

**NEW!**

# FM - 10

## TEN METER TRANSCEIVER



**JOIN THE FUN and EXCITEMENT OF 10 FM!**

- PLL Synthesizer 29.5 - 29.7 MHz.
- Super Hot Rcvr - True FM.

Kit includes a two color, silk screened, aluminum chassis, wired and tested CYBERNET (Hy-Gain) CB board, True FM Discriminator kit, correct crystal, 2 pots, knobs, S.P.D.T. frequency switch to give you 29.5 and 29.6, board stand offs, hardware and instruction manual. Kit does not include power switch, L.E.D., "S" meter, coax connector or wire.

**\$59<sup>95</sup>**

**COMPLETE KIT**

### ACCESSORIES

- |  |                |
|--|----------------|
| <b>Repeater Offset Kit</b><br>includes crystal, switch, L.E.D, P.C. board, instructions. . . | <b>\$12.00</b> |
| <b>40 Channel Frequency Switch. . . . .</b>  | <b>\$ 6.00</b> |
| <b>Hy-Power Kit</b><br>produces 10 -- 12 watts output on 10 meters. . . . .                  | <b>\$ 6.00</b> |
| <b>6kHz. Broad band Filter. . . . .</b>  | <b>\$ 8.00</b> |
| <b>Meter 'S' or "RF Output" indicator.</b>   | <b>\$ 3.00</b> |

**The TEN METER FM HANDBOOK** by BOB HEIL

include \$2.00 for postage and handling.  
Ill. residents add 5% sales tax.

# MELCO

P.O. Box 26 M

The One-Stop Parts House for 10 FM!

Marissa, Ill. 62257

Phone 1-618-295-3000

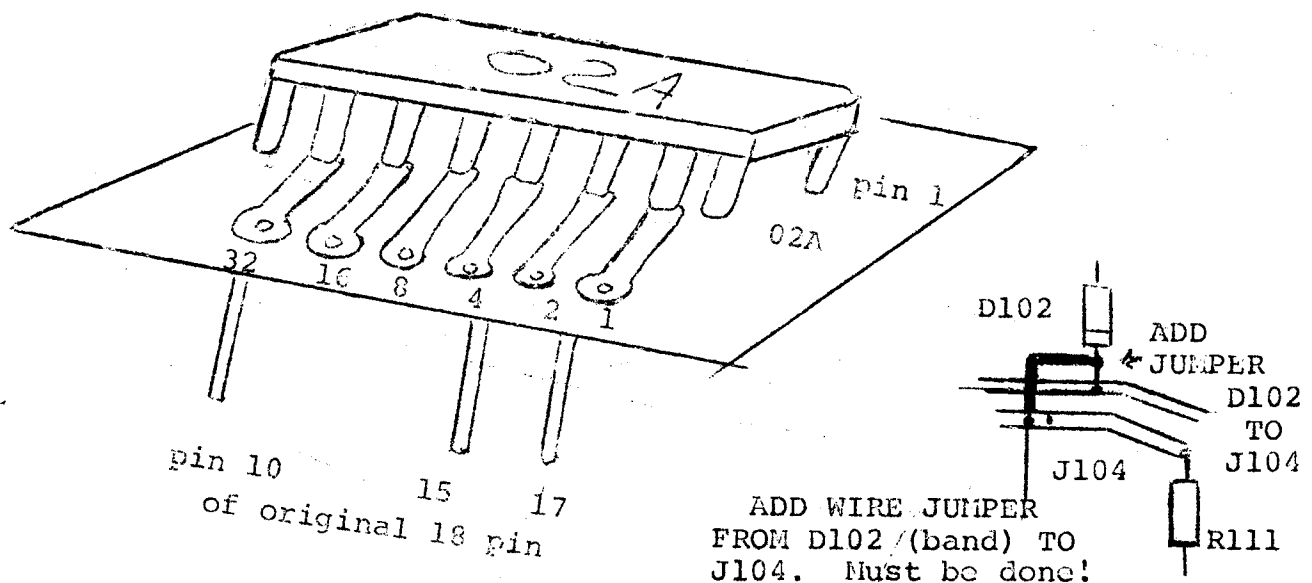
## THE HY GAIN 2715 BOARD

The board furnished with this kit is the board that was built by HY GAIN and is a very high quality unit, using all Motorola devices. The radio that used this, had all of it's contols in the microphone. A micropocessor chip was used to do the programming and of course, is not on the main CB board. In order to make this board usable, you will have to remove and discard the 18 pin I.C. (78141). Thus, we can replace with an 02A chip which is the P.L.L. and programs so very well for ten meters, FM. Since the 02A chip is only 16 pins, a small 02A adapter board is furnished to make this a very easy conversion.

The adapter board is a single sided board and is used with the FOIL side up, not down, as is the usual case with P.C. boards. The 02A and the pins that mount the board, will solder to the FOIL side of the board, -02A on the FOIL side, the connecting pins protruding through the board extending 3/4" on the other side.

Begin by removing the 18 pin chip, very carefully, either with a solder sucker or using solder wick. Should you not have either, use a 5 or 6" peice of braid from RG 58U coax, to 'suck' the molten solder as you heat each of the 58141 pins. Take care not to rip the foil from the HyGain board. When removed, you will notice that only SIX of the pins of that 18, are used, Pins 5,6,9,10,15 and 17.

Cut six 3/4" leads (can be from ends of resistors or caps, that you normally throw away) and solder these wire leads at the six locations on the adapter board. Trim these leads as close as possible AFTER you have soldered them. Mount the 02A (760136) to the FOIL side of the board, taking care in not overheating the I.C. Be certain of it's alignment. It will cover up the tops of the three leads that form the pins 10,15, and 17. Mount the completed adapter board by aligning the six 'pins' to fit into the proper holes of the original 18 pin chip- pins 5,6,9,10,15 and 17. Notice the programming pins are along the front edge of the 02A adapter board. The 02A chip pin 10=32, pin 11=16, pin 12=8, pin 13=4, pin 14=2, pin 15=1. Connecting buss pins 32,16, and 8 together to common, -cathode of D102, will give you CB channel 20 for check out and 29.50 MHz. when converted.



These are the divide-by numbers. For clarity, we number these BUSS PINS 1 thru 7. BUSS pin #1 is 02A pin 7, BUSS pin 2 is 02A pins 8,9, and 10, BUSS pin 3 is 02A pin 11, BUSS pin 4 is 02A pin 12, etc. Drill the 6 holes to mount the pins that will connect the 02A adapter board to the main CB board. Do NOT drill the 16 holes for the 02A I.C. Line up it's pins so the 02A aligns with the correct 16 pads with pin 1 of the 02A near the dot and letters "02A". Solder the 02 to the TOP foil side of the adapter. The program wires will solder directly to their corresponding pin 1 thru 7.

#### SQUELCH MODS

Install a 22K resistor from hole #12 to #7. Install a 22K at R179. To make the squelch 'click' instead of 'crash' at you when the carrier is dropped, change C212 (33mfd) to a 5 mfd. You may want to install a squelch sensitivity control at RV101. It is a 10K variable pot.

To make connections to your front panel controls, much easier, cut some leads from resistors or caps about 3/4" long and install at the following points for wire harness connections later.

1,2,3,4,5A,6A,7,11,13,14,21,22,25 G2 and G3

Connect jumpers at the following points

JUMPER 9 to 20

JUMPER 3 to 23

JUMPER 38 to 39

If you desire to install the repeater offset kit later, it would be advisable to remove X102, the 10.695 crystal and install two 3/4" wire leads into the X102 holes, then resolder the crystal to the top of these wires, thus allowing removal of THAT crystal and installing the repeater offset components at a later time.

#### REMOVING AM SECTION

A very neat method to remove the AM modulation without cutting foil, etc. is to remove completely, the modulation transformer T110, and diode D105. This will necessitate applying +12 volts PURE D.C. to the final R.F. stage. Connect a small jumper from center tap hole of the old modulation xfmr you revoed (actually that's pin 20) to the R.F. final end of the D105 hole. Connect #23 to + end of C204 or the bottom end of the xfmr to reconnect the speaker audio. That removes the A.M. There are other methods, but they will require cutting foil.

This board, the 2716 is already pre-aligned on the CB band. We recommend that you connect the controls and do a quick preliminary check to see that the functions work before making the ten meter conversion.

#### PROGRAMMING FREQUENCY

You MUST program the 02A for a frequency between 29.5 and .6 in order to test the board. For test purposes tie pins (BUSS) 2,3, and 4, which is 02A pins 10,11, and 12, to +5v. which is the band end of D102. This is exactly where you will connect your frequency switching apparatus later. The frequency switch can be anything from a simple SPDT switch to give you two frequencies, to an active programmer to give you 300kHz. At this time, for simplicity in construction, tie BUSS 2,3,4 pins to +5v. and this will put the 02A on 29.5 or channel 20 of the CB band which is 27.205.

## MELCO FM-10 CONVERSION INSTRUCTIONS

Before attempting any work on your HY GAIN CB board, you read the TEN METER FM HANDBOOK (K9EID) from Melco and the JAN 80 73 MAG. article.

Begin your conversion by checking the board to see that it works properly on 27 MHz. Program the PLL for CH 20 (27.205). This becomes 29.50. (refer to the PROGRAMMING SHEET). Here's a quick check for your board:

1. Solder #47 pilot lamp to RF out, pin 5 and GND, G2.
2. Program the P.L.L. 02A to Channel 20. (Buss pins 2,3,4 to +5 v.)
3. Connect +12 v.d.c. to terminal #1. GND to terminal #2.
4. Jumper Terminals 9,20, and 25.
5. Measure TEST POINT 8. Adjust T101 CAREFULLY (Don't break the tiny slug) to give you 1.5 volts.
6. Attach a clip lead from Terminal #13 (PTT LINE) to GND G3. This will key up the transmitter and you should hear a good signal on 27.205 as well as see the lamp glow. If not, check obvious things, crystals not oscillating, T101 slightly mis-aligned, broken component or lead.
7. Inject an audio signal, microphone to pin of Terminal #22 and Gnd G3. You will be able to modulate the AM signal. This will test the audio section.
8. Detach the clip lead from #13. Connect to one lead of a speaker.
9. Attach other speaker lead to pin #23.
10. Ground Terminal #7 (Squelch). Connect Terminal #19 to #21. The receiver will be working with audio wide open. Should you want to test this further, install a pot between 19 and 21 to vary volume.

This concludes a quick check of your board. It has been pre-aligned on 27 MHz. and should function. This main problem will be the programming of the 02A chip and perhaps a broken lead or component during the transport to you.

TEN METER CONVERSION can begin by installing new crystal 12.571 at X101 xtal#3. Carefully adjust the cans as follows to get them close enough to get your signal through to hear it on a ten meter receiver.

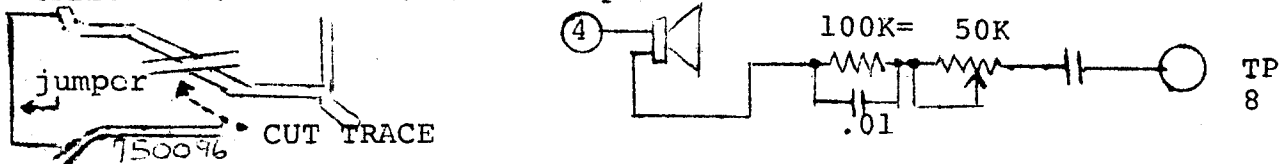
T101	1t.	CW	(clockwise)	L108	1	turn	Counterclockwise
T111	3/4	turn	CW	L109	2	"	"
T102	1/4	"	"	L110	2	"	"
T103	"	"	"	T104	1	"	"
L103	1t	"	"	T105	1	"	"
L104	1/2	"	"				

Grounding the PTT Line (#13) should produce a signal you can hear on any SSB receiver tuned to 29.50. Loose couple #5 (RF OUT) to the receiver front end. Watch the "S" meter and CAREFULLY peak the cans in sequence, T111, L103,104,T102,103,L106,109 110. Problem area will be L103,104,T102. These can be tuned to the 2nd Harmonic of the 10.695 xtal and produce a strong 15 meter signal! They tune VERY sharp and interact on ten meters.

Once the transmitter is tuned, detach PTT #13, and connect the speaker as before. Inject a 29.50 signal at #5. Tune T104 and 105 for maximum voltage at 6A, the "S" Meter output. The 10.695 and 455 kHz. section should be in good alignment. You can peak that after cabinet work is finished., discriminator board installed, etc. Follow the enclosed wiring diagram and install in the cabinet.

Use extra care with these cans. Adjust with ONLY the proper alignment tool. Should you break a slug, remove the entire can, turn over and unscrew slug carefully, then insert back into top of can.

Locate the modulation transformer (between heat sinks). Under this on foil side, locate the number 750096 and HY GAIN. The trace close to the top of these numbers (connecting C120 and pin 20) is the B+ line that you must connect a 2" jumper wire to and connect the junction of L108 and C150. Cut the trace between D10 cathode and C150. This kills the A.M. and introduced pure D.C. to the final.



To introduce F.M., wire the speaker audio through the trim pot and capacitor to TEST POINT 8 of the V.CO. A simple mount for the trimmer is to solder the ground leg right to the side of T101. Deviation is adjusted with the trimmer. Audio quality can be changed by substituting various values of by-pass across the 100K resistor. See page 39 of the TEN METER FM HANDBOOK for more information.

Make all of your connections to the foil side of the board at this time. The 13 volt B+ leads to pins 1 and 2. Attach a short 3" shielded lead to Q119 BASE with shield to Gnd. This is to feed the i.f. board. If you plan to install the repeater offset later, remove X102 and extend it's crystal legs by 1". Resolder the crystal to these 1" leads on TOP of the board so you can easily remove that xtal, later.

Simple transmitter alignment can be done by connection of the PIN 5 to the terminals of a receiver tuned to 29.50. Program the V.C.O. for 29.50 (page 40-45 of the HANDBOOK). Apply power and tune T101 to give you 1.5. volts at Test Point 8. Key up xmit by grounding Pin 13. You should hear a small signal on 29.50. Peak T111 and L103. You should have a fairly good signal at this point and so remove the lead directly coupling the output to your receiver. Loosely couple the receiver. (too much RF from the CB board might destroy the test receiver front). Carefully peak L103, L104 and T102. This is a problem area. These cans are VERY sharp tuning. It may help in the early stages to monitor Q111 Emitter with an R.F. probe or a good scope. Finish the tune up of the transmitter.

The receiver is aligned best by receiving a weak signal on 29.50. Connect a speaker from pin 23 and G2. Gnd Squelch pin 7. Connect detector output (A.M.) pin 19 to Audio in, pin 21. This will bring the receiver on with full audio, but good enough to check with at this point. Align T104, T105 (a critical one). The rest should be fairly close and can be peaked after unit is installed in case, etc. (pg. 41)

Build the F.M. I.F. board and connect it to the shielded lead feeding Q119 BASE, B+, GND, and the Top of the volume control pot. This can is aligned for best quality when listening to a good F.M. signal. Tune for maximum noise in the beginning.

## CHASSIS CONSTRUCTION

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The CL board will mount on the chassis tray with four insulated stand offs. Mount the i.f. discriminator board on the 1" stand off above the T109 can. Drill the hole for the stand off in the white chassis tray as near to Q 119 as possible. It is VITALLY IMPORTANT that the two heat sinks are mounted to the back panel with the four #4-40 screws provided. The sinks are tapped and threaded. Drill the proper holes in the back panel and mount secure. For proper RF by-passing, mount a 200 to 50 pf (not critical) cap across the coax connector with as short as leads, possible.

Mount the SPDT switch in the hole labeled FREQUENCY. In one position it will give you 29.5 in the other, 29.6. With 90% of the activity on these simplex frequencies, it is good to get started with this simple and effective programmer. Adding a 40 channel switch, later is easy, only 7 wires.

You may want to add a power switch, a red L.E.D. for XMIT and a green L.E.D. for receive mode. Connect a 470 ohm resistor to pin 14, then to the XMIT L.E.D. to ground and the same to pin 11 for receive. These pins give you +12 volts on their respective modes and can be used for keying all kinds of useful things such as C.O.R. for external amplifiers, etc.

When mounting the volume-squelch controls, speaker jack, etc. it is helpful to make up a harness using the tie wraps. Here's the wire lengths you will need. Color, of course, is not important. (these wires aren't supplied)

3.5"	Red	Power Switch	25 to S1 (Power)
5.5"	Red	Power Switch	9 to S1 (Power)
3.0"	Brown	Common Freq. Programmer	D102 to S2 (FREQUENCY)
1.8"	White	Buss	Pin 1 to S2
2.0"	Wh/Brn	Buss	Pin 2 to S2
5.5"	Yellow	Deviation Pot	R1 to J1, pin 1
8.0"	White		3 to J1, pin 2
11.0"	Wh/Brn	Mic Jack to J1	J1, pin 1
4.5"	Grn		4 to 23
10.0"	Black	Mic Jack	to G3
6.5"	Ern	Mic Jack	to 13
9"	Grn	Mic Jack	to 21
6"	Yellow	Volume Pot	to 22
7"	Blue	Volume Pot	to Audio Out FM Disc.
2.5"	Red	V+	20 to V+ of FM Disc.
2.5"	Black	G2 to Gnd	G2 to Gnd of FM DISC.
6"	White	7 to Squelch pot bottom	
6"	Black	Vol. Pot. (bottom) to G3	

To help you standarize the mic jack, here are the pin outs:

MIC CONNECTOR	1 to MAIN BOARD PIN 22
MIC CONNECTOR	2 to MAIN BOARD PIN G1
MIC CONNECTOR	3 to MAIN BOARD PIN Speaker Jack 1
MIC CONNECTOR	4 to MAIN BOARD PIN 13
VOL/SQUELCH POT	

## SQUELCH IMPROVEMENT

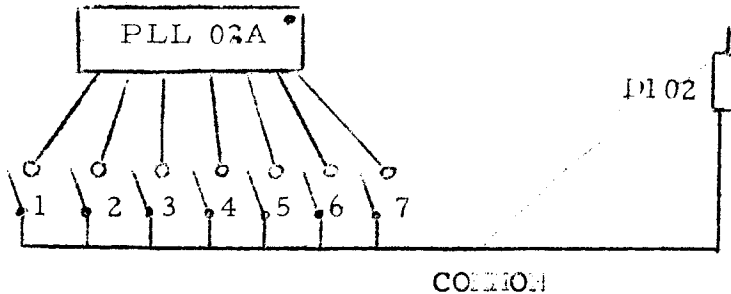
The internal squelch works well but much improved by changing R151 to 220K and change C212 from a 33 mfd. to a 2 mfd. Adjust RV 101 FULLY CCW. These parts are all located near PIN 7.

FREQUENCY PROGRAMMING

A SPDT switch is used, initially to get the programming on 29.5 and 29.6. To program the PLL 02A, one simply has to use the proper programmer switch, or series of switches, to wire direct to the seven buss pins, or you can build an active programmer, complete with L.E.D. readout as described in the Jan. 1980 73 Magazine.

A little time should be spent in studying the 02A and learn what it takes to make the chip operate where you want. The repeater offset is accomplished by either programming the chip, directly, or by adding the REPEATER OFFSET KIT that MELCO offers. This kit gives you a transmit frequency 500 KHz. below the received frequency by switching the transmit offset crystal.

The following is the truth chart for the PLL 02A buss lines:

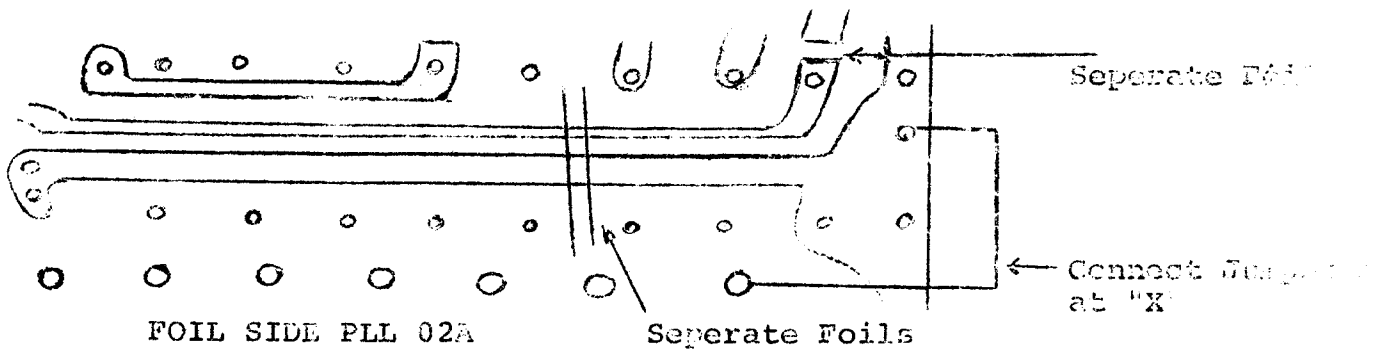


EXAMPLE: To program 29.60 connect COMMON at bottom of D102, to pins 1 and 6. 29.50 will come up with COMMON connected to pins 2,3, and 4.

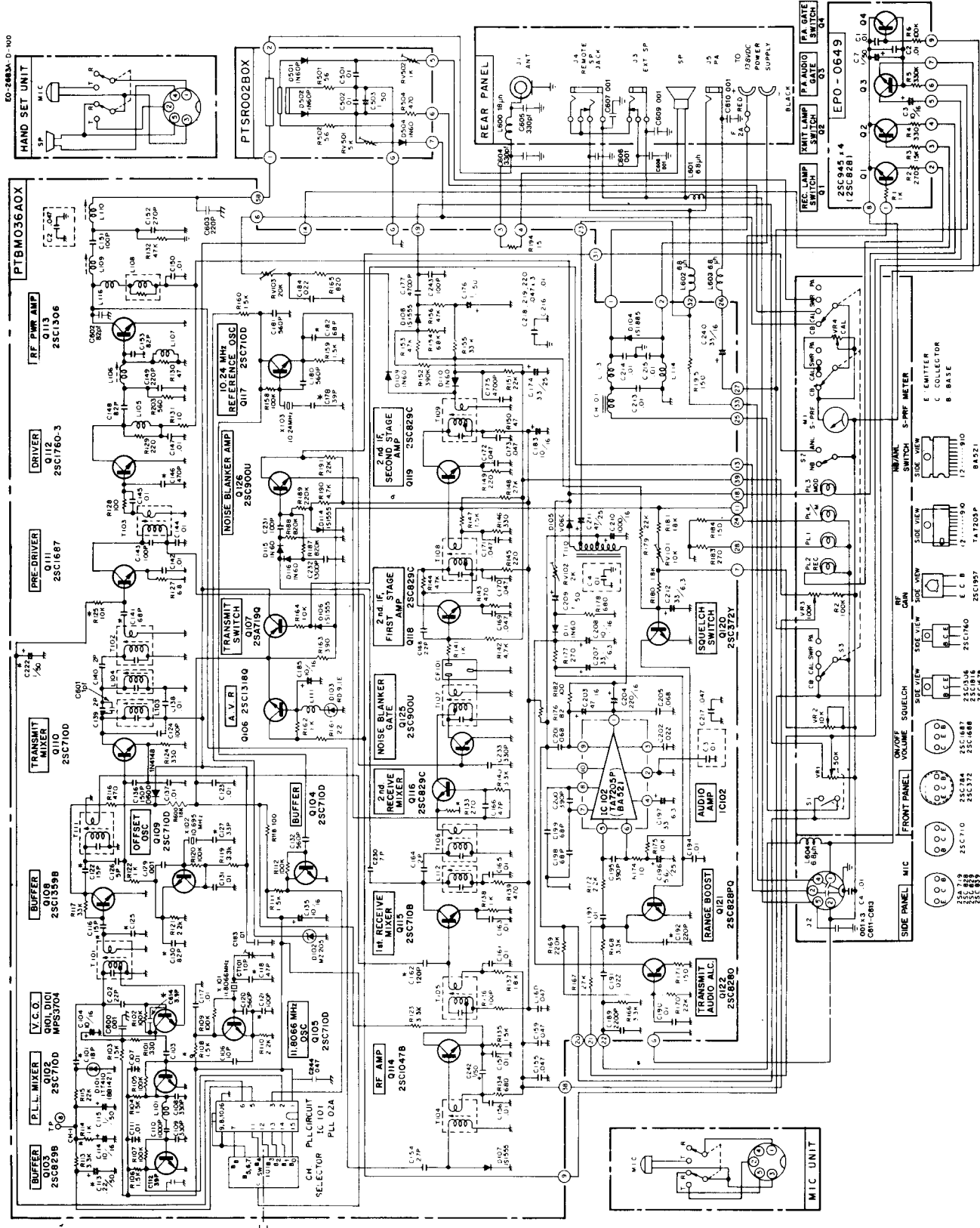
		COMMON		
29.50	2-3-4		29.60	1-6
.51	2-3-4-7		.61	1-6-7
.52	2-3-4-6		.62	1-5
.53	2-3-4-6-7		.63	1-7-5
.54	2-3-4-5-		.64	1-5-6
.55	2-3-4-5-7		.651	1-5-6-7
.56	2-3-4-5-6		.66	1-4
.57	2-3-4-5-6-7		.67	1-4-7
.58	1		.68	1-4-6-
.59	1-7		.69	1-4-6-7

These are for 40 channel programming using the 12.57K crystal

The CYBERMET Boards were originally built for 23 channel use. When the 40 ch. extension came to be, a modification was made to the existing board and put together with 40 ch. switches. You may want to check to see if your board has been properly modified to be a 40 channel board. This can be made to any of the older 23 channel radios or boards.



EO-2484A (D-100)

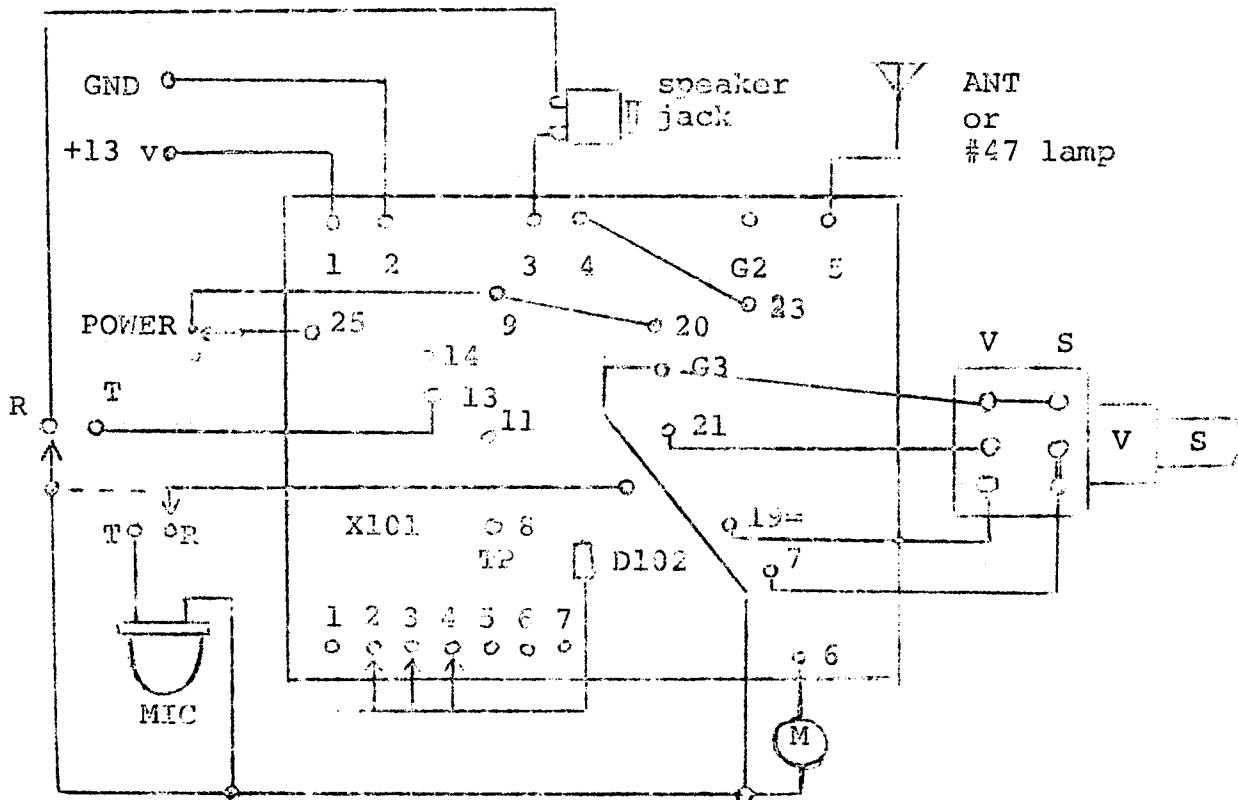


SEMICONDUCTOR TERMINAL CONNECTION (BOTTOM VIEW UNLESS OTHERWISE NOTED)



**MELCO**  
 P. O. BOX 26  
 MARISSA, ILLINOIS 62257





WIRING DIAGRAM FOR FM-10

MAKE NEAT WIRING HARNESS USING #20 ga. STRANDED WIRE AND SECURE WITH CABLE TIES. THIS HOOK UP IS SHOWN FOR INITIAL TEST, WITHOUT DISCRIMINATOR BOARD WIRED. TO CONNECT THAT BOARD, SIMPLY REMOVE LEAD FROM VOLUME POT TO PIN 19, AND CONNECT FROM VOLUME POT TOP TO LETTER "A" (audio) OF DISCRIMINATOR BOARD. THE BASE OF Q119 CONNECTS TO 455 "In", V+ to PIN 20 (13 v.d.c.) and of course, GND.

TO MIC SWITCH

