Peak Weighting Module
Model PWM-1

Revision A

for the Belar FMM-2
FM Modulation Monitor
(effective beginning S/N 162190)

Guide to Operations

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BELAR PWM-1 PEAK WEIGHTING MODULE
Operation Guide

The Belar PWM-1 Peak Weighting Module adds peak weighting to the Peak Mod and 100% Peak lights of your Belar FMM-2 FM Modulation Monitor. It will generally result in your peak lights lighting less frequently for a given modulation level. It does not affect the operation or reading of the modulation meter.

BYPASS The PWM-1 is completely bypassed. The monitor will function exactly as it would without the option installed.

3 CYCLES The monitor peak lights will ignore any peak shorter than 3 cycles (of a 10kHz tone burst).

5 CYCLES The monitor peak lights will ignore any peak shorter than 5 cycles (of a 10kHz tone burst).

9 CYCLES The monitor peak lights will ignore any peak shorter than 9 cycles (of a 10kHz tone burst).

15 CYCLES The monitor peak lights will ignore any peak shorter than 15 cycles (of a 10kHz tone burst).

20 CYCLES The monitor peak lights will ignore any peak shorter than 20 cycles (of a 10kHz tone burst).

By changing the peak weighting constants and noting the effect on your peak lights, you can better understand the composition of your total modulation. For example, if your program material is highly processed with little dynamic range (and you have no subcarriers), peak weighting will cause almost no change in your monitor readings. If your program has little processing, you will see more effect from the peak weighting.

Instructions for installing the BELAR PWM-1 PEAK WEIGHTING MODULE in your Belar FMM-2 FM Modulation Monitor

Before proceeding, please:

- Read through these entire instructions before beginning the actual installation.
- Ensure that your PWM-1 kit is complete. Contents include:
  PWM-1 circuit board (with rotary switch and ribbon cable attached)
  Knob for rotary switch
  Allen wrench for tightening set screws on knob
  Mounting template
  PWM-1 foil label for back of unit
  Coaxial jumper cable
  Instruction book

Overview: The PWM-1 is installed in the back of the cover of your FMM-2. The installation procedure involves removing the cover, making a hole for the switch (S/N 161677 and later already have this hole), applying the foil label, installing the switch (with attached circuit board), making the electrical connections, and reinstalling the cover.

Tools required:

small Phillips screwdriver	small round file or similar
center punch or awl	Exacto knife or similar
1/4" drill	IC removal tool (or small flat screwdriver)

1 Unplug all cords from the FMM-2, and remove it from the equipment rack.

2 Remove the FMM-2 top cover.

3 Using a scissors, cut the template supplied where indicated. (The two templates are identical -- one is a spare.)

4 Tape the template to the outside rear of FMM-2 cover, using the left and top edges as a guide.

5 Center punch and drill a 1/4" hole as shown by the template.

6 Using the template, carefully mark label position on rear cover. This will help you properly position the foil label when you apply it later.

7 Remove the template and deburr the hole.

8 Carefully peel the label backing away from bottom of label, and fold it over so about 3/8" of the label is exposed. Locate the label on the cover using the marks you made in step 6, and carefully press the bottom of label against the panel.

9 Slowly peel label backing from the bottom up, while pressing label against panel. This will avoid air bubbles under label.

10 Roll label flat with a rubber roller, or rub the label backing over the surface of the label to flatten.

11 Using an Exacto knife, cut a hole in the label around the edge of the switch mounting hole.

12 Remove the nut and lockwasher from the PWM-1 rotary switch.

13 Install the PWM-1 module on the inside rear of the FMM-2 top cover, with the gold pins toward the top. Mount the lockwasher and nut and tighten securely, making sure that the module remains horizontal.

14 Install the knob. The knob pointer should be opposite the flat on the switch shaft. Tighten the set screws on the knob with the Allen wrench supplied. If the pointer does not line up with the position marks on the label, remove the knob, loosen the nut and rotate the module slightly. Tighten the nut and reinstall the knob.

15 Lay the FMM-2 top cover just behind the unit with the PWM-1 knob facing down. Rest the cover on the A2 board fingers.

16 Unplug the coaxial cable from pins 18 and 19 on the FMM-2 A2 board. (See diagram at the rear of the manual.) Note which pin is ground. These pins are marked "BB". Plug the center conductor of the coax you just removed onto pin 3 of the module, and the shield onto ground pin 4 (see PWM-1 Component Layout drawing).

17 Plug one end of the center conductor of the coaxial cable (supplied) onto pin 1 of the module and the shield onto ground pin 2. Plug the center conductor of the other end onto pin 18 on the FMM-2 A2 board and the shield onto ground pin 19. (This is why you noted which pin is ground -- in case you forgot, pin 18 is the one closest to the thumbwheel.)

18 Remove U23 (TLO71) from the FMM-2 A2 board. U23 is near the LED and thumbwheel wires (see diagram). Note the position of pin 1.

19 Insert the 8 pin DIP plug from the module into U23's socket on the FMM-2 A2 board. The notch on the DIP plug denotes pin 1. This pin should be inserted closest to the dot on the A2 board next to U23's socket. If the DIP plug is inserted properly, the flat cable should exit the DIP plug on the side of the socket toward the unit power supply. Fold the flat cable across the top of the DIP plug.

20 Carefully rotate the top cover into position and temporarily secure it with two mounting screws.

> NOTE: The gain of the PWM-1 is factory set and installation of the module should not require any field adjustments. The following steps are included for the user who wishes to verify the PWM-1 module gain after installation.

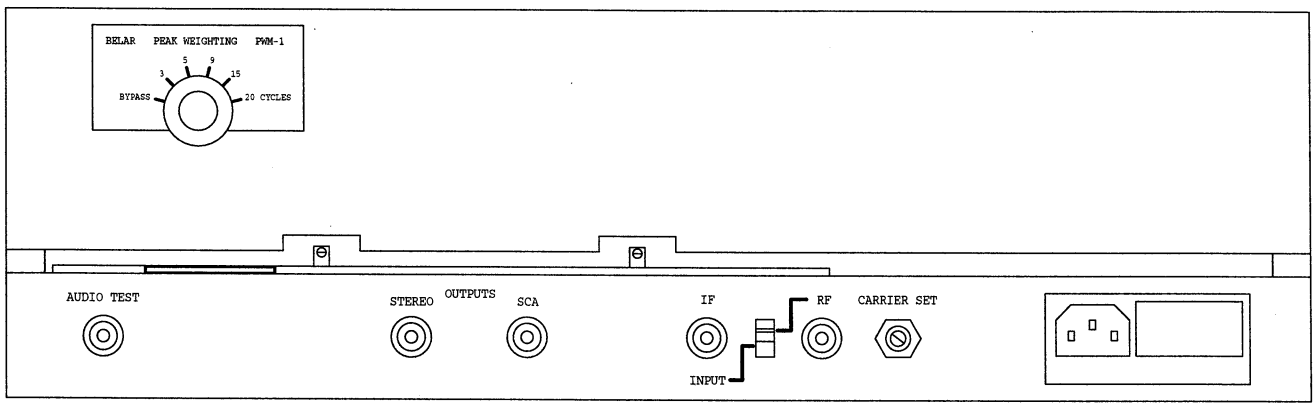
21 Depress the FMM-2 "CAL" and "PEAK" pushbuttons. Set the PWM-1 switch to the "BYPASS" position. Plug the FMM-2 line cord in and allow unit to warm up for about 15 minutes.

22 Increase the thumbwheel setting on the FMM-2 front panel until the "PEAK MOD" LED goes out. Decrease the thumbwheel setting until the LED just comes on. Make a note of the thumbwheel position.

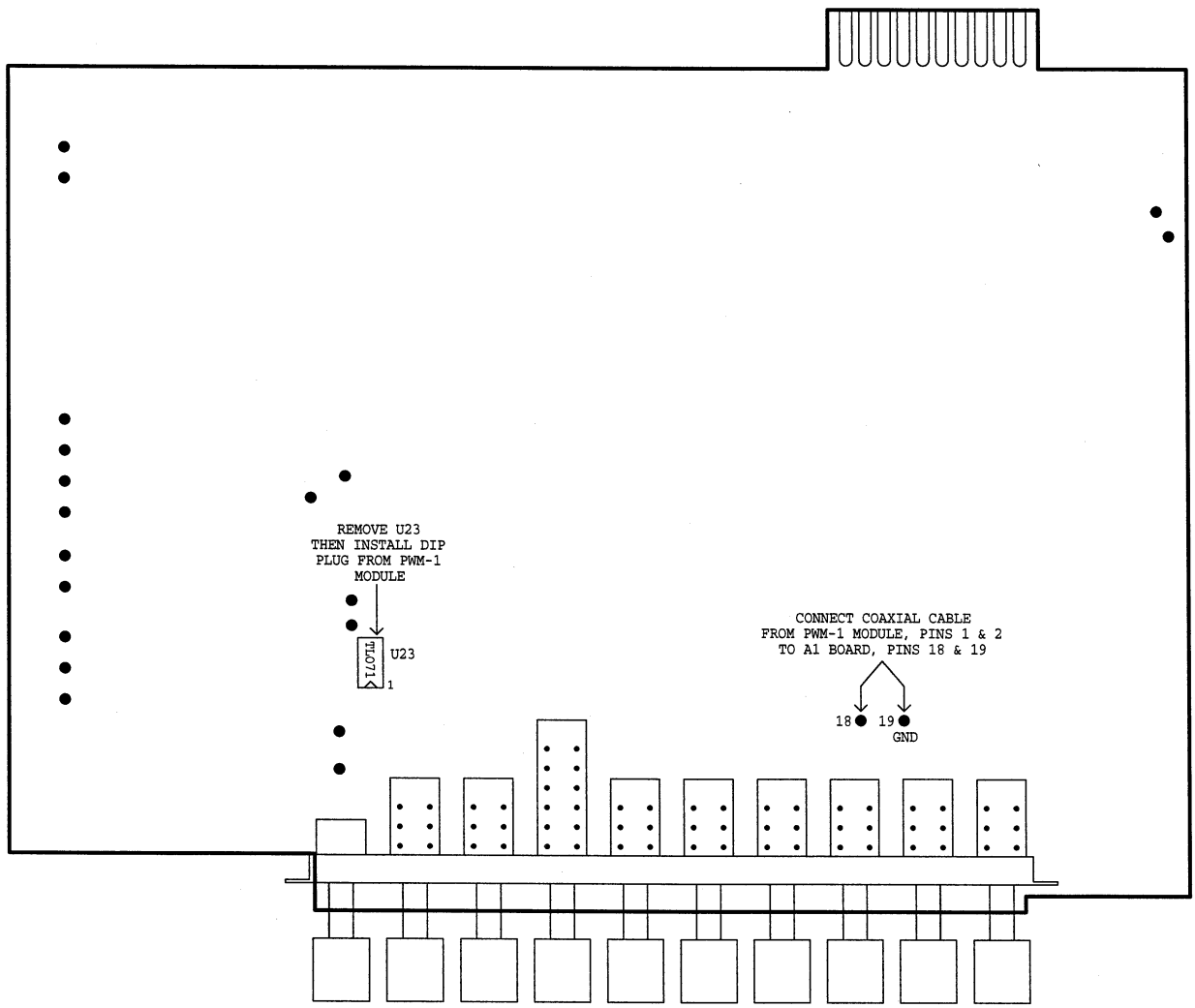
23 Move the PWM-1 switch to the "3 CYCLES" position. Again, rotate the thumbwheel setting on the FMM-2 until the "PEAK MOD" LED just comes on. This point should be the same as in the "BYPASS" position. If not, remove the cover and carefully rotate it to gain access to the PWM-1 module gain adjustment pot. Take care that the cover does not short to the A2 board.

24 With the PWM-1 still in the "3 CYCLES" position, set the FMM-2 thumbwheel to the same position you noted in step 22. Adjust R3 on the module until the LED is off, then reverse the adjustment rotation until the LED just comes on and stays on. When the adjustment has been properly made, the "PEAK MOD" LED should come on at the same thumbwheel position in both the "BYPASS" and "3 CYCLES" positions of the PWM-1. When the adjustment is complete, unplug the FMM-2 line cord and install the cover using all the mounting screws.

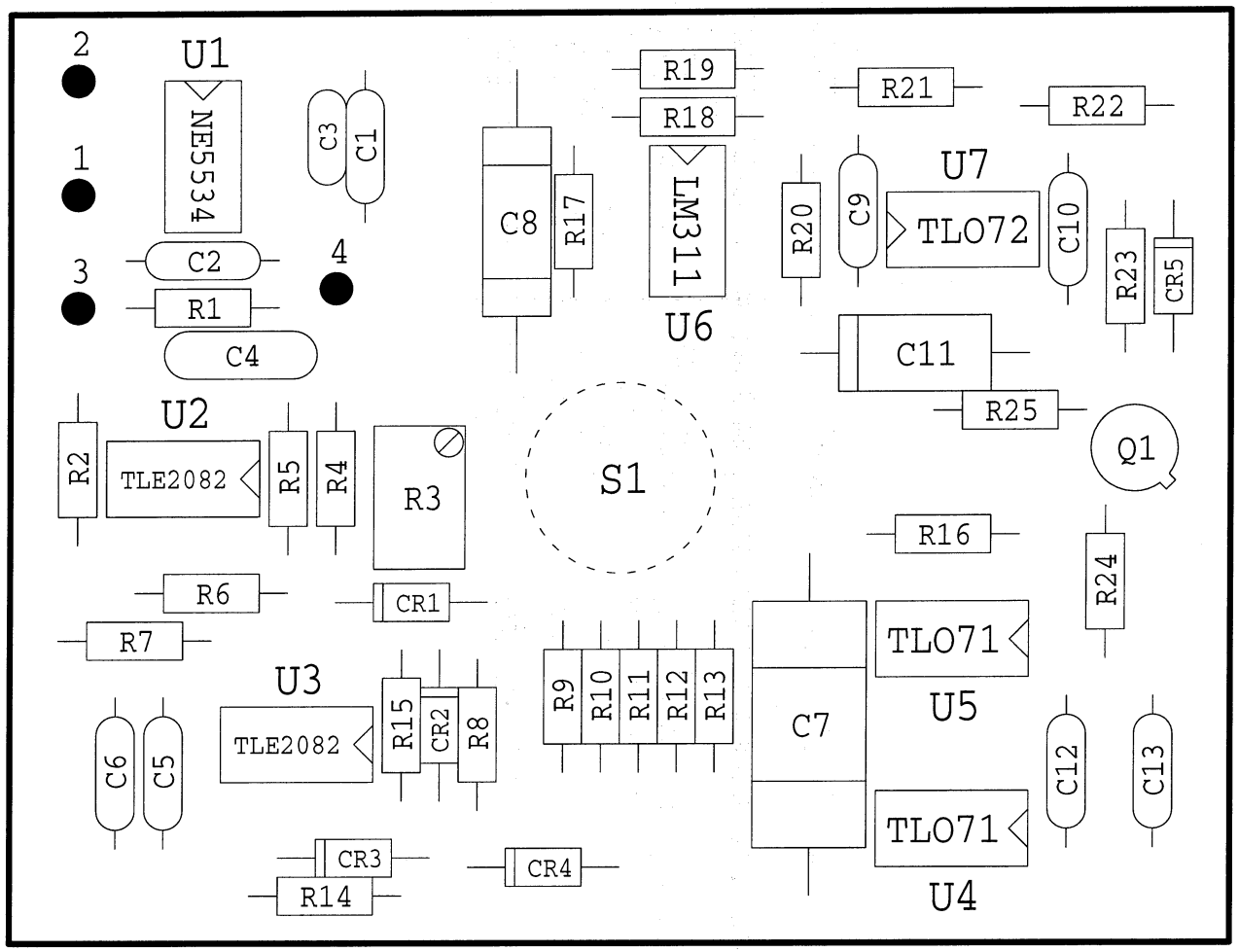
25 Reinstall the FMM-2, and reconnect all cords. This completes the module installation.



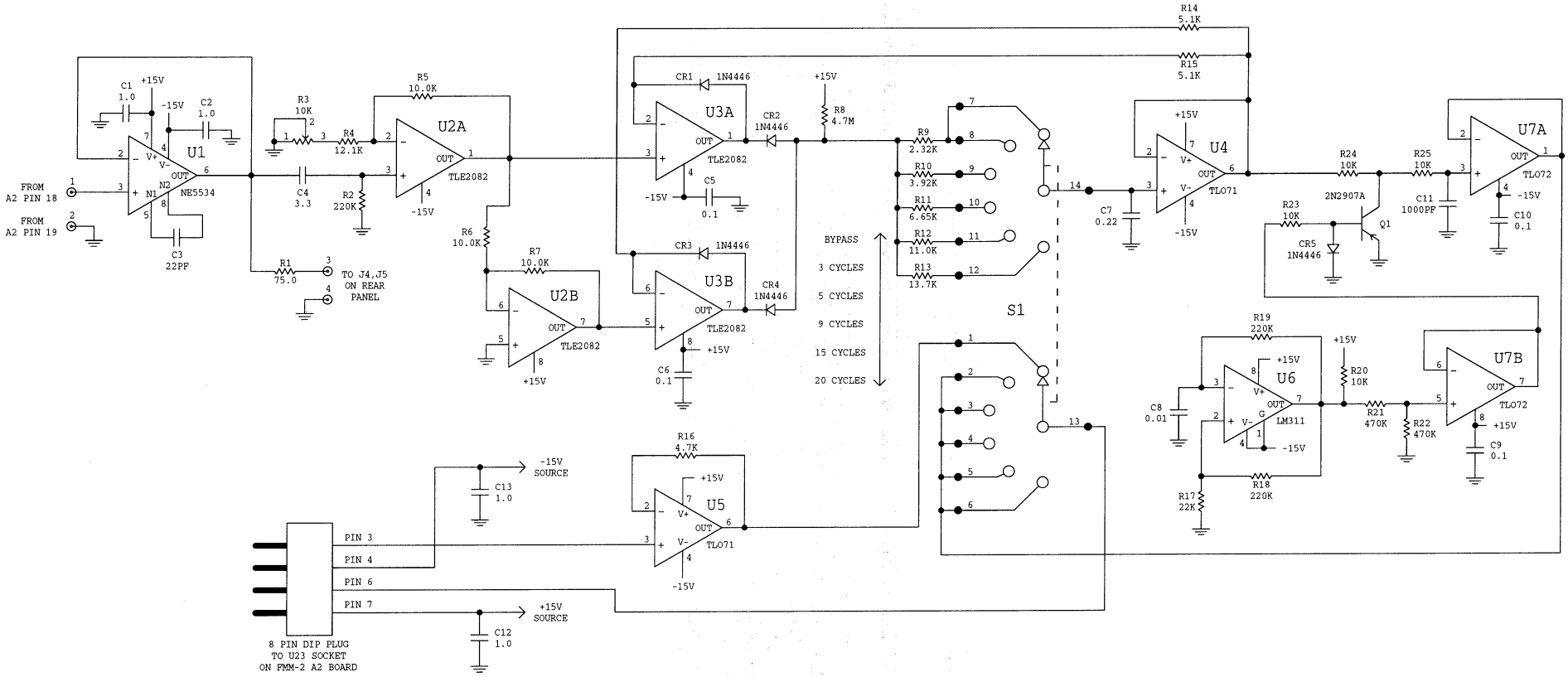
FMM-2 CHASSIS REAR VIEW
WITH PWM-1 INSTALLED



PWM-1 MODULE TO FMM-2 A2 BOARD
CONNECTION POINTS
(EFFECTIVE UP TO S/N 162166)
BELAR ELECTRONICS



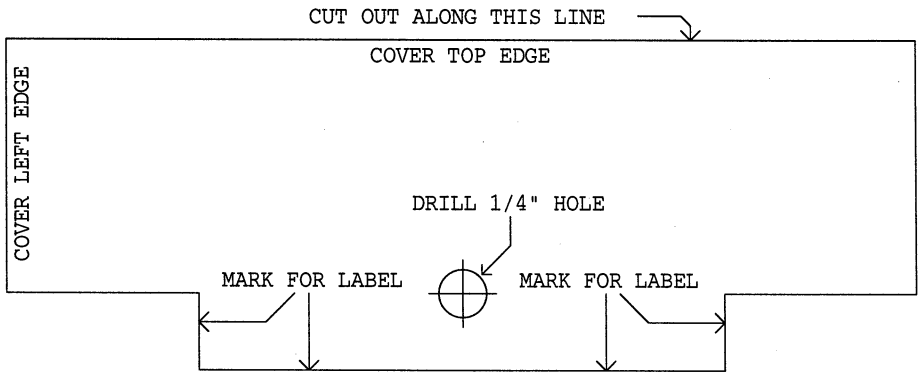
FMM-2 PWM-1 BOARD
COMPONENT LAYOUT
BELAR ELECTRONICS

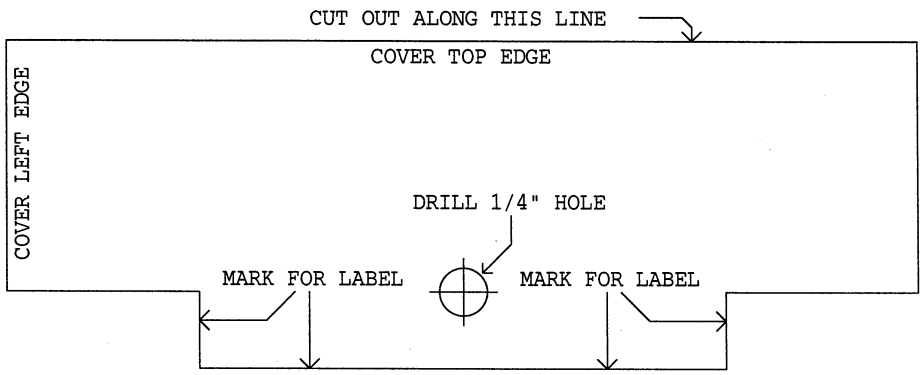


FMM-2 PWM-1
PEAK WEIGHTING BOARD
BELAR ELECTRONICS
9-3-03

PWM-1 BOARD FMM-2
(for FMM-2 monitors with the original A2 board)

Reference Designation	Description	Part Number
C1,C2	C: FIXED CERAMIC 1.0uF 50V	0151-0008
C3	C: FIXED MICA 22pF 5%	0142-2205
C4	C: FIXED CERAMIC 3.3uF 50V	0151-0011
C5,C6	C: FIXED CERAMIC 0.1uF 50V	0151-0006
C7	C: FIXED FILM 0.22 uF 10% 80V	0120-2241
C8	C: FIXED FILM 0.01 uF 10% 200V	0120-1031
C9,C10	C: FIXED CERAMIC 0.1uF 50V	0151-0006
C11	C: FIXED POLY 1000pF 2.5% 160V	0130-1022
C12,C13	C: FIXED CERAMIC 1.0uF 50V	0151-0008
CR1 thru CR5	DIODE: 1N4446	1900-0002
Q1	TRANSISTOR: 2N2907A	1850-0027
R1	R: METAL FILM 75.0 1%	0721-75R0
R2	R: METAL FILM 220k 2%	0751-2242
R3	R: VAR COMP 10k, 10 TURN	2100-0024
R4	R: METAL FILM 12.1k 1%	0721-1212
R5 thru R7	R: METAL FILM 10.0k 1%	0721-1002
R8	R: FIXED CARBON 4.7M 5% 1/4W	0683-4755
R9	R: METAL FILM 2.32k 1%	0721-2321
R10	R: METAL FILM 3.92k 1%	0721-3921
R11	R: METAL FILM 6.65k 1%	0721-6651
R12	R: METAL FILM 11.0k 1%	0721-1102
R13	R: METAL FILM 13.7k 1%	0721-1372
R14,R15	R: METAL FILM 5.1k 2%	0751-5122
R16	R: METAL FILM 4.7k 2%	0751-4722
R17	R: METAL FILM 22k 2%	0751-2232
R18,R19	R: METAL FILM 220k 2%	0751-2242
R20	R: METAL FILM 10k 2%	0751-1032
R21,R22	R: METAL FILM 470k 2%	0751-4742
R23 thru R25	R: METAL FILM 10k 2%	0751-1032
S1	SWITCH: ROTARY - 2 POLE, 6 POS.	3100-0003
--	KNOB: 0F3B	0370-0005
U1	IC: NE5534	1826-0025
U2,U3*	IC: TLE2082	1826-0069
	*(In earlier PWM-1's U2 and U3 were the MC34082 IC. The IC's are interchangeable.)	
U4,U5	IC: TLO71	1826-0004
U6	IC: LM311	1826-0009
U7	IC: TLO72	1826-0038





FMM-2 PWM-1 MOUNTING TEMPLATE
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