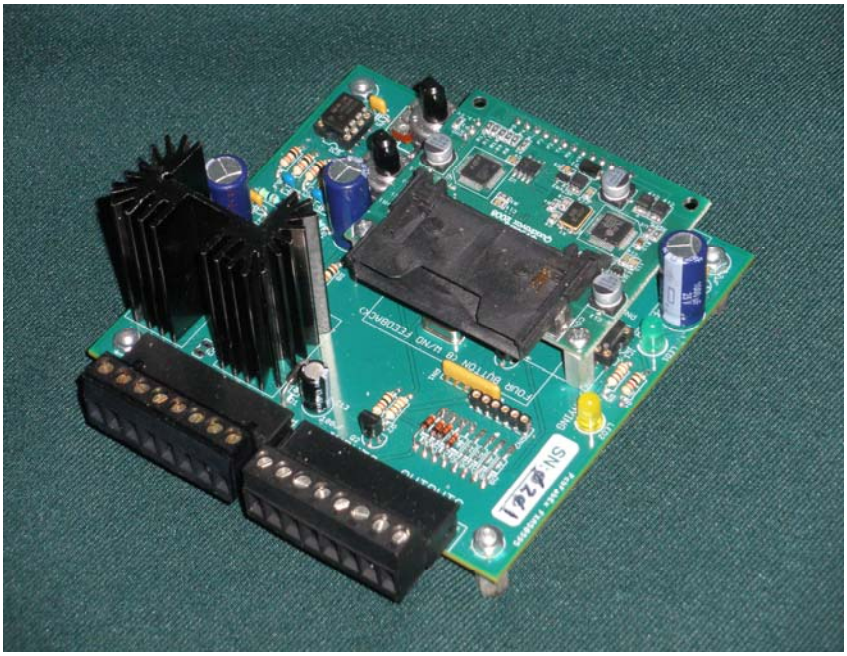


Figure 3 DMR 4 – Inputs and 4 - IOs

Basic DMR Number 3: This and all following DMRs are controlled via switches (buttons). This unit, seen in Figure 3, has four inputs for buttons or switches and another four optional IOs. One standard configuration is for four buttons to play one of four files and the other four IOs to provide feedback. Other, more practical uses for this unit would be audio (or its volume) to be triggered by motion detectors, inputs to be used to mute and un-mute the audio or adjust volume. All of the button versions of our DMRs could have a button that plays the next file and could cycle through up to 254 files. Or, they could play several pre-designated files. The non-amplified version of this DMR is the same PCB without populating the amplifier components.

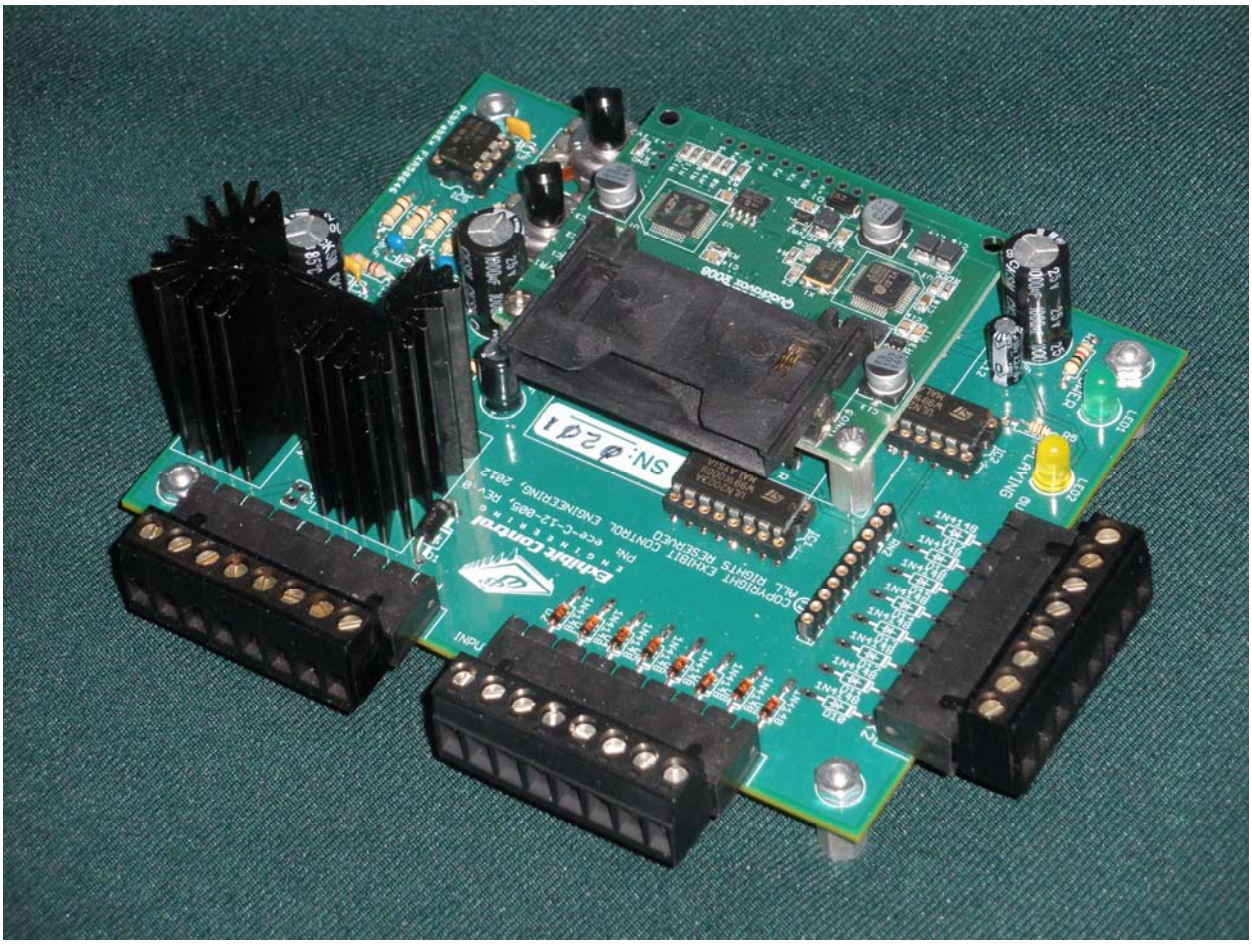


Figure 4 - DMR with 8 Inputs and 8 IOs

Basic DMR Number 4: This unit in Figure 4, has eight inputs with an additional eight IOs for feedback or additional inputs. Once again the additional IOs could provide button feedback or be used to select another eight (for a total of 16) files. The non-amplified version of this DMR is the same PCB without populating the amplifier components.

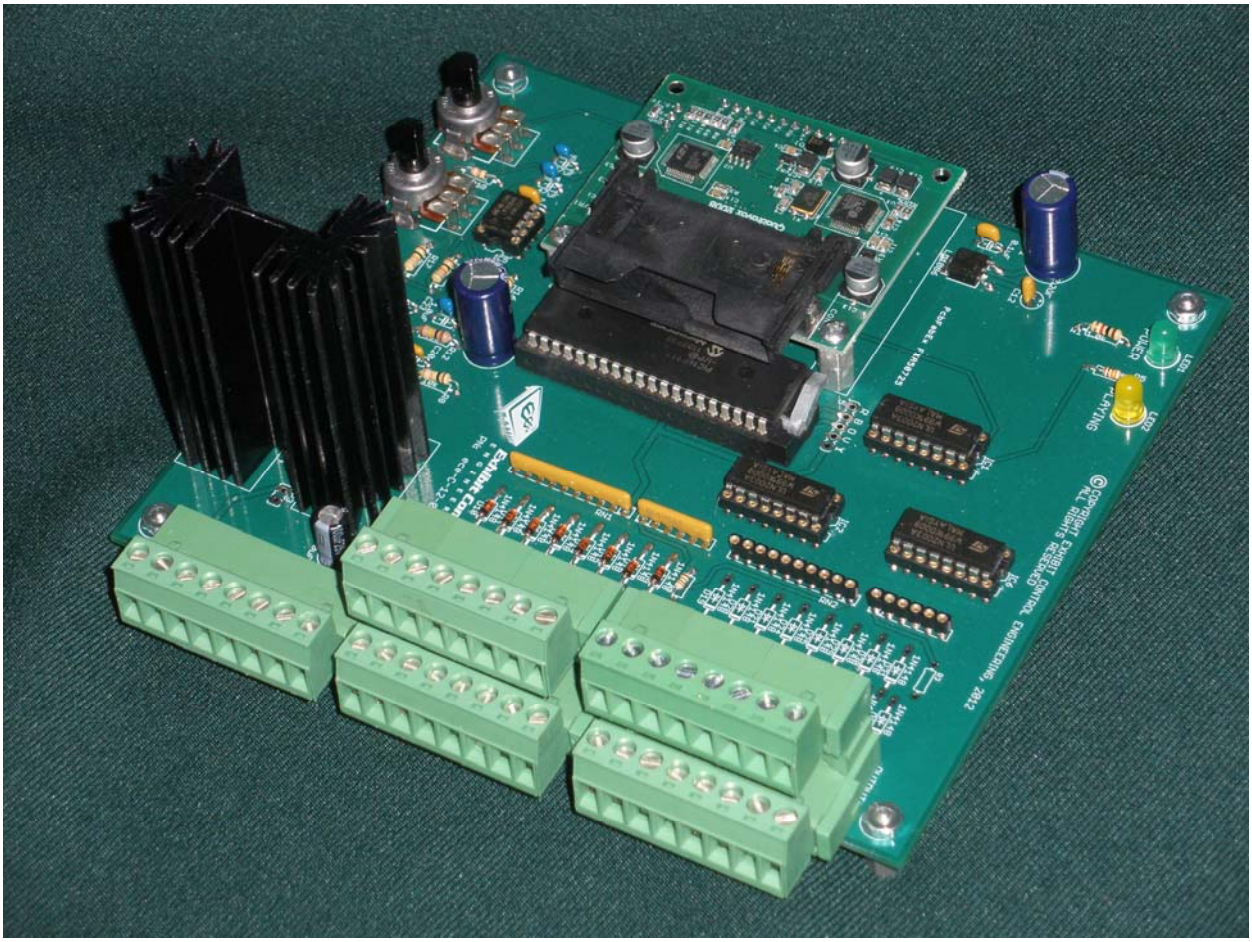


Figure 5 - DMR with 15 Inputs and 15 IOs

Basic DMR Number 5: This unit, Figure 5, has 15 inputs with another 15 optional IOs. It could select one of fifteen files to play with feedback for each button or select one of a total of 30 files to play. The non-amplified version of this DMR is the same PCB without the amplifier components being populated. For those demanding users that absolutely need feedback for 16 to 30 button inputs, we

designed a feedback board to use with this DMR to get the extra feedback on the buttons. The two PCBs mounted together are seen in Figure 6.

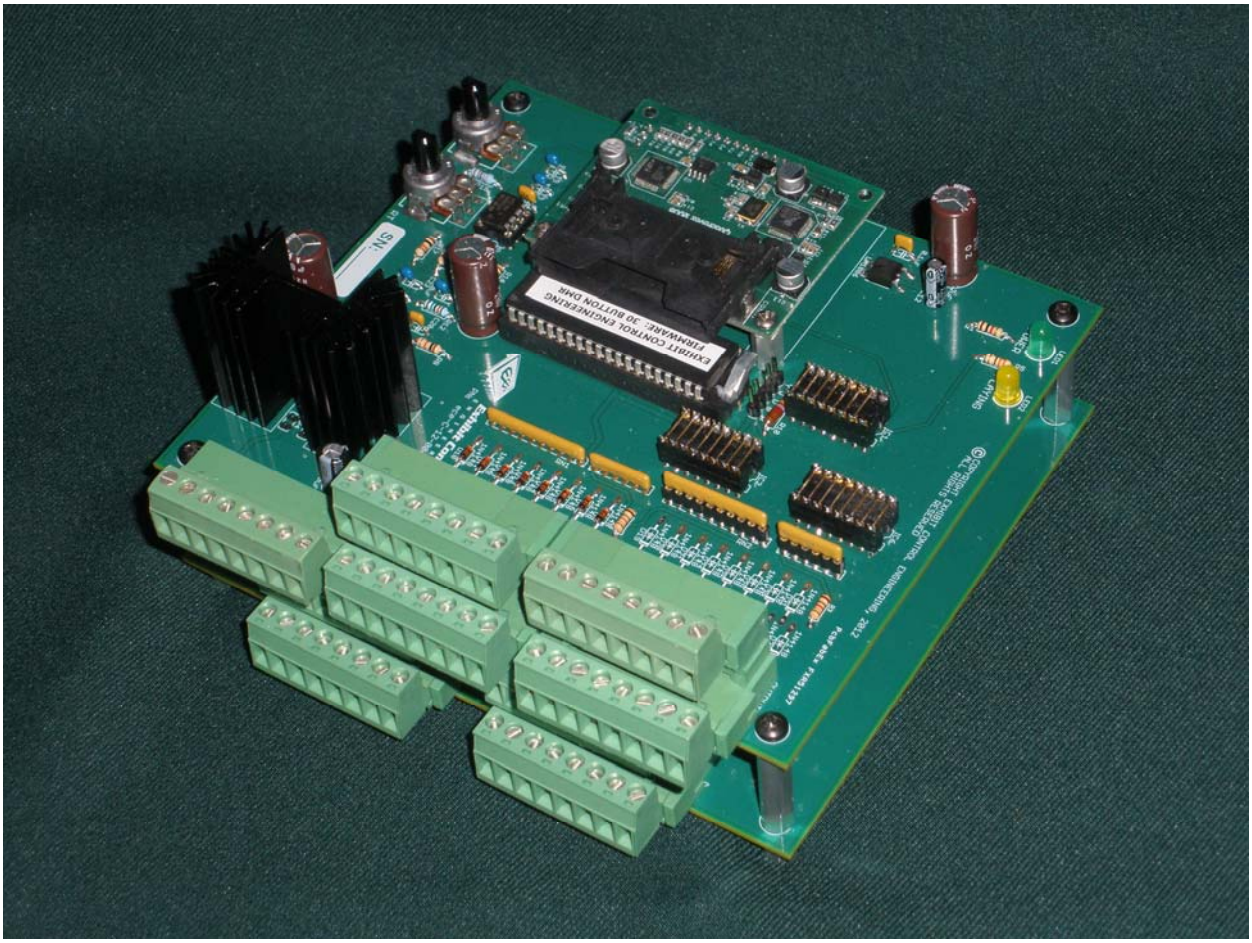


Figure 6 - DMR with 30 Inputs and 30 Feedback Outputs

Pricing Guide:

DMR	Basic Price	Price with Amplifier
Basic DMR (no control)	$185	$260
Serial DMR	$225	$300
DMR 4 – Input, 4 IO	$300	$375
DMR 8 – Input, 8 IO	$375	$450
DMR 15 – Input, 15 IO	$500	$575
Feedback Board – 30 Outputs	$250	N/A