Ending Alignment Confusion

MARK-A-CHANNEL SELECTS ANY OF 12 VHF CHANNELS, WITH COLOR AND AURAL!

FRUSTRATIONS OF MARKING

Anyone who has been around CATV for any length of time has suffered from the *frustrations* of trying to align a precision device such as a bandpass filter, trap, strip amplifier or adjacent channel trap with the conventional type of CATV markers.

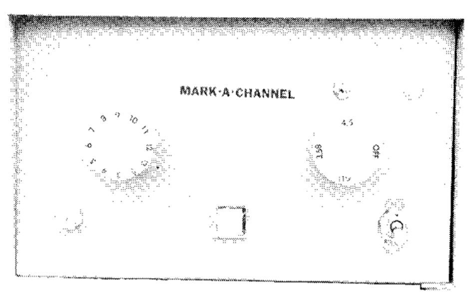
Unless you are fortunate enough to have precise on-channel and adjacent channel markers in your sweep system (1), you have been using some type of marker machine such as the RCA WR-99A. This is a fine piece of equipment, costing about $300.00, but it is a little tedious to use and there is plenty of room for operator error. First you locate the 10 MHz marker and zero it with the pointer on the nearest 10 MHz mark on the dial. Then you turn on the 1 MHz markers and start counting down (or up) until you are in the vicinity of, or on, the correct MHz that is nearest to your desired marker carrier frequency. Finally you zero in around the vicinity of the 1/4 MHz marker region, trying to sort out the 1/10th MHz marks as you go. It is very easy to be 1, 1-1/4 or more MHz off of frequency. And when you are aligning a piece of gear that *must* be on frequency, that kind of error can be a disaster.

In the WR-99A, the 4.5 MHz modulation (second marker) is a nice feature, except for the fact that you also get a minus 4.5 MHz carrier marker as well. This can be a real problem on some of the older test set ups since a simple reversal of the plug on the scope can produce a change in the direction of the sweep. Many a bandpass filter has been erroneously aligned to pass the visual carrier frequency plus the *lower* sideband, attenuating the upper sideband when you thought it was the other way around as you tediously aligned the beast!

Those who do not belong to the WR-99A school of hard knocks have cut their teeth on scope screen linearity trying to utilize the 50,10 and 1 MHz markers provided as standard equipment on many modern sweep units. As long as the sweep *is linear,* the detector *is flat* and the scope *is in perfect adjustment,* you can accurately *eyeball* .25 MHz *spaces* between the markers and come pretty close. But setting adjacent channel traps with interpolation of *spaces between markers* is at best risky. Some of today's traps are so sharp that a 3-5 db error can easily pass by, simply because you were 100-200-300 KHz off in where you interpolated the .25 MHz marker *point* should fall, between *real* 1 MHz marker spots.

In sweeps with built-in 50,10 and 1 MHz markers, a moment of laxity can get the technician as much as 50 MHz off of where he thinks he is.

It was with all of the preceding facts in mind that the design of the Mark-A-Channel was undertaken. The design criteria was as follows:



by:
S.K. Richey
Richey Development Company
Oklahoma City, Oklahoma

(1) *Crystal stability* (good-bye WR-99A tuning procedures!)

(2) *Switch selectable tuning* (ditto, plus good bye reading 50,10,1 MHz markers as they "sweep by")

(3) *Addition of 4.5 MHz audio* with the visual carrier frequency

(4) *Addition of 3.58 color* with the visual and aural carrier markers

(5) *Supression of the lower sidebands* (good bye to wrong channels by error)

(6) *Ease of construction* (this *is* a do-it-yourself construction project!)

(7) *Low cost* (well, lower than a WR-99A anyhow)

The easiest way to generate 12 crystal controlled carriers is to utilize 12 crystals. But alas, crystals cost money and even at $5.00 a pop that is at least $60.00 for the crystals alone. There would be 12 separate and discreet oscillators with all of their transistors and small component parts.

If we went directly on channel with individual oscillators, this would mandate that we have 12 separate built-in bandpass filters or traps to handle the supression of the lower sideband. Scratch 12 separate oscillators.

So using modern *crystal synthesis* techniques, how *few* crystals could we utilize and still generate all of the carriers we need (12 channels, 3 carriers per channel, or 36 markers in all)? The answer was astounding.

Four crystals.

Egads you say. How can that be so?

THEORY OF OPERATIONS

The heart of the Mark-A-Channel (2) is a 6 MHz crystal controlled oscillator and a comb generator. A comb generator is an amazing bit of electronic wizardry which has a single carrier frequency at its input, and then gobs of multiples of that input frequency at its output. Our 6 MHz oscillator runs through the magic of the comb (the name is derived from the tooth-on-a-comb like appearance of the output when displayed on a sweep set up) and produces carriers at 6, 12, 18, 24, 36, 42, and 48 MHz (see Diagram 1).

Now the output of the useful comb is fed into a 12 to 48 MHz tuneable amplifier. We tune this amplifier by *switching diodes* which in turn activate tuning capacitors C1 through C7. Thus by switching in the particular capacitor (C1 or C2, etc.) which appears across the 12-48 MHz amplifier, we select *just one* of the comb output frequencies one at a time.

The 12 MHz comb is utilized for channels 2, 5 and 7. The 18 MHz comb output is chosen for channels 3, 6 and 8. The 24 MHz comb is utilized for channels 4 and 9. The 30 MHz comb, the 36 MHz comb and the 40 and 48 MHz combs are utilized for channels 10,11,12 and 13 (respectively).

The output of the 12-48 MHz amplifier is split in a DC-10 (directional coupler) and fed into a single balanced mixer. Here is the 3.58 and 4.5 MHz carriers are added to the circuit. One of the more interesting features of a single balanced mixer is that it *rejects* (attenuates) the input signal and only allows the sidebands to appear at the output (see Figure A). At the output we cleverly design in a series of tuned trap consisting of L2 and C8 through C14. The trimmer capacitors are switched in and out of the cir-

TABLE ONE — MIXING FREQS

Channel	Low F +	Local Osc. =	Pix Carrier
2	12 MHz	43.25 MHz	55.25 MHz
3	18	43.25	61.25
4	24	43.25	67.25
5	12	65.25	77.25
6	18	65.25	83.25
7	12	163.25	175.25
8	18	163.25	181.25
9	24	163.25	187.25
10	30	163.25	193.25
11	36	163.25	199.25
12	42	163.25	205.25
13	48	163.25	211.25

(1) *Such as Wavetek unit with built-in on channel and adjacent markers .*

cuit as required for the various channels which you select with the single knob front panel channel selector control.

Therefore, at the input to the two-way splitter (see Figure A) we end up with only the *plus* or upper sideband 3.58 and 4.5 MHz information. At the other input to the two-way splitter (which we are using here to combine signals together, *not* split apart), the original carrier (first split out in the DC-10) is re-inserted. And here is the magic. At the output of the splitter used as a combiner, we have (1) *a visual carrier,* (2) *a color sub-carrier,* (3) *an aural carrier set of markers, but, no lower sideband!*

All that remains for the magic box is to take this wondrous collection of marker signals and place them in the appropriate spot in the RF spectrum to match up with the

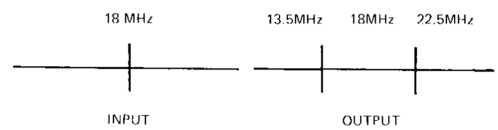


FIGURE A

TV channel assignments of channels 2-13. This is accomplished by taking the output of the previously detailed two-way splitter used as a combiner and feeding it into a double balanced mixer where it is mixed with the appropriate local oscillator to give us the desired TV channel.

As a for instance, to get the 12 MHz (dedicated) marker with 3.58 and 4.5 MHz *subcarriers* up to 55.250 MHz, we must mix the 12 MHz with a 43.25 MHz oscillator.

After the ingenious mixing work of the

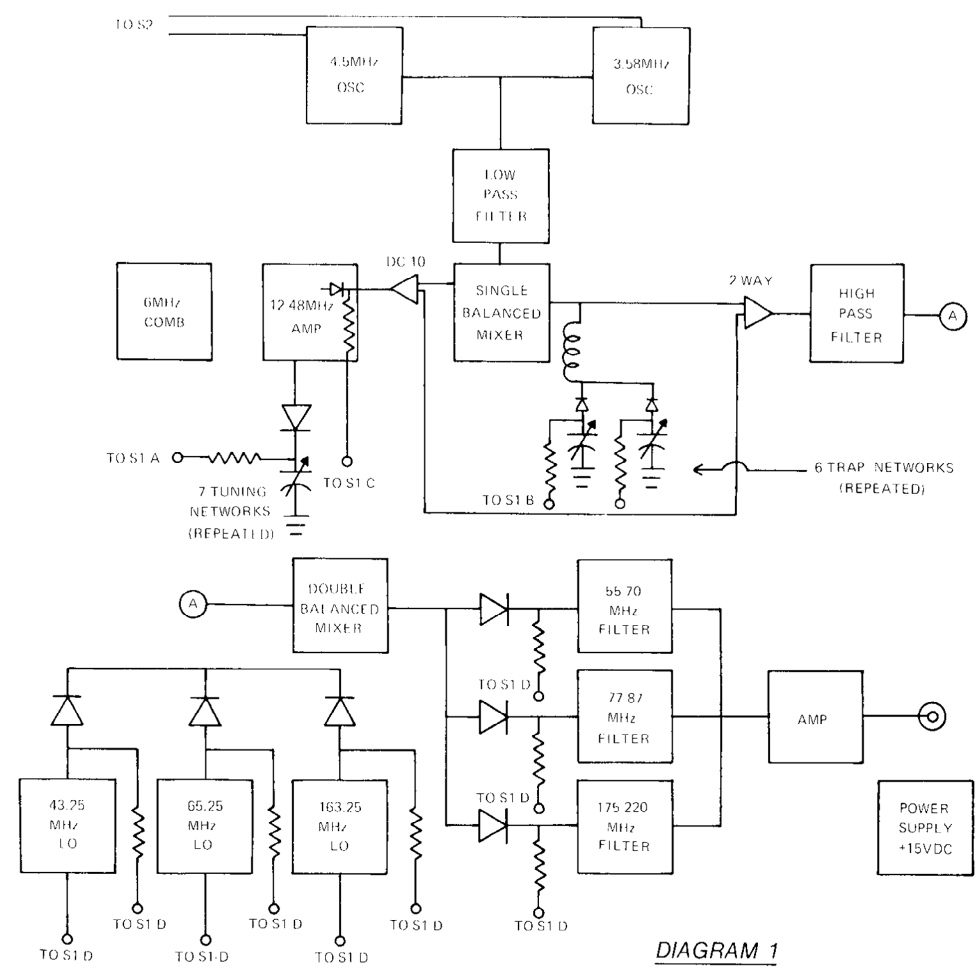


DIAGRAM 1

double balanced mixer, the output is run through a filter for the channel range it is working in. There are filters for channels 2,3,4; 5,6; 7,8,9,10,11,12 and 13 (three filters in all). The appropriate local oscillator and the appropriate filter are switched into the circuit by using switching diodes activated by the "D" section of switch 1 (appropriately, switch 1D).

After broad bandpass filtering (to handle any outputs not in the appropriate range) the signal is applied to a final (output) amplifier stage, and fed to the output "F" fitting.

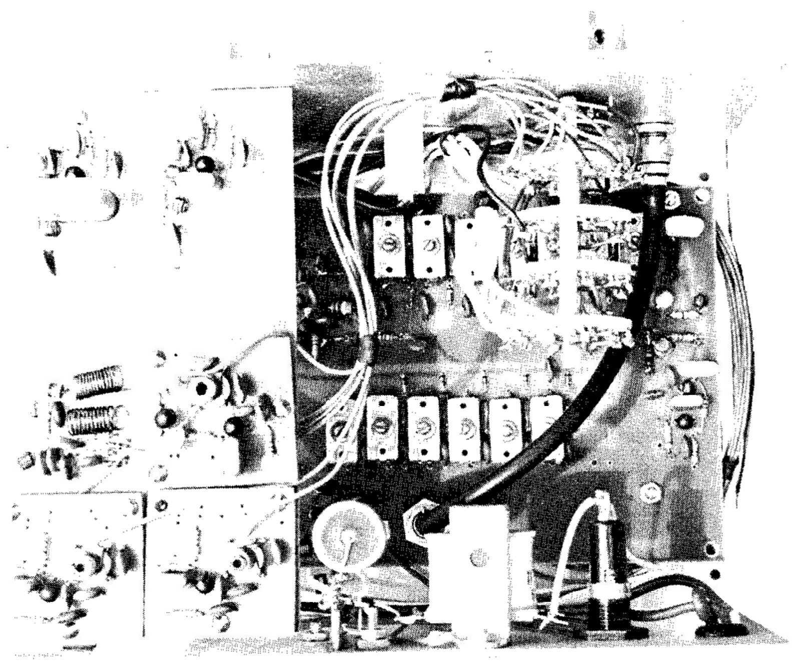
Powering for the Mark-A-Channel is straight forward and is essentially the same as the power supply circuit shown in the 10 channel marker featured in the May issue of CATJ (Volume 1, Number 1).

If you still are pondering how so few crystals can do so much work, take a gander at Table 1 here. As you can see, the basic 6 MHz oscillator (with combs at 12-48 MHz in 6 MHz increments) is mixed with three other oscillators that function at either 43.25 MHz, 65.25 MHz or 163.25 MHz. Who says electronics has to be complicated?

KIT CONSTRUCTION

In the inaugural issue of CATJ (May) we described a crystal controlled marker for specific marker functions such as band edge marking and radiation tests. The article was prepared as a do-it-yourself construction article, as is this article. Recognizing that not everyone has the experience to wire up from scratch a unit such as that, we offered a "kit" of parts and circuit boards. A number of readers took us up on that and we assume the kit builders were satisfied with the results.

Construction of a "kit" falls into a couple of categories. Most everyone has had some experience with Heathkits; it is hard to go wrong with a Heathkit, even if you have never held a soldering iron in your hands before. Then there are magazine articles, such as this one, which offer kits of parts and circuit boards. Magazine article kits tend to be for the more experienced builders; that is, someone who has a working knowledge of component parts and a basic grasp (at least) of what the unit they are building does. Magazine article kits are not step-by-step projects ala the fine work done by Heathkit.



Additionally, for every reader out there who might want to build up this unit from the kit, there are quite a few who would like the unit for their CATV work, but who would not tackle the kit. We have an answer to that one this month. The kit described here is available as a wired and tested unit as well.

Why go to all of this trouble? Well, it is like this. Our series on CATV test equipment is intended to fill voids in available test equipment for the CATV system. We are not out to compete (heaven forbid!) with existing test equipment manufacturers. In fact, we would be delighted if after our research and development work someone like Larry Dolan of *Mid-State* came along and put such a unit as we describe here into production. But in the interim, we offer the project for anyone who wants to (1) procure the parts on their own and build it, (2) procure the parts from us and build it or, (3) buy the unit wired and tested.

The green tear out card between Pages 8 and 9 of this issue include a tear-out card for ordering the parts or the unit described here.

CONSTRUCTION

Begin construction of the smaller circuit board initially. This is the board with the 3.58 and 4.5 MHz oscillators and, the plug-in oscillator boards for 163.25, 65.25 and 43.25 MHz.

Mount all parts for the 4.5 MHz oscillator (this is the oscillator with the physically smaller crystal). The only part that is critical in this portion of the circuit is L65, which has 10 turns of one color wire and 2 turns of a second colored wire. *Make sure the 10 turn side goes to the collector of Q6.*

Note: The circuit boards provided with the kits are silk screened for parts location, called out by the part number in the master list appearing here. The schematics appearing with this article refer to parts by assigned part number, while the parts-list table describes what *Q1*, etc. are. In mounting parts on the circuit boards supplied with the kit, the builder simply follows the silk screened designations.

Construction of the 3.58 MHz oscillator is similar to the 4.5 oscillator. Again, the many turns side of L6 goes to the collector of Q7.

Next wire in the diode switching section of the same circuit board, being careful to watch the polarity of the diodes as they are mounted.

The three local oscillators (163.25, 65.25 and 43.25 MHz) are pre-wired from the kit supplier. The circuit for the oscillators is included (it is the same as the plug in oscillators described in the May CATJ) and they can of course be duplicated from scratch by anyone familiar with such construction techniques. On the assumption you are working from a kit, mount the oscillators in the appropriate positions (see Figure B) on three screws with 1/4 inch standoffs. When mounting the 65.25 and 43.25 MHz oscil-

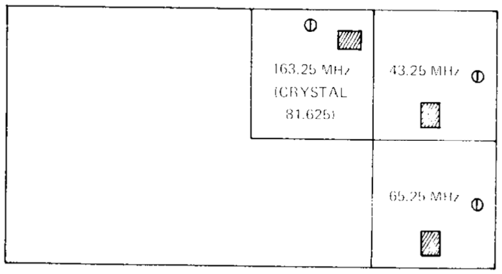


FIGURE B

lators, add two right angle brackets to the underside of the board. Turn the master (small) board over and solder wires to the holes provided at the junction of R29/C81, R30/C82 and R31/C83. These wires will be connected later as will the wires coming from the three plug-in oscillator modules.

With the small circuit board (for oscillators) out of the way, set it aside and start on the large master circuit board.

(A) Place all of the inductors on the board; pay particular attention to L1 making certain the six turn side of this coil goes to the collector.

(B) Mount all resistors on the board.

(C) Install all capacitors, *except* trimmers.

(D) Install all diodes, paying attention to the diode polarity shown.

(E) Install all transformers, with particular attention to T6. Make certain that five turn side of T6 goes to B+ and L30/C66 while the two turn side goes to Q5.

(F) Install the transistors.

(G) Install the 6.00 MHz crystal and the SRA-1 mixer.

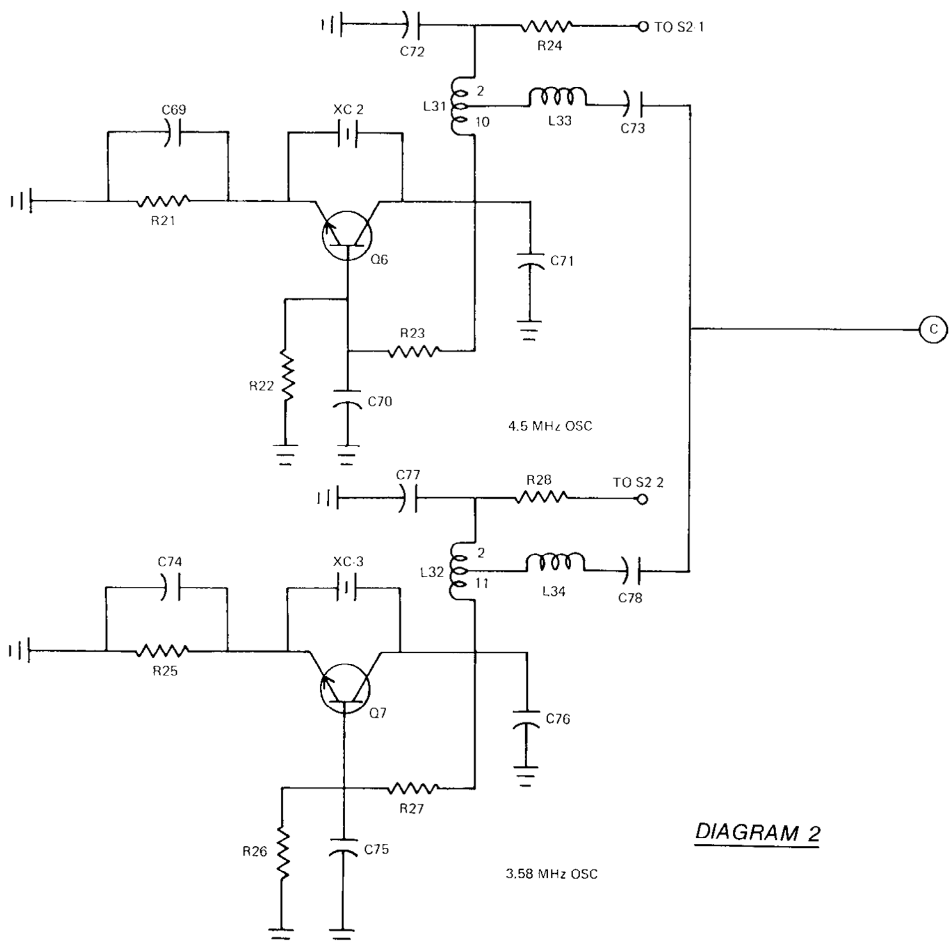


DIAGRAM 2

(H) Install all trimmer capacitors, checking to be sure that the end of the trimmer which is common with the adjusting screw goes to ground (check with an ohmmeter).

(I) Install the F-61 connector.

(J) *Turn the board over* and install six 12 inch long wires to the following component junctions: L15/C40, L16/C41, L17/C42, L18/C43, L19/C44, L20/C45. Leave the board turned over for the following five steps.

(K) Install seven 10 inch long wires to the following component junctions: L4/C39, L5/C14, L6/C15, L7/C16, L8/C17, L9/C18, L10/C19.

(L) Install two 10 inch long wires to the following component junctions: R7/C27, R8/C28.

(M) Install three 12 inch long wires to the following component junctions: R13/C50, R14/C51, R15/C52.

(N) Install underneath the board (i.e. on bottom) a jumper between C20 and C67, and another from C67 to C29. Here we are tieing 15 volt (+) lines together so that in the next step we can common-connect them to a +15 source.

(O) Install a single 10 inch wire to C20.

(P) Install one end of a 1/2 watt 680 ohm resistor at point *AA*, leaving the opposite end free for the moment and full length (do *not* cut).

(Q) Go to the master drawing on switch S1 and proceed to wire up the various switch sections as shown. Looking at the back of the switch make pin number 13 at about the 9 o'clock position and then proceeding clockwise count starting from 2 (these will be channel numbers). The gang furthest away from the front panel is Section "A" and Section "D" is the gang closest to the front panel.

(R) Wire up switch S-2 (marker carrier selector) as shown in the drawing, connecting 5 inch wires *from* pins 1 and 2. 2.

(S) Install the fuse holder, power transformer and power supply on the back of the chassis, wiring up the power supply as shown in Figure "C".

(T) Install power transistor Q6.

(U) Prepare a pair of 5 inch wires by twisting them together (twisted pair as it were); solder one to Point "C" (single balanced mixer section) and one to ground at that point. Color code so you know which

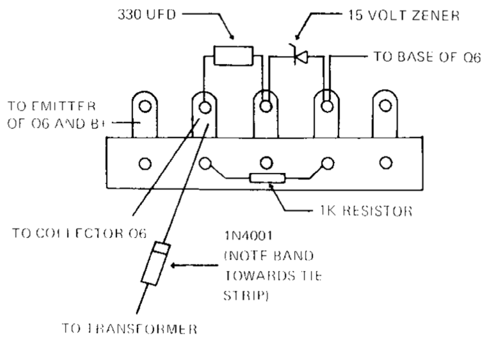


FIGURE C

is ground and which is to Point "C".

(V) Prepare a 5 inch length of miniature 75 ohm coax, connect the center conductor to Point "D" on the double balanced mixer region, the shield to ground at that point.

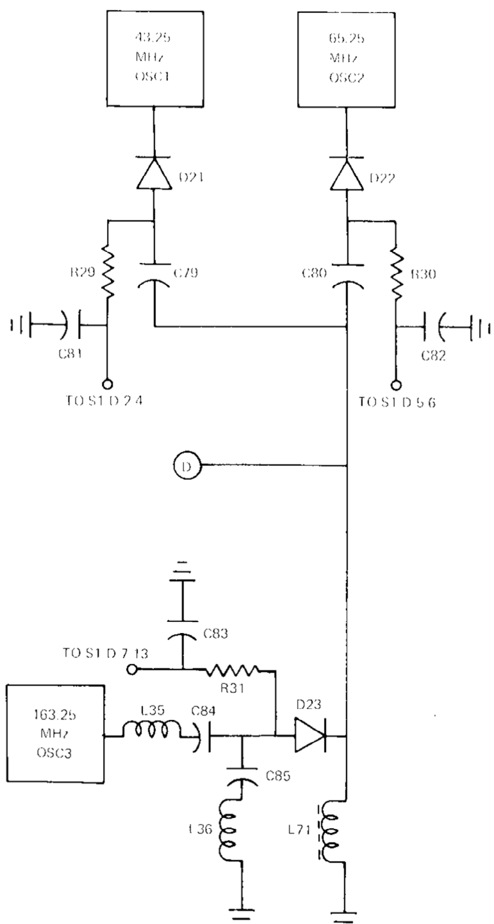


DIAGRAM 3

(W) Install the five 6:32 x 3/4 inch screws through the bottom of the case. On the top side of the case slide a 1/4 inch spacer over the screws and secure with a 6:32 nut.

(X) Place the large circuit board in place and secure finger tight with five 6:32 nuts.

(Y) Install switch S1 into the chassis.

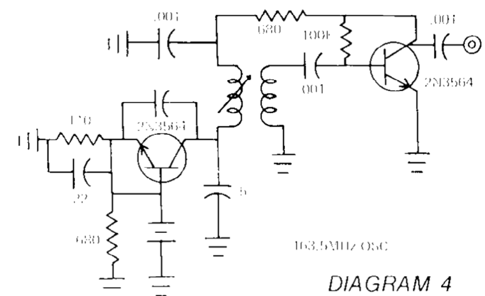


DIAGRAM 4

INTER-WIRING HARNESSES

(A) Locate the group of wires coming from the tuned amplifier section and using an ohmmeter connect them in the following order:

Wire From	*Connect To*
L4/C39	S1A-13
L5/C14	S1A-12
L6/C15	S1A-11
L7/C16	S1A-10
L8/C17	S1A-9
L9/C18	S1A-8
L10/C19	S1A-7

(B) Locate the group of wires coming from the series trap section and using an ohmmeter to locate the proper wires, connect as follows:

Wire From	*Connect To*
L15/C40	S1B-13
L16/C41	S1B-2
L17/C42	S1B-12
L18/C43	S1B-10
L19/C44	S1B-9
L20/C45	S1B-8

(C) Locate the two wires coming from R7 and R8 and connect them as follows:

Wire From	*Connect To*
R7/C27	S1C-7
R8/C28	S1C-8

(D) Locate the three wires coming from the filter section, and using an ohmmeter to locate the proper wires, connect as follows:

Wire From	*Connect To*
R13/C50	S1D-2,3,4
R14/C51	S1D-5,6
R15/C52	S1D-7,8,9,10,11,12,13

CONTINUED ON PAGE 42

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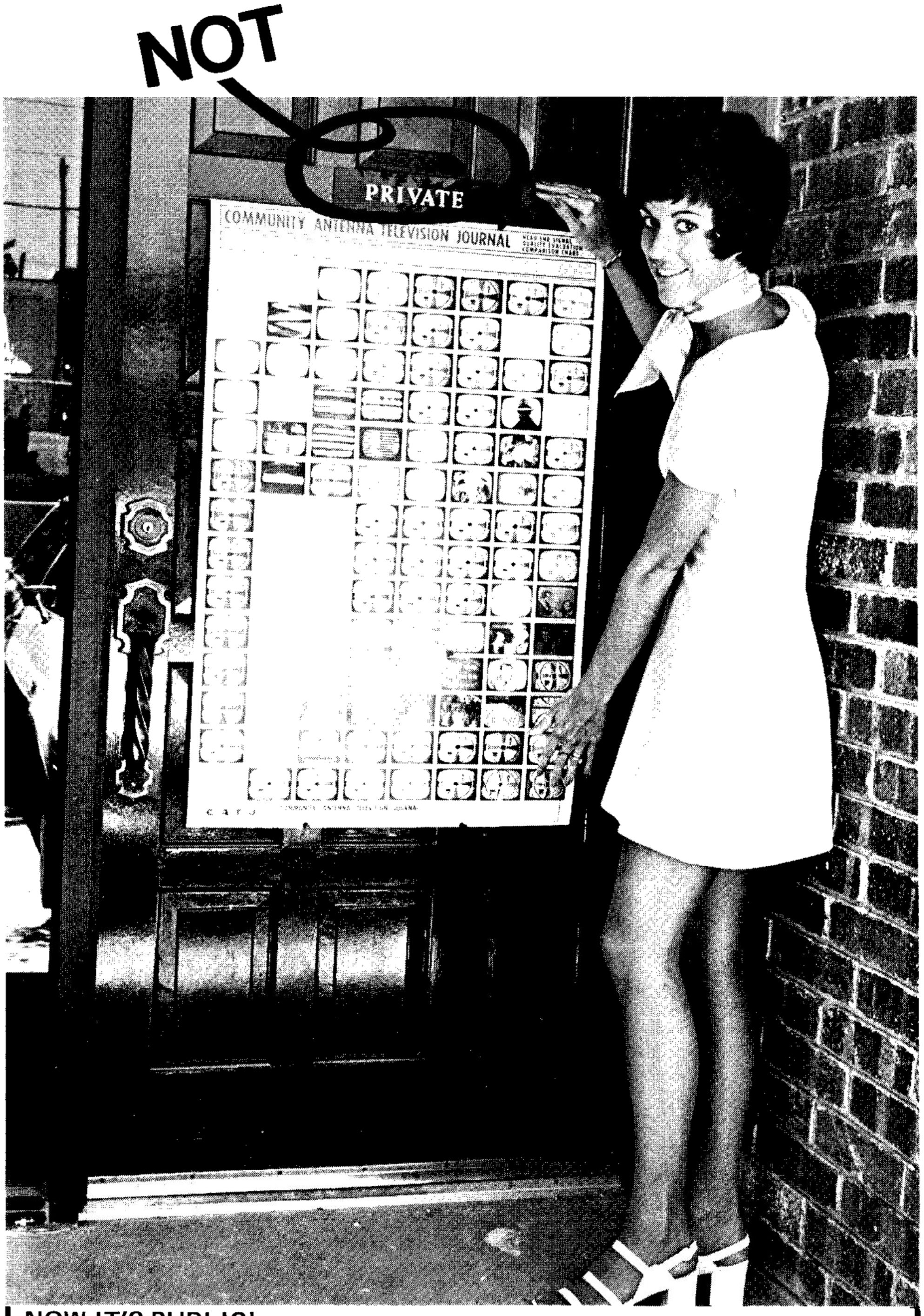

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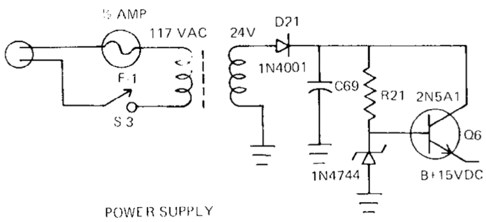


DIAGRAM 5

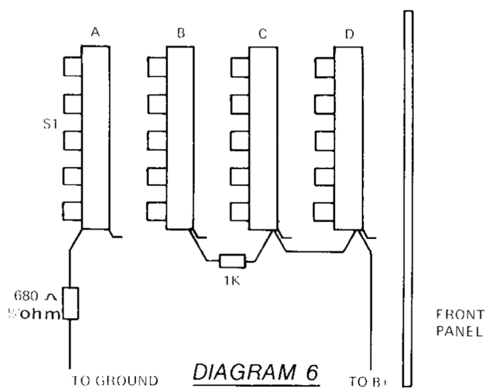


DIAGRAM 6

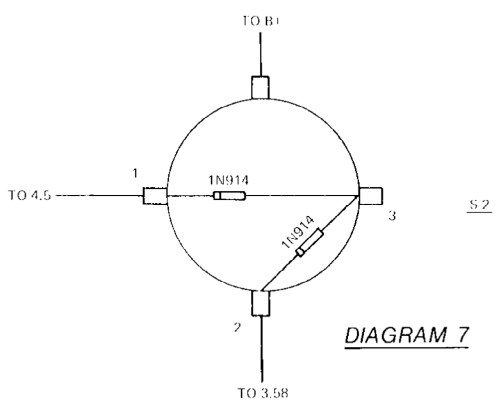


DIAGRAM 7

(E) Locate the free end of the 680 ohm resistor, 1/2 watt, and connect to the common switch point on S1-A.

(F) Install switch S-2.

(G) Now install the two remaining right angle brackets on the small (oscillator) circuit board and then install the board on the chassis with four 6:32 screws.

(H) Locate the miniature coaxial cable that connects to point "D" on the double balanced mixer and connect the free end to point "D" on the small circuit board (underside), with shield to circuit board ground.

(I) Locate the twisted pair coming from point "C" on the single balanced mixer; connect the hot portion of the pair to point "C" on the underside of the small (oscillator) circuit board; connect the other 1/2 of the twisted pair to chassis circuit board ground nearby.

(J) Connect the wire connected from pin 1 of switch S-2 to R24 on the underside of the small circuit board. Connect the wire from pin 2 in the same way to R28.

(K) In the following steps the three oscillators are connected to the switching of S1D which applies power to the oscillators and to the switching diodes.

(1) Locate the wire protruding from the 43.25 MHz oscillator (B+ line) and the pigtail from C81/R29 on the small board; connect both to S1D-2,3 and 4.

(2) Locate the wire protruding from the 65.25 MHz oscillator (B+ line) and the pigtail from R30/C82 on the small board; connect both to S1D-5,6.

(3) Locate the wire protruding from the 163.25 MHz oscillator (B+ line) and the pigtail from R31/C83 on the small board; connect both to S1D-7,8,9,10,11,12 and 13.

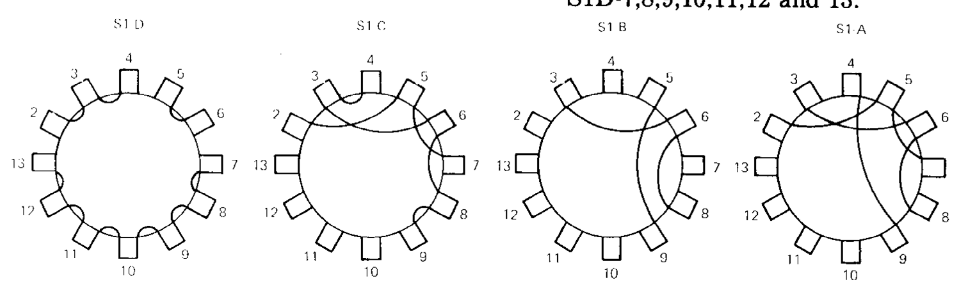
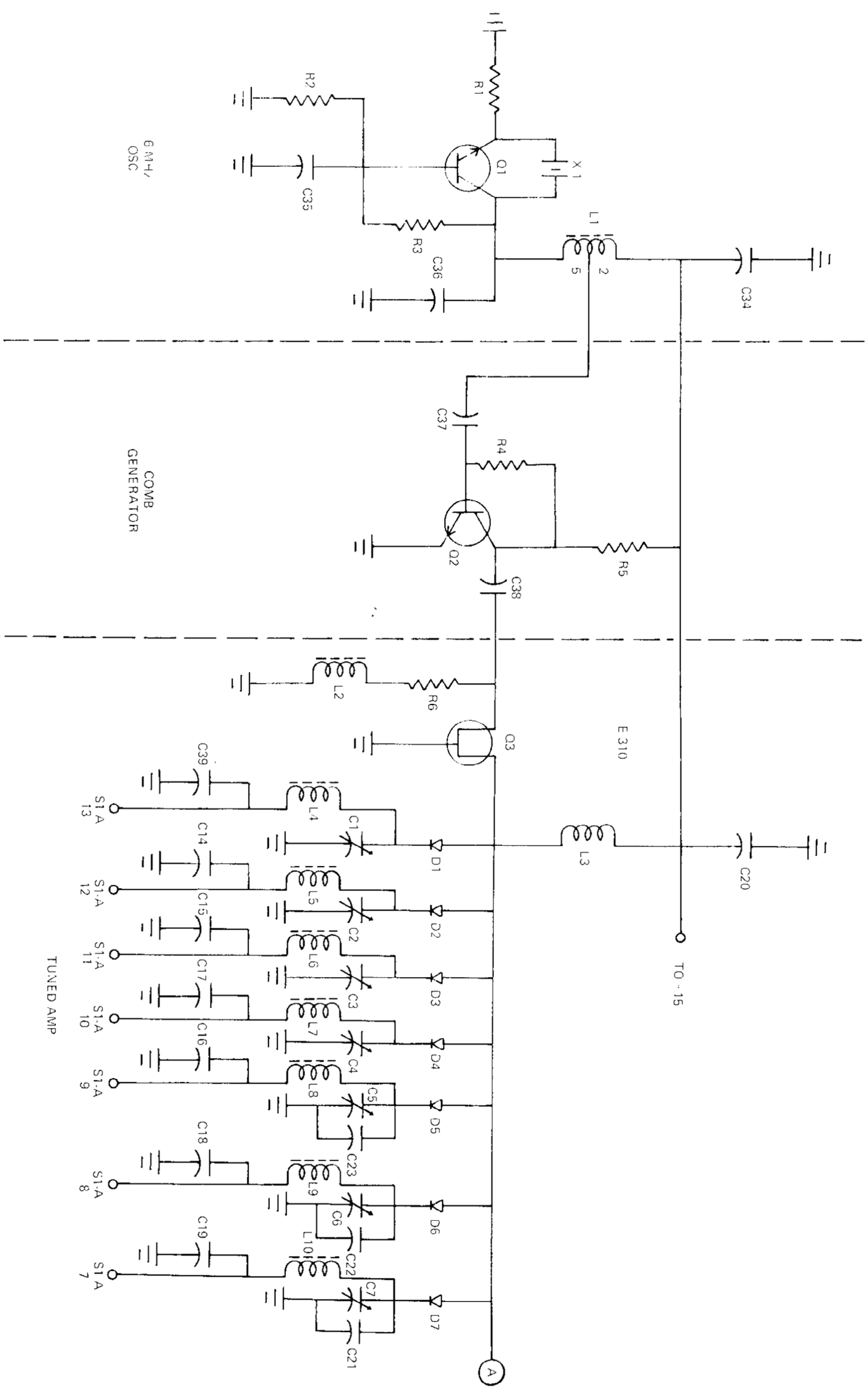


DIAGRAM 8


6 MHz OSC
COMB GENERATOR
TUNED AMP
E 310
TO - 15
R1
R2
R3
R4
R5
R6
Q1
Q2
Q3
X1
L1
L2
L3
L4
L5
L6
L7
L8
L9
L10
C1
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D5
D6
D7
S1-A 13
S1-A 12
S1-A 11
S1-A 10
S1-A 9
S1-A 8
S1-A 7
A

DIAGRAM 9

(L) Install the fuse, pilot light, switch S-3 (power on/off switch) and wire up to the power transformer.

(M) Plug the unit in and turn on; check for voltage level present *at the emitter* of power transistor Q6. *It should read 14-15 volts DC.*

(N) Unplug the unit, and connect the wire from C20 to the output binding post on the power supply.

(O) Connect a wire from the inside (common) lug of S1-D to the power supply.

(P) Connect the wire for B+ from S1 to the inside (common) lug of S1-D.

(Q) Position the turret on switch S1 so that the wiper connects to pin 13 (i.e. channel 13); install the front panel knob so that 13 points up.

INITIAL CHECK OUT

(A) Connect the output of the Mark-A-Channel to the external marker input on your sweep generator.

NOTE: This unit is designed to function only with a sweep system that has a provision for external marker addition. If your sweep system does not have this provision, the Mark-A-Channel will not function properly. However, in the next issue of CATJ (August issue) we will present a marker-adder circuit for external marker addition so that the Mark-A-Channel can be utilized with virtually any test set up.

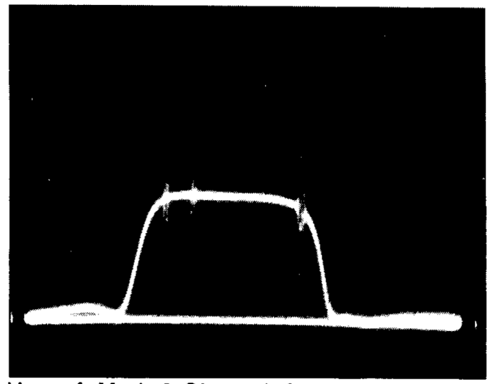
(B) Turn switch S-2 (marker selection) as far as it will go counter clockwise and install the knob with *off* up.

(C) Replug the unit into AC power and turn on. Turn the channel indicator knob (S-1) to 7 (for channel 7) and locate the marker on your sweep. Locate C7 (last in line, under the pilot light) for maximum indicated marker output.

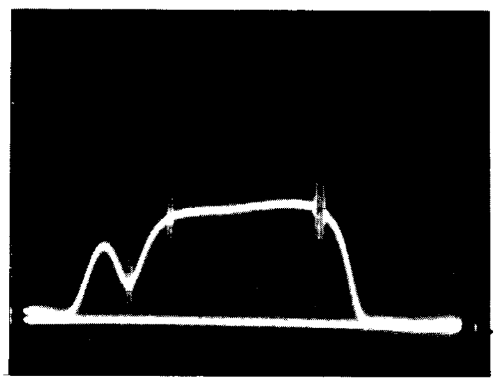
(D) Turn channel indicator to 8 and peak up C6 for maximum indicated marker output. Repeat for channels 9-13, and trimmers C5 etc. until each of the high band channels have been peaked for marker output levels.

(E) Turn the channel selector (S-1) back to channel 7 and switch S-2 (marker selection) to the 4.5 MHz position. You should now see the visual carrier *plus* the 4.5 MHz audio carrier, the latter being either right or left of the visual carrier. Make a note as to which side it appears on; this will be termed the *correct* side and will be the standard for your sweep system for tune up of the other channels.

(F) Turn the channel selector switch to 8 and note that you now have audio carrier(s) indicated on *both* sides of the visual carrier. Using C9 (the trimmer closest to the 6 MHz crystal) and referencing to the channel 7 test where your display had the aural carrier either right *or* left of the visual carrier, tune C9 so that the incorrect (i.e. *unwanted*) 4.5 MHz carrier drops away (i.e. is nulled out). This maintains the aural carrier display on the *same side of the visual carrier* as with channel 7.



Use of Mark-A-Channel for single channel strip alignment.



Checking sound notch (left marker) with sound, color, visual (left to right).

(G) Repeat this process for channels 9 - 13, using trimmers C10 through C14 to null out the unwanted 4.5 MHz sideband for each channel. Remember, the 4.5 MHz side carrier is to be on the same side (left or right, depending upon your sweep and display system) for all channels. Adjusting C9-14 can notch either side, but you only wish to *notch one side*, and then always the

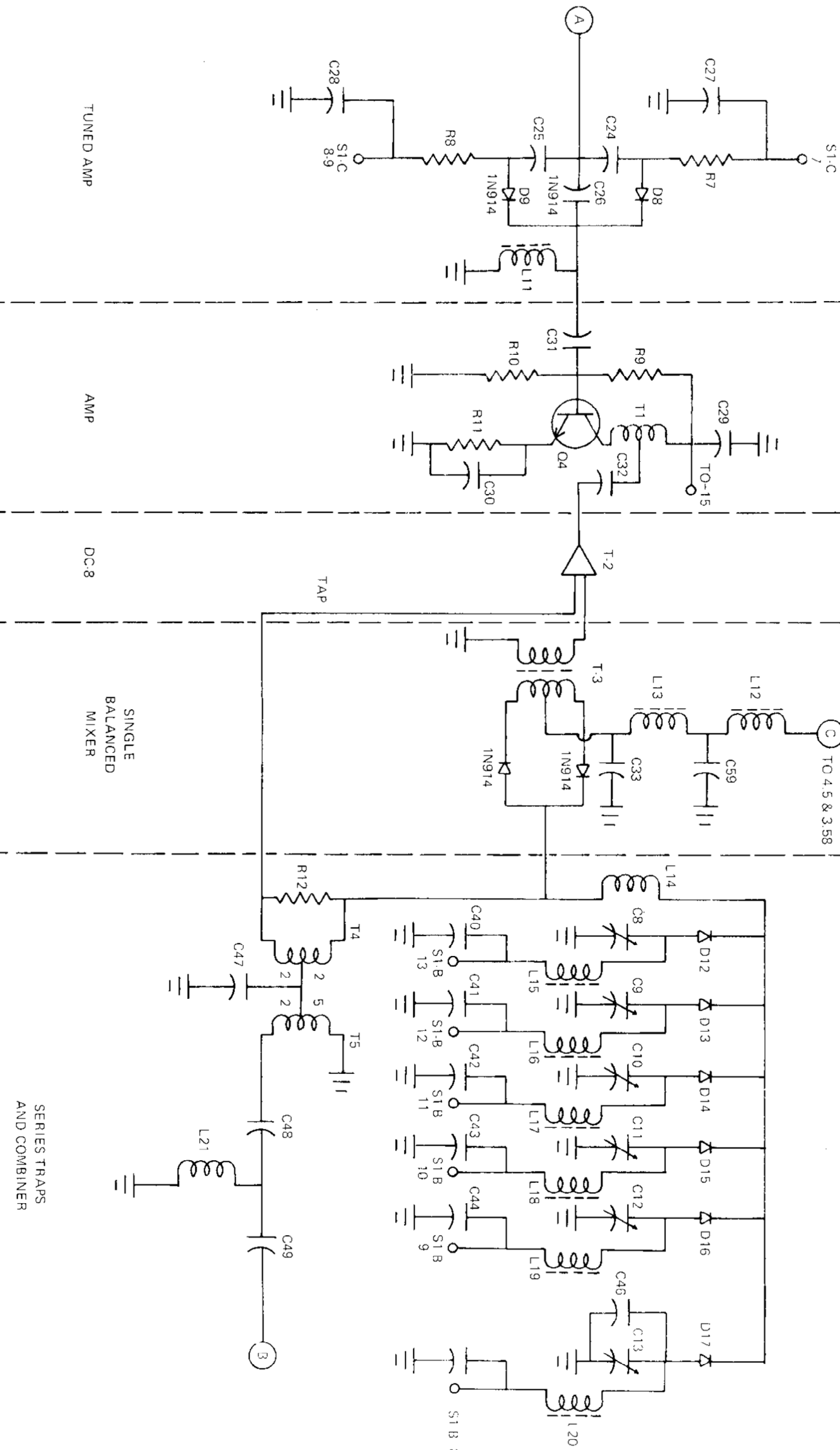

TUNED AMP
AMP
DC-8
SINGLE BALANCED MIXER
SERIES TRAPS AND COMBINER
TAP
TO 4.5 & 3.58
TO-15
1N914

DIAGRAM 10

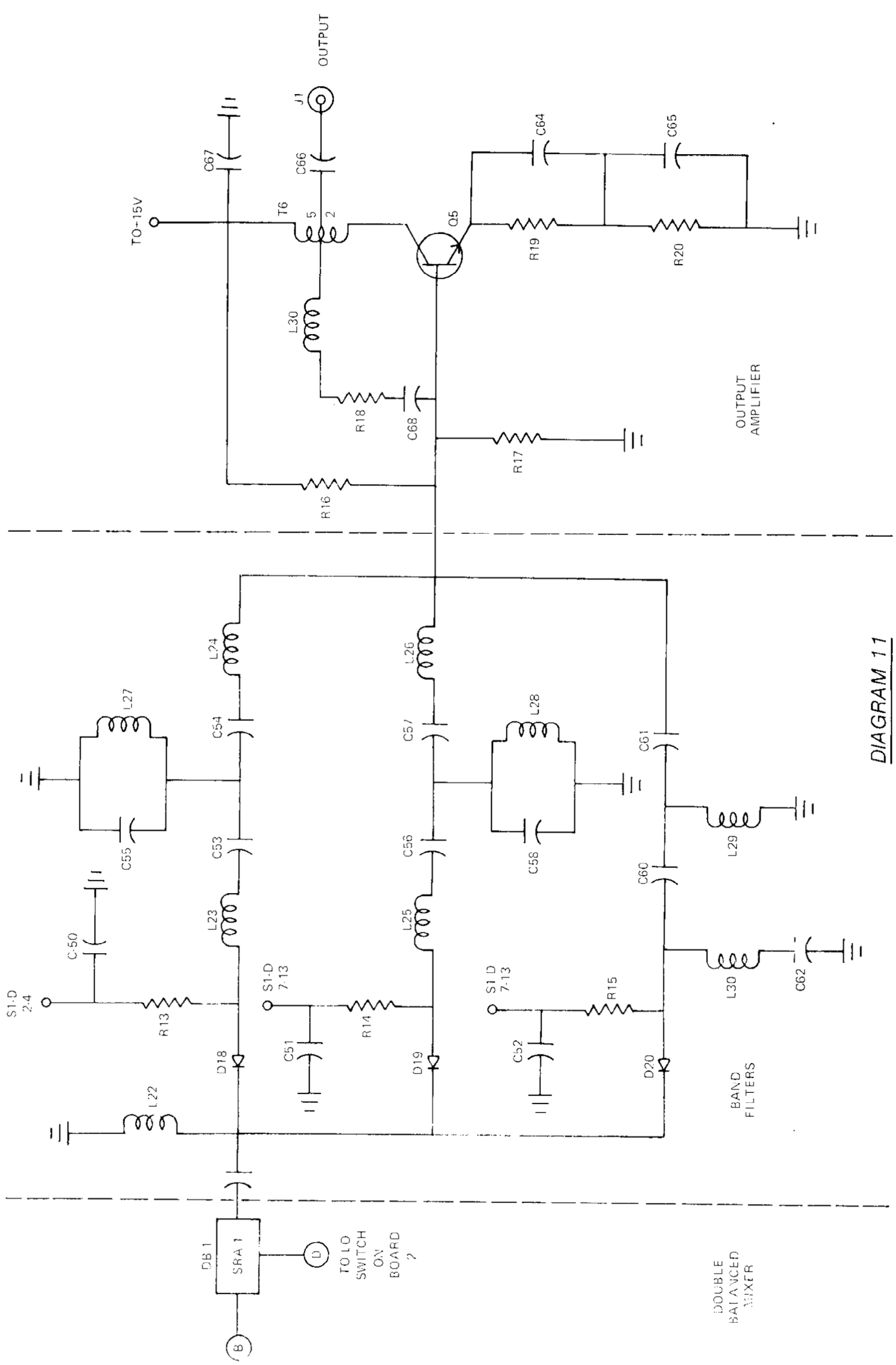

OUTPUT
J1
TO-15V
C67
C66
T6
5
2
Q5
C64
C65
R19
R20
L30
R18
C68
R17
R16
OUTPUT AMPLIFIER
L24
L26
L27
L28
C54
C57
C61
C55
C53
C56
C58
C60
L29
C-50
L23
L25
S1-D 2-4
S1-D 7-13
S1 D 7-13
R13
R14
R15
L30
C62
D18
C51
D19
C52
D20
L22
BAND FILTERS
DB 1
SRA 1
TO LO SWITCH ON BOARD 2
B
D

DIAGRAM 11

same side to maintain integrity of your Mark-A-Channel unit.

(H) Turn S-2 to 3.58 and swing through channels 7-13 to see that you have visual carrier *plus* 3.58 on all channels.

(I) Turn S-2 to 3.58 + 4.5 and repeat through all high band channels. You should have visual, color and aural on all channels.

(J) Now check the low band channels (2,3,4,5 and 6). They should be operational with no additional adjustments required.

(K) Install a 6 inch jumper of RG-59/U from the circuit board output to the output connector on the front panel; install the cover, and you are completed!

MARK—A—CHANNEL PARTS LIST

Q1,4,5,7,8	2N3564
Q2	BFX-89
Q3	E-310
D1,2,3,4,5,6,7	3080 pin diode
D8-23	*1N914*
R1,11	240 ohms
R2,5,10,17,22,24,26	680 ohms
R3,7,8,9,13,14,15,16,23, 27,29,30,31	3.3K ohms
R4	100K ohms
R6	select for 10MA E310 drain current
R12	150 ohms
R18	330 ohms
R19	10 ohms
R20,21,25	110 ohms
R28	510 ohms
C1-13	Elmenco 422 trimmer
C20,34,72,77	1 mfd
C21,59	390 pf
C22,48,49	150 pf
C23,55,76	68 pf
C24,58	50 pf
C25,85	6.8 pf
C26	2.2 pf
C30	180 pf
C33	500 pf
C36	120 pf
C46,71,78	100 pf
C47,53,54	8 pf
C56,57	3.3 pf
C60,61	10 pf
C62	5 pf
C64	18 pf
C69,73,74	47 pf
C84	1 pf
C14,19,27,29,31,35,37,45,50,52, 65,67,70,75,79-83	.001 mfd
XC-1	6.000 MHz
XC-2	4.500 MHz
XC-3	3.580 MHz (*)
	* 3579.545 kHz
J1	F61A
L1	7 turns tapped 2 (56-590-65/4B core #30)
L2,11,22,37	6 turns on 4B #30 core
L3	33 uH
L4,5,6,7,8,9,10,15, 16,17,18,19,20	65 uH
L12,13	8 turns on 4B core #30
L14,23,24,25,26	82 uH
L21,28	3 turns #20, 1/4"diameter
L27	4 turns #20, 1/4"diameter
L29	2 turns #20, 1/4"diameter
L30	9 turns #22, 1/8"diameter
L31	12 turns tapped at 2 on 4B core #32
L32	13 turns tapped at 2 on 4B core #32
L33,34	14 turns on 4B core #32
L35	16 turns #22, 1/4"diameter
L36	12 turns #22, 1/4"diameter
1	AC power cord
1	3/8" rubber grommet
1	SPST switch
1	fuse holder
1	3AG 1/2 amp fuse
1	117 VAC primary, 24 volt secondary 100 mA transformer
1	1N4001 diode
1	320 mfd at 64 vdc electrolytic
1	1k, 1/2 watt resistor
1	1N4744 diode
1	2N5191 power transistor (Q6)
1	5 terminal tie point strip
T1,5,6	2x5 auto transformer #30 wire on 4B core
T2	10 db directional coupler with 75 ohm resistor
T3	4 turn center tapped secondary, 2 turn primary on Micrometals 2664000912 core
T4	2 turn center tapped on 4B core
1	LMB chassis box #685
1	F81
1	680 ohm, 1/2watt
1	1K ohm, 1/4 watt
1	6" RG-59/U jumper
2	1N914
1	SRA-1 double balanced mixer
1	12 position, 4 gang switch (S1)
1	4 position, single gang switch

CONTINUED PAGE 48

CABLE BUREAU COMMUNIQUE

The Federal Communications Commission has taken action in a number of areas which tends to indicate some of the present thinking of the Cable Bureau and the full Commission at this time. Most of these deal with present-day interpretations of the Cable Rules; one, however, gets into the region of MATV regulations.

A **Tacoma, Washington MATV system operator** has been ordered to show cause why he should not cease and desist from further violations of Rule Section 15.31, which pertains to incidental radiation. It appears that the operator of the MATV system in the College Orchard Apartments (A. J. Corvin, Jr.) is picking up the signal of local FM radio station KPLU-FM (Tacoma) on 88.5 MHz, and either purposefully or accidentally **doubling** its frequency so that KPLU-FM ends up on the MATV system on 177 MHz. The MATV system is in turn radiating signal in the area, which allows the 177 MHz signal to interfere with off-the-air reception on channel 7 (locally used in the region). The Commission reports it has "repeatedly given written and oral warnings" to the operator of the system, but to date it has not corrected the problem.

A CATV system to serve the community of **Fridley, Minnesota** has received certification by the Commission for annual franchise fees totaling 5% of the system's gross revenues. The Commission, in approving the excess franchise fee above the normal 3% ceiling, noted "The City of Fridley, as local regulator, has provided a detailed and documented explanation of the costs justifying the (initial) franchise acceptance fee and the reasonableness of five percent". The Commission warned however "we will not sanction excessive fees and will watch for evidence of abuses".

A proposed CATV system for **Washburn, Maine** has received a Certificate of Compliance for an "indefinite period of time" although the franchise the cable operator (TEL-TECH CABLE TV, INC.) has is "yearly" in term. The City of Washburn requires "annual review of the franchise" under which the CATV company operates. The cable company argued successfully that the terms of the franchise are the same, year after year, only the annualized expiration date of the franchise changes as each successive renewal is considered and approved.

The Commission agreed that annual re-submissions for Certificates of Compliance would be an "undue administrative and economic burden" for the CATV operator.

CONTINUED FROM PAGE 47

1	117 VAC pilot light
2	knobs (custom)
1	master circuit board
1	oscillator circuit board
1	43.25 MHz oscillator (complete module)
1	65.25 MHz oscillator (complete module)
1	163.25 MHz oscillator (complete module)
14	1" spacers
5	6:32 x 3/4" screws
13	6:32 nuts
4	right angle brackets
9	4:40 x 1/2" screws
9	4:40 nuts
3	6:32 x 1/4" screws

KIT AVAILABILITY

Kit Alone — complete with all boards, parts, plug-in oscillators, and all parts required for assembly as described here $175.00

Kit - 2B — Two circuit boards used in construction (master board and oscillator board less plug in oscillators) . . $25.00

Wired & Tested — Mark-A-Channel unit as described herein, wired and tested $300.00

Note: To order kits or wired and tested unit, use order card appearing between Pages 8 and 9 of this issue of CATJ. Allow 3 - 4 weeks for delivery of kits, 4 - 5 weeks for delivery of wired — tested unit.