and video is fed to pin 5 of comparator U1. The U1 reference voltage is obtained from a voltage divider that includes potentiometer R113 labeled MONITOR CAL. on the circuit board. R113 sets the reference voltage to a prescribed value for correct operation of the video amplifier.

The output of comparator U1, at pin 6, goes into Q11 and Q12 which act as a sync tip level detector and provides a DC correction signal fed back to the base of Q7 through J2, J8 and R23.

In summary, the sync tip clamp circuit involves a feedback loop from Q7, through Q8, Q9, Q10, U1, Q11 and Q12. From the emitter of Q12, a DC correction voltage is fed back to the base of Q7 to set the sync tip operating point of the emitter of Q10.

The white level clipper exerts its influence on Q10 through a signal path from the Q13 emitter, CR1, to the Q10 emitter. Through this path, Q10 is biased so that it can no longer furnish additional video drive to a diode bridge in the video modulator.

The biasing of Q10 puts a limit on modulation depth and prevents carrier cut-off caused by over modulation and the resulting distortion and sync buzz.

The modulation depth, in the white level clipper circuit, is adjusted by potentiometer R42, a user screwdriver adjustment on the circuit board labeled WHITE CLIP LVL.

The output video amplifier, from the Q10 emitter, drives the video modulator circuit consisting of R68, L19, R69 and diode bridge modulator CR8, CR9, CR10, and CR11. R113, labeled MONITOR CAL. on the circuit board, is factory adjusted to calibrate the diode bridge to generate 87.5% modulation at the standard video input level to the ATM-1600. R113 forms a voltage divider with R112 and thermistor RT1 to pin 3 of operational amplifier U4B.

The R113/R112/RT1 combination sets the reference voltage at the U4B output, Pin 1. This output provides a low impedance drive point for CR9 and CR11. The CR9 and CR11 junction is a fixed voltage point. The video signal is fed to the other side of the diode bridge, at the junction of CR8 and CR10.

When the voltage at the CR8/CR10 junction is equal to the voltage at the CR9/CR11 junction, the bridge is balanced. The RF drive out of transformer T6 is cancelled out and zero power results, across the two junctions, representing 100% modulation. When the levels at the junctions are different, the bridge is unbalanced allowing the RF drive from T6 to go through the modulator stage and to module pin J1-P, the (VISUAL OUT) terminal. The modulation percentage is proportional to the difference in level between the CR8/CR10 and CR9/CR11 junctions.

Factory adjustment C60 across T6, is an adjustable capacitor used to balance out the static phase error that causes differential phase. C60 is adjusted to minimize differential phase.

Input to the modulation percentage detector is from Q10 emitter (from the output video amplifier). The signal is fed through emitter follower, Q22, to diode detector circuit, CR4, CR5 and CR6. The output of the diodes is a DC voltage proportional to the video drive into Q22.

The output of the diode circuit, CR6, is fed into an operational amplifier, U6B. used to provide a visual indication on the MODULATION % bar graph indicator on the front of the Video Modulator .

Transistor Q17, Crystal Y1, tank circuit inductor L10, feedback inductor L12, and C47 comprise a 45.75 MHz oscillator. The oscillator output goes to buffer amplifier Q18.

The buffer amplifier output, at the Q18 collector, is fed through a low pass filter, L13, C52, and C53, and then into directional taps T3 and T4. The directional taps function and routing are as follows:

T3, 45.75 MHz in and out. When SW1, the user EXT/INT switch on the PCB is in the INT position, 45.75 MHz is fed from module pin J1-H to the rear panel connector J7 (IF REF). When SW1 is in the EXT position, the module accepts an external 45.75 MHz source, fed into connector J7 (IF REF).

T4, 45.75 MHz to module Pins J2-3 and J2-C. The feed to the audio module used to lock up the Aural IF generating circuits.

The video modulator carrier drive consists of buffer amplifier Q19 and all components between T4 and T6. The circuit supplies CW visual IF carrier drive to the video modulator.

R100, labeled CARRIER DRIVE on the circuit board, is a factory adjusted variable resistor that adjusts the RF drive level to the modulator. This level is set to a prescribed value to maintain the lowest distortion.

The circuit containing Q20 and Q21 and associated components, including capacitors and inductors leading to the module pin J1-P output, is the modulated visual IF output amplifier.

The modulated output from the diode bridge in the video modulator circuit is fed to differential amplifier Q20 and Q21.

The amplifier output is taken from the collector of Q20 and fed to output level potentiometer R105, a factory adjustment labeled OUTPUT LVL CAL on the circuit board.

R105 is associated with coupling transformer T7 which goes into low pass filter C64, C65, C66, L16 and L17. The low pass filter output goes to module pin J1-P which is connected to rear panel J11 (VISUAL OUT). R105 is adjusted to obtain a +40 dBmV output.

Q40 amplifies visual IF, Q42 amplifies aural IF, and with jumper J10 pin 2-3, visual and aural IF signals are fed through directional tap transformer T10. T10 adds the aural IF to the visual IF before the SAW filter, FL1. The combination of components in the Q40 emitter circuit helps to flatten the response over a 40-47 MHz bandwidth.

The J10 jumper is used to add the aural signal to the visual IF signal as follows: J10 pin 2-3 connection adds the aural signal to the visual IF before the SAW filter. A J10 pin 1-2 connection adds the aural signal after the SAW filter. In some applications, the SAW filter bandpass is too narrow to allow passage of the aural signal; then the J10 pin 2-3 jumper is removed and J10 pin 1-2 is used.

Transistor Q14 forms an IF amplifier that compensates for SAW filter losses. Q14 also forms a buffer between the SAW filter and the LC filter in the Q14 collector circuit. The trimmer potentiometer, R176 allows a small adjustment in gain to maintain unity gain throughout the module amplifier circuits.

The LC filter, L36, L37, C119, C120, C121, C122, and C123, compensates for the SAW filter's slope of the passband response. The pi pad, R183, R184, and R185 helps isolate any perturbations caused by the composite IF outputs affecting the LC filter.

The transformer T5 forms a 3 dB signal splitter to drive U20 and U21. These amplifiers boost the signal to a +40 dBmV output at pins J1-15 and J1-16

At pin J1-K aural IF input, the pi pad R189, R190, and R191 insure a good return loss and isolates the broadband aural IF amplifier Q42.

Following Q42 is a electronic attenuator circuit consisting of C138, C139, CR20, CR21, L41, R197 through R205.

R205 is the AURAL CARRIER front panel adjustment for setting the level of the aural IF carrier referenced to the visual IF carrier.

On the rear panel, J16 monitors the presence of video on J5, VIDEO IN. Output from J16 is positive logic TTL. Output is high with video input (+5 V through 1k ohm source) with an internal pullup resistor. Output is low with no video input (0.4 V maximum). Resistive loads down to zero ohms are acceptable. An LED lamp may be connected between the Video Sense terminal and ground for remote indication of video status.

4.5 Baseband Encoder Interface

The baseband encoder interface allows the modulator to be used in a baseband video scrambling system. Baseband encoded scrambling requires a baseband encoder interface board assembly part number 9001-2037 in the video modulator module. This assembly replaces the normal sync tip clamp circuit with a gated clamp which is enabled only during the appropriate time interval for video sync.

Timing information is supplied to the modulator by an encode gate signal originating in the baseband encoder. The encode gate timing pulses trigger a series of one-shot timers and associated electronic switches in the encoder interface board assembly. This process gates on the clamping circuits during the suppressed sync interval.

Refer to the block diagram, Figure 4-5, and timing diagram, Figure 4-6.

Central to the operation of the baseband encoder interface assembly is a current mode (Norton) amplifier, U4, acting as a sync level sensing feedback element between the modulator's video amplifier output and the bias input. This circuit automatically adjusts the sync clamping level so that current through R10, into the non-inverting input

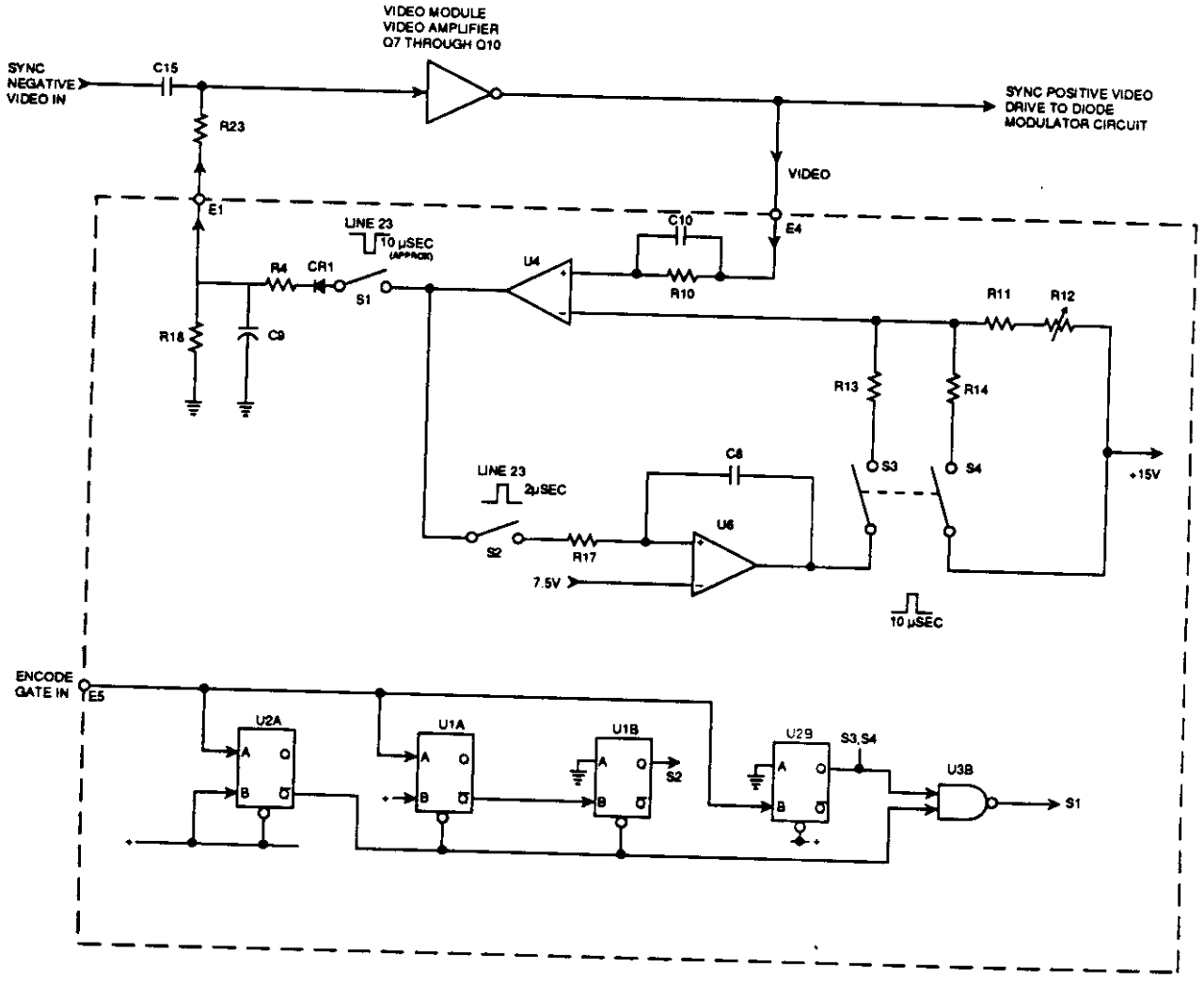

Figure 4-5
Baseband Encoder Interface Assembly, Block Diagram

of U4, matches the reference inverting input current of U4.

In the non-scrambled mode the reference current to the U4 inverting input is set by variable resistor R12 in series with R11. The encoded gate line remains inactive, (high) thus preventing operation of the one-shot timers and electronic switches. Electronic switch S1 is closed; S2, S3 and S4 are open, allowing U4 and associated components to act as a conventional sync tip referenced clamp circuit. Variable resistor R12 calibrates the video bias level, as required for normal sync by adjusting the reference current into U4. In the scrambled mode, the encode gate line is activated. This causes operation of the one-shot timers and the electronic switches, as indicated in the timing diagram. At the beginning of the vertical sync interval., sync is not suppressed and the encode gate line remains inactive. Beginning at line 23, sync is suppressed by the encoder and the encode gate line is driven low as shown in the timing diagram.

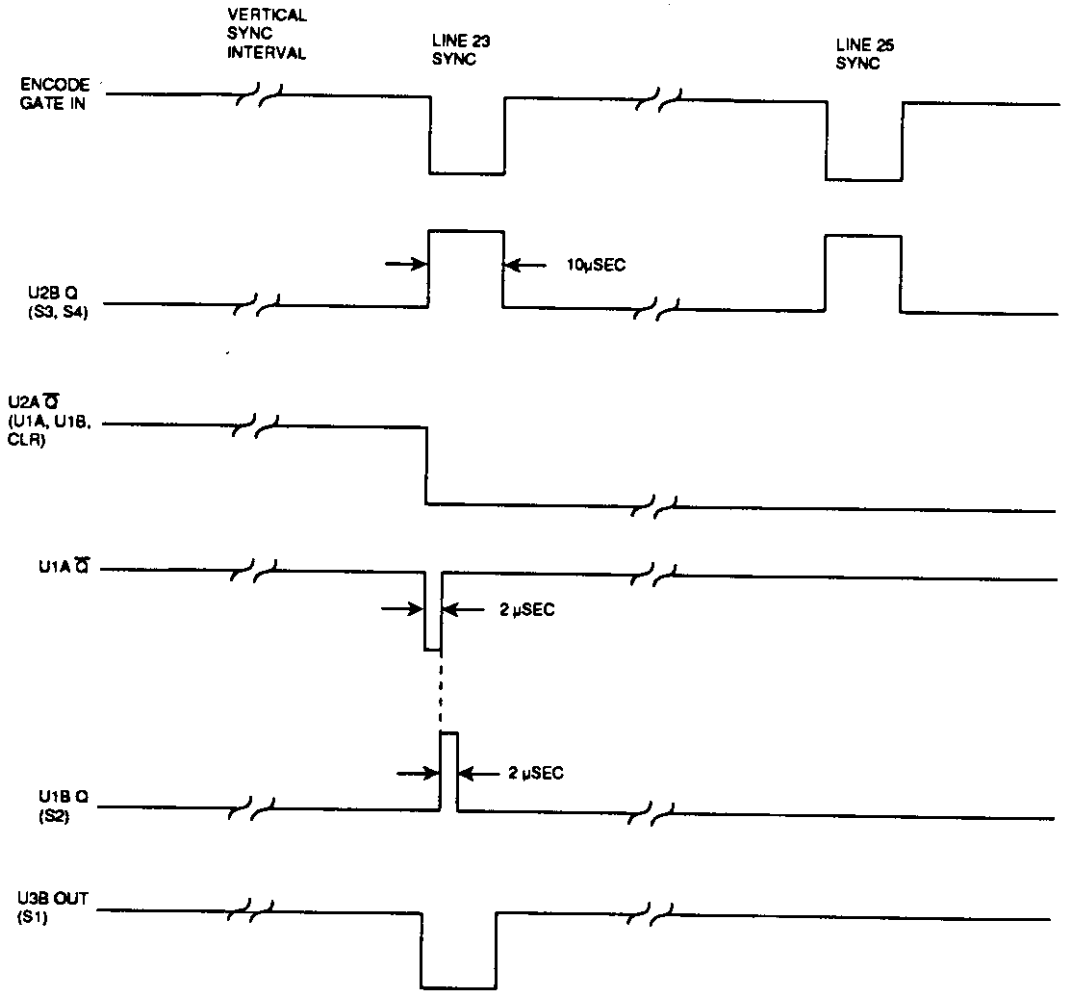

Figure 4-6
Baseband Encoder Interface Assembly, Timing Diagram

At the initiation of sync suppression, electronic switch S1 opens for a time period equal to the low state of the enable gate.
Electronic switch S2 closes for two microsecond; S3 and S4 close for ten microseconds. This switching sequence closes the feedback loop around U4 and the integrator circuit, U6, C8 and R17. At this time, the U4 inverting input reference current includes R11/R12, R13, and U6/R14 current paths.

The feedback loop circuit, including integrator U6, stabilizes with the sync clamp referenced to the suppressed sync level established at the first line with suppressed sync. The active video component remains at the same bias level as with unscrambled sync. During the remainder of the video frame, electronic switch S1 remains closed and S2 remains open. Further switching of S1 and S2 is inhibited until one-shot U2A can reset during the next vertical interval when the enable gate becomes inactive. To maintain clamping on the suppressed sync amplitude, electronic switches S3 and S2 continue to close for a period of ten microseconds during each line in response to the encode gate signal.

4.6 Audio Subcarrier Processor

Not available at this printing.

5.0 PARTS LIST

5.1 Introduction

This Section of the manual provides a list of parts for each assembly covered by this manual. The list contains a break down of each assembly by component part number, component description and reference designation. Figure 5-1 shows an exploded view of the ATM-1600 and identifies major subassemblies. Parts location diagrams, Figure 5-2 for the Audio Modulator, Figure 5-3 For the Video Modulator have been provided to assist in locating individual components.

The parts lists contain many abbreviations. Some of the abbreviations used in this list are as follows:

BD	Board
STL	Steel
ASSY	Assembly
CER	Ceramic
FXD	Fixed
MET	Metal
VAR	Variable
RAL	Radial
ADJ	Adjustable

5.2 Ordering Information

When ordering replacement parts, give the quantity, reference designator, part number and description for each item ordered. The part that will be supplied against an order for a replacement item may not be an exact duplicate of the original part; however, it will be a satisfactory replacement differing only in minor mechanical or electrical characteristics. Such differences will not impair the operation of the equipment.

Catel maintains a complete stock of replacement parts for your Catel equipment. We recommend ordering all replacement parts from Catel to ensure compatibility of components and having your order filled promptly.

Order from:
Catel Telecommunications
4050 Technology Place
Fremont, CA 94537-5122

PART NUMBER	DESCRIPTION	REFERENCE DESIGNATOR
9001-2031-XX ATM-1600,FINAL ASSY.		
2832-0802	NUT,KEP.6-32X5/16A/F.STEEL/CAD.PL.	
6012-0365-XX	PANEL ATM-1600	
6014-0084	MODULE ASSY,CHASSIS,T.V.MODULATOR	
6033-0116	FAB HANDLE AM MODULATION	
6820-0421	NUT,HEX 4-40 STD.PATT STL/ZINC	
6910-0003	LABEL. MODEL/SERIAL NO.	
7112-0408	SCR.PAN/PHIL.#4-40X1/2 STL/ZN.P	
7122-0403	SCR.FLAT/PHIL.#4-40X3/16 STL/ZN.P	
7122-0606	SCR.FLT/PHIL.#6-32X3/8 STL/ZN.P	
7212-0605	SCR.PHIL/PAN 6-32X5/16 STL/Z IN/WS	
7923-0023	CABLE POWER CORD 3-COND DETACHABLE	
8000-4055	ASSY MODULE POWER SUPPLY, ATM-1600	
8000-2610	ACCESSORY KIT	
9001-2031-XX	ATM-1600 FINAL ASSY.DWG	

PART NUMBER	DESCRIPTION	REFERENCE DESIGNATOR
5901-0340 ASSY PCB BACK PLANE, ATM-1600		
1007-5103	CAP CER Z5V DISC .01 UF 20% 50V	C1
4612-2106	INDUCTOR FXD MOLDED 10 UH 10%	L1
4707-0531-08	INDUCTOR AIR CORE 8T 1/4 22GA	L3
5216-0022	CLIP LOCKING 2 PIN	J1
5216-0039	CONNECTOR "F" PCB	J7,8,9,10,11,12, 13,17
5216-0092	CONN.COAX.,RF,PCB,PRESS-FIT,COM.BNC	J3,4,5,6
5216-0105	CONN CARD EDGE RCPT 2X22 .156 ST	J15
5216-0107	CONN CARD EDGE 20 PIN DUAL	J14
5223-0012	TERMINAL BLOCK 3POS .250C/C ST	J2
5223-0036	TERMINAL BLOCK 2POS SCR CONN	J16
5900-0340	FAB PCB BACK PLANE	
7921-0012	CABLE COAX SEMI-RGD.75 OHM.085DIA	
8000-4055 ASSY MODULE POWER SUPPLY, ATM-1600		
5901-0340	ASSY PCB, BACK PLANE, ATM-1600	
5501-0040	SWITCH, ROCKER SPDT 5A120V PNLMT	
5601-0023	CONN., AC POWER, FILTERED 6J4	
5602-0041	PWR SPLY, SGL OUT 18V/1.25A 90-260 VIN	
6012-0366	REAR PANEL FAB, T.V. MODULATOR	
7612-0404	SCR, BINDER/PHIL 4-4-X1/4 STL/ZINC	
6014-0083	CHASSIS, BKT. CRS, TV MDULATOR	
7112-0204	SCR, PAN HD. PHL #2-56X1/4LGN ZN.PL	
5101-0255	ASSY CABLE, 2 CONDUCTORS	
5105-0256	ASSY CABLE, 2 CONDUCTORS	
7301-0003	TUBING, HEAT SHRINK. 1/8D BLACK	
7910-2005	WIRE, STRANDED, 20CA, 7/28 PVC GRN	
5227-0020	TERMINALS SOLDER	
6821-0004	NUT 3/8" X 32 X 3 1/2 THK. STL/CAD.PL	
5562-0001	FUSE, 1/2A SLOW BLOW (115V OPTION)	
5562-0003	FUSE, 1/4A SLOW BLOW (230V OPTION)	

5602-0041 ASSY. POWER SUPPLY, SGL OUT 18V/1.25A 90-260 VIN

(Non-Catel assembly, information provided for reference only; may only be ordered from Catel as a complete assembly under P/N 5602-0041)

JUMPER WIRE	J2
JUMPER WIRE	J1
RESISTOR CARBON FILM, 57K, 2W	R2
RESISTOR CARBON FILM, 10R, 1/4W	R19
RESISTOR CARBON FILM, 15R, 1/4W	R52
RESISTOR CARBON FILM, 100R, 1/4W	R7,12

PART NUMBER	DESCRIPTION	REFERENCE DESIGNATOR
5602-0041 ASSY. POWER SUPPLY, SGL OUT 18V/1.25A 90-260 VIN (Cont.)		
	RESISTOR CARBON FILM 330R 1/4W	R10
	RESISTOR CARBON FILM 470R 1/4W	R14
	RESISTOR CARBON FILM 3K3 1/4W	R13
	RESISTOR CARBON FILM 3K9 1/4W	R15
	RESISTOR CARBON FILM 5K1 1/4W	R6,8,9
	RESISTOR CARBON FILM 27K 1/4W	R17
	RESISTOR CARBON FILM 2K2 1/4W	R11
	RESISTOR CARBON FILM 4R7 1/2W	R21
	RESISTOR METAL FILM 330R 2W	R16,20
	RESISTOR WIRE WOUND NF OR56 1W	R3
	VR 2K	VR1
	NTS 5RO	R1
	CAPACITOR EL SM 47µ 25V	C8
	CAPACITOR EL KME 1000µ 25V	C17,18
	CAPACITOR EL SME 1000µ 25V	C20,21
	CAPACITOR "TANTA" 1µ 16V	C15
	CAPACITOR EL SMG 100µ 400V	C7
	CAPACITOR "X" .1µ 250V	C1
	CAPACITOR "Y" 2200P 400V	C6
	CAPACITOR POLYESTER 152 50V	C4
	CAPACITOR POLYESTER 103 50V	C11,12,13,14
	CAPACITOR CREAMIC 102 1KV	C22
	CAPACITOR CERAMIC 103 1KV	C3
	CAPACITOR CERAMIC 471 2KV	C10
	INDUCTOR	L4
	INDUCTOR	L1
	TRANSFORMER	T2
	C-M CHOKE	T1
	BRIDGE DIODE	DB1
	ZENER DIODE 18V 1W	DZ1
	SCR	SCR1
	FAST RECOVERY DIODE	D4
	FAST RECOVERY DIODE	D7, D6
	MOSFET	Q1
	IC	IC3
	IC (CTR:60-130%) PC713	IC1
	IC	IC2
	CONNECTOR-PIN HEADER 5273-04	TB2
	CONNECTOR-PIN HEADER 5277-02	TB1
	FUSE CLIP	(F1)
	FUSE 2A 250V	F1
	TRANSISTOR SOCKET	(IC2)

PART NUMBER	DESCRIPTION	REFERENCE DESIGNATOR
5602-0041 ASSY. POWER SUPPLY, SGL OUT 18V/1.25A 90-260 VIN (Cont.)		
	TRANSISTOR SOCKET	(SCR1)
	SONY BOND	(L1)
	HEAT SINK	HS1
	HEAT SINK CLIP	(HSQ1)
	LABEL "S/N"	(C7)
	LABEL "SPECIFICATION"	(C18)
	PCB (88, 18)	
	SILICON RUBBER	(R2,16)
	SILICON RUBBER TUBE	(HS1-Q1)
8000-4056 SUBASSY. AUDIO BD.,ATM-1600		
5901-0344	ASSY PCB AUDIO MODULATOR, ATM-1600	
6822-0421	NUT,KEP 4-40 1/4AF STD PATT STL/Z	
7112-0406	SCR.PAN/PHIL.#4-40X3/8 STL/ZN.P	
7921-0014	CABLE,COAX.RG187A/U. TEFLON	
8000-4057 SUBASSY. VIDEO BD.,ATM-1600		
5901-0343	ASSY PCB ATM-1600 VIDEO MODULATOR	
5901-0348	ASSY PCB BAR GRAPH	
6822-0421	EA NUT,KEP 4-40 1/4AF STD PATT STL/Z	
7112-0406	EA SCR.PAN/PHIL.#4-40X3/8 STL/ZN.P	
7921-0014	CABLE,COAX.RG187A/U. TEFLON	
5901-0344 ASSY PCB AUDIO MODULATOR, ATM-1600		
1011-2826	CAP MICA DIPPED 82 PF 1% 500 V	C53
1045-2186	CAP CER NPO DISC 18 PF 5% 500V	C52
1156-3277	CAP CER X5F DISC 270 PF 10% 1KV	C1,2,3,8
1182-4754	CAP POLSTRN FILM TBL 7500PF2.5%125V	C12
1219-0002	CAP AL 100 UF 80/20% 35V	C11
1219-0014	CAP AL 22 UF 20% 35V 2000H/85C	C6,7,10,18,22,42,9
1256-1226	CAP TANT PLZD SOL DIPP 2.2UF 10%35V	C26
1256-1686	CAP TANT PLZD SOL DIPP 6.8UF 10%35V	C4,5
1287-5103	CAP CER ML Z5U DIPPED .01UF 20%50V	C57,58,59,66,68 C17,21,29,67,
1287-6103	CAP CER ML Z5U DIPPED .1 UF 20% 50V	C13,27,28,34,35 C60,61,64,65,41
1287-7103	CAP CER ML Z5U DIPPED 1 UF 20% 50V	C23,24,30
1295-2474	CAP CER ML NPO 47 PF 5% 100V	C31
1295-3333	CAP CER ML NPO 330 PF 5% 50V	C19,20
1300-0016	CAP VAR CER 1.2-6.5PF 250V	C40
1366-6333	CAP CER ML X7R .33 UF 10% 100V	C25
152089-6	TRANSFORMER	T1
153316-16	INDUCTOR,ADJUSTABLE,16.5T	L4,7
2045-2430	RES FXD CARB COMP 1W 43 OHM 5%	R62

PART NUMBER	DESCRIPTION	REFERENCE DESIGNATOR
5901-0344 ASSY PCB AUDIO MODULATOR, ATM-1600 (cont.)		
2055-2100	RES FXD CARB FILM 1/4W 10 OHM 5%	R70
2055-2750	RES FXD CARB FILM 1/4W 75 OHM 5%	R2,50
2055-3100	RES FXD CARB FILM 1/4W 100 OHM 5%	R35,47
2055-3220	RES FXD CARB FILM 1/4W 220 OHM 5%	R18
2055-3470	RES FXD CARB FILM 1/4W 470 OHM 5%	R31
2055-3510	ES FXD CARB FILM 1/4W 510 OHM 5%	R57
2055-4100	ES FXD CARB FILM 1/4W 1K OHM 5%	R34,41
2055-4150	ES FXD CARB FILM 1/4W 1.5K OHM 5%	R36
2055-4200	ES FXD CARB FILM 1/4W 2K OHM 5%	R46,79
2055-4360	ES FXD CARB FILM 1/4W 3.6K OHM 5%	R37
2055-4390	ES FXD CARB FILM 1/4W 3.9K OHM 5%	R78
2055-4430	ES FXD CARB FILM 1/4W 4.3K OHM 5%	R73
2055-4470	ES FXD CARB FILM 1/4W 4.7K OHM 5%	R42,45,49
2055-5100	ES FXD CARB FILM 1/4W 10K OHM 5%	R3,4,7,10,11,12,17, R21-25,32,33,39,40 R43,48,63,64,67 R71,72,77
2055-5220	RES FXD CARB FILM 1/4W 22K OHM 5%	R68
2055-5270	RES FXD CARB FILM 1/4W 27K OHM 5%	R60
2055-5330	RES FXD CARB FILM 1/4W 33K OHM 5%	R76
2055-5470	RES FXD CARB FILM 1/4W 47K OHM 5%	R20,26,27
2055-5910	RES FXD CARB FILM 1/4W 91K OHM 5%	R30
2055-6100	RES FXD CARB FILM 1/4W 100K OHM 5%	R5,6,8,9,19,65,69,74
2055-6150	RES FXD CARB FILM 1/4W 150K OHM 5%	R55
2055-6180	RES FXD CARB FILM 1/4W 180K OHM 5%	R28,29
2061-3121	RES FXD MET FILM 1/8W 121 OHM 1%	R66
2061-3511	RES FXD MET FILM 1/8W 511 OHM 1%	R14
2061-4130	RES FXD MET FILM 1/8W 1.3K OHM 1%	R83
2061-4178	RES FXD MET FILM 1/8W 1.78K OHM 1%	R61
2061-4274	RES FXD MET FILM 1/8W 2.74K OHM 1%	R75
2061-5133	RES FXD MET FILM 1/8W 13.3K OHM 1%	R13
2061-5200	RES FXD MET FILM 1/8W 20K OHM 1%	R53
2061-5332	RES FXD MET FILM 1/8W 33.2K OHM 1%	R15
2061-5402	RES FXD MET FILM 1/8W 40.2K OHM 1%	R54
2061-6100	RES FXD MET FILM 1/8W 100K OHM 1%	R51,52
2226-0014	RES VAR CER 1-TRN 1/2W 10KOHM 10%	R38,44
2226-0025	POT 10K	R1
2326-0006	RES VAR M-TRN 1/2W 10K OHM10% T/ADJ	R58
2326-0104	RES VAR M-TRN 1/2W 100K0HN10% T/ADJ	R56
2601-0005	RES 1.0 OHM 1% 1W WIREWOUND	R16
3120-0003	DIODE 1N4154	CR3,4,5,6
3120-0006	DIODE 1N4148	CR1
3151-0026	DIODE VARACTOR MV409 26-32PF 20VR	CR2

PART NUMBER	DESCRIPTION	REFERENCE DESIGNATOR
5901-0344 ASSY PCB AUDIO MODULATOR, ATM-1600 (cont.)		
3231-1004	TRANS SILICON NPN GENL PRP 2N3904	Q6
3231-2026	TRANS SILICON NPN UHF-VHF NE41632	Q3,5
3241-1006	TRANS SILICON PNP GNL PRP 2N3906	Q4
3311-0008	IC LIN VREG +5V LM7805CT VS=35V	Q2
3311-0028	IC LIN VREG +15V LM7815CT VS=35V	Q1
3312-0053	IC LIN OP AMP LF353N DUAL VS=18	U1
3312-0074	IC LIN OP AMP LM358N DUAL	U6
3313-0034	IC LIN FREQ SYN MB1504P PLL	U4
3322-0020	IC DIG FF DUAL D 74AC74PC CMOS	U2
3325-0035	IC DIG COUNTER 74HC4040N 12-STAGE	U3
3542-1013	DIODE RED LED	DS1
4602-1476	INDUCTOR FXD MOLDED 4.7 UH 10%	L5,6
4611-1156	INDUCTOR FXD MOLDED 1.5 UH 10%	L2
4612-2106	INDUCTOR FXD MOLDED 10 UH 10%	L1,8,9
5222-0037	3 POST JACK	J6
5222-0038	2 POST JACK	J2,3,4,5
5701-0001	ATM1600 AUDIO PLD	U5
5900-0344	FAB PCB ATM-1600 AUDIO MODULATOR	
7921-0014	CABLE,COAX.RG187A/U. TEFLON	
860010-119	CAP,ELECT,RADIAL,1UF,50V	C16,32,33 C56,62
860010-121	CAP,ELECT,RAD,3.3UF,50V	C55
860010-123	CAP,EL,RAD,10UF,16V+75-10	C54
860049-115	IC LIN OP AMP CA3240AE VS=36V	U9,10
860049-32	IC LIN IF/RF AMP CA3028AS	U7,8
900048-103	CAP CER N330 DISC 5.1 PF 5% 500V	C44
900048-104	CAP CER N750 DISC 5.1 PF 5% 500V	C47
900048-32	CAP CER NPO DISC 20 PF 5% 500V	C48
900048-49	CAP CER X5F DISC 100 PF 10% 500V	C63
900048-9	CAP CER NPO DISC 2.2 PF .25 500V	C39,46
900066-1	SWITCH,SLIDE T.V.	SW1,2
1287-4103	CAP CER 1000PF PER MIL-C-11015	C14,15,36,37 C38,43,45,49 C50,51
2061-5165	RES 16.5K 1/8W 1%	R59
1N751A	DIODE,ZENER	CR1
2055-41802	RES FXD CARB FILM 1/4W 1.8K OHM 5%	R1
5220-00122	HDR ASSY 1X22 .025 SQ .100 RT ANG	J1
5900-0348	FAB PCB BAR GRAPH	
860026-27	I.C. LED DISPLAY	U1,2
5901-0343 ASSY PCB ATM-1600 VIDEO MODULATOR		
1011-2476	CAP MICA DIPPED 47 PF 1% 500 V	C66
1011-3226	CAP MICA DIPPED 220 PF 1% 500 V	C57
1015-3106	CAP MICA DIPPED 100PF 5% 500V	C49

PART NUMBER	DESCRIPTION	REFERENCE DESIGNATOR
5901-0343 ASSY PCB ATM-1600 VIDEO MODULATOR (cont.)		
1015-4114	CAP MICA DIPPED 1100PF 5% 100V	C86
1043-2107	CAP CER NPO DISC 10 PF 5 % 1 KV	C64,67
1044-1153	CAP CER NPO DISC 1.5 PF .25 50 V	C16,59
1045-2126	CAP CER NPO DISC 12 PF 5% 500V	C46
1045-2133	CAP CER NPO DISC 13 PF 5% 50V	C82
1045-2156	CAP CER NPO DISC 15 PF 5% 50 V	C121
1045-2186	CAP CER NPO DISC 18 PF 5% 500V	C37,38
1106-2227	CAP CER N750 DISC 22 PF 10% 1KV	C47
1186-4153	CAP POLY MET MLD RECT.0015UF 10%63V	C87
1191-2916	CAP MICA DIPPED 91 PF 1% 500V	C14,81,85
1219-0015	CAP AL 1000UF 20% 16V 1000H/85C	C92
1219-0023	CAP AL 100 UF 20% 25V 2000H/85C	C13,21,22
1256-1106	CAP TANT PLZD SOL DIPP 1 UF 10%35V	C20,40,41
1256-2106	CAP TANT PLZD SOL DIPP 10 UF 10%35V	C25,39,71,76,90
1256-2227	CAP TANT PLZD SOL DIPP 22 UF 10%50V	C91
1287-4103	CAP CER ML X7R DIPPED 1000PF 10%50V	C23,24,42 43,44,45,48 50,51,54,55 56,58,63 110,111,112 113,116,118, 143,124,125 127,128,130 131,132, 134 135,136,137 138,139,140 141,142,144
1287-5103	CAP CER ML Z5U DIPPED .01UF 20%50V	C18,61,62 70,72,73,88 89,129
1295-2474	CAP CER ML NPO 47 PF 5% 100V	C122
1295-3394	CAP CER ML NPO 390 PF 5% 100V	C75
1400-0010	CAP VAR AIR 2-10PF 125V	C120
152036-3	TRANSFORMER	T10
152069-12	INDUCTOR,VARIABLE	L37
152069-6	INDUCTOR,VARIABLE	L36
152089-6	TRANSFORMER	T3,4,13
152492-10	INDUCTOR,POT CORE	L3
152492-11	INDUCTOR,POT CORE	L2,5
152492-12	INDUCTOR,POT CORE	L6
152492-16	INDUCTOR POT CORE	L4
152492-9	INDUCTOR,POT CORE	L7
152493-5	TRANSFORMER,ADJ,POT CORE	T2
152493-6	TRANSFORMER,ADJ,POT CORE	T1
153316-16	INDUCTOR,ADJUSTABLE,16.5T	L10,12
153343-5	TRANSFORMER,OUTPUT	T7
153344-4	TRANSFORMER,MODULE	T6
1650-0007	CAP 5-50PF TEFLON VAR	C123
2015-7180	RES FXD CARB COMP 1/8W 1.8M OHM 5%	R138
2025-4150	RES FXD CARB COMP 1/4W 1.5K OHM 5%	R57,137
2055-1470	RES FXD CARB FILM 1/4W 4.7 OHM 5%	R213,177
2055-2100	RES FXD CARB FILM 1/4W 10 OHM 5%	R12,77,199

PART NUMBER	DESCRIPTION	REFERENCE DESIGNATOR
5901-0343 ASSY PCB ATM-1600 VIDEO MODULATOR (cont.)		
2055-2160	RES FXD CARB FILM 1/4W 16 OHM 5%	R166,195
2055-2180	RES FXD CARB FILM 1/4W 18 OHM 5%	R161,190
2055-2220	RES FXD CARB FILM 1/4W 22 OHM 5%	R168
2055-2270	RES FXD CARB FILM 1/4W 27 OHM 5%	R184
2055-2330	RES FXD CARB FILM 1/4W 33 OHM 5%	R101,102
2055-2560	RES FXD CARB FILM 1/4W 56 OHM 5%	R211,94
2055-2620	RES FXD CARB FILM 1/4W 62 OHM 5%	R112
2055-2750	RES FXD CARB FILM 1/4W 75 OHM 5%	R89,90,91 169,170,197 198,209
2055-3100	RES FXD CARB FILM 1/4W 100 OHM 5%	R25,26,29,30 R61,82,85,131
2055-3130	RES FXD CARB FILM 1/4W 130 OHM 5%	R175
2055-3150	RES FXD CARB FILM 1/4W 150 OHM 5%	R186
2055-3180	RES FXD CARB FILM 1/4W 180 OHM 5%	R103
2055-3220	RES FXD CARB FILM 1/4W 220 OHM 5%	R5,10,18,20,32 R36,196,206,134 139,167,210,212
2055-3270	RES FXD CARB FILM 1/4W 270 OHM 5%	R93,95
2055-3300	RES FXD CARB FILM 1/4W 300 OHM 5%	R11,164,70,194
2055-3330	RES FXD CARB FILM 1/4W 330 OHM 5%	R207
2055-3360	RES FXD CARB FILM 1/4W 360 OHM 5%	R98
2055-3430	RES FXD CARB FILM 1/4W 430 OHM 5%	R178,183,185, 14
2055-3470	RES FXD CARB FILM 1/4W 470 OHM 5%	R3,4,9,17,43 24,27,28,88,99
2055-3620	RES FXD CARB FILM 1/4W 620 OHM 5%	R120,160 R162,189,191
2055-3680	RES FXD CARB FILM 1/4W 680 OHM 5%	R122
2055-3820	RES FXD CARB FILM 1/4W 820 OHM 5%	R19,104
2055-4100	RES FXD CARB FILM 1/4W 1K OHM 5%	R2,8,13,16,60,68 69,83,123,171
2055-4130	RES FXD CARB FILM 1/4W 1.3K OHM 5%	R163,192
2055-4200	RES FXD CARB FILM 1/4W 2K OHM 5%	R165,193
2055-4220	RES FXD CARB FILM 1/4W 2.2K OHM 5%	R73,84,97,172,200
2055-4240	RES FXD CARB FILM 1/4W 2.4K OHM 5%	R203
2055-4270	RES FXD CARB FILM 1/4W 2.7K OHM 5%	R133,208
2055-4330	RES FXD CARB FILM 1/4W 3.3K OHM 5%	R31,96,173
2055-4360	RES FXD CARB FILM 1/4W 3.6K OHM 5%	R119
2055-5100	RES FXD CARB FILM 1/4W 10K OHM 5%	R1,23,34,35 40,41,55,80 86,87,140
2055-5120	RES FXD CARB FILM 1/4W 12K OHM 5%	R56,204
2055-5220	RES FXD CARB FILM 1/4W 22K OHM 5%	R37,59,143
2055-5470	RES FXD CARB FILM 1/4W 47K OHM 5%	R58,126
2055-6200	RES FXD CARB FILM 1/4W 200K OHM 5%	R142
2055-6680	RES FXD CARB FILM 1/4W 680K OHM 5%	R121
2055-7100	RES FXD CARB FILM 1/4W 1M OHM 5%	R75,76
2061-3453	RES FXD MET FILM 1/8W 453 OHM 1%	R49
2061-3523	RES FXD MET FILM 1/8W 523 OHM 1%	R71
2061-3562	RES FXD MET FILM 1/8W 562 OHM 1%	R53
2061-3619	RES FXD MET FILM 1/8W 619 OHM 1%	R38

PART NUMBER	DESCRIPTION	REFERENCE DESIGNATOR
5901-0343 ASSY PCB ATM-1600 VIDEO MODULATOR (cont.)		
2061-3825	RES FXD MET FILM 1/8W 825 OHM 1%	R44,45
2061-4110	RES FXD MET FILM 1/8W 1.1K OHM 1%	R33,202
2061-4150	RES FXD MET FILM 1/8W 1.5K OHM 1%	R116,128
2061-4178	RES FXD MET FILM 1/8W 1.78K OHM 1%	R39
2061-4200	RES FXD MET FILM 1/8W 2K OHM 1%	R72
2061-4232	RES FXD MET FILM 1/8W 2.32K OHM 1%	R51
2061-4249	RES FXD MET FILM 1/8W 2.49K OHM 1%	R118
2061-4392	RES FXD MET FILM 1/8W 3.92K OHM 1%	R115
2061-4432	RES FXD MET FILM 1/8W 4.32K OHM 1%	R22
2061-4470	RES FXD MET FILM 1/8W 4.7K OHM 1%	R74,81,117 129,201
2061-4499	RES FXD MET FILM 1/8W 4.99K OHM 1%	R46
2061-4634	RES FXD MET FILM 1/8W 6.34K OHM 1%	R108
2061-5113	RES FXD MET FILM 1/8W 11.3K OHM 1%	R136
2061-5261	RES FXD MET FILM 1/8W 26.1K OHM 1%	R132
2135-3330	RES FXD CARB FILM 1/2W 330 OHM 5%	R54,187
2226-0004	RES VAR CFR 500 OHMS	R6
2226-0007	RES VAR CER 1-TRN 1/2W 5K OHM 10%	R127
2226-0014	RES VAR CER 1-TRN 1/2W 10KOHM 10%	R42,106
2226-0023	RES VAR MLD 1W 1K OHM 10% PNL MT	R15,205
2226-0026	RESISTOR VAR. PC MTG 1K 10%	R7
2226-0029	RES 200 OHM 1/2W	R105,176
2226-0030	RES VAR PC MT CERMT 100R 1/2W 10%	R113
2226-0031	RES VAR 1-TRN 1/2W 50 OHM10%T/ADJ	R100
2326-0016	RES VAR M-TRN 1/2W 1K OHM 10% T/ADJ	R50,52
2601-0005	RES 1.0 OHM 1% 1W WIREWOUND	R48,188
3120-0003	DIODE 1N4154 CR1,2,4,5	CR6,7
3231-1004	TRANS SILICON NPN GENL PRP 2N3904	Q15,16,25,27
3231-2023	TRANS SILICON NPN AMPLIFIER MPS3563	Q17
3231-2027	TRANS SILICON NPN AMPLIFIER MPS6521	Q1,3,5,7 Q9,10,12,13
3232-4002	TRANS SILICON NPN POWER AMP PT4579	Q14,18,19,20,21 Q40,42
3241-2006	TRANS SILICON PNP AMPLIFIER MPS6523	Q2,4,6,8,11,22
3251-0017	TEANS JEFT N-CHAN LN 30V 2N4222	Q26
3311-0008	IC LIN VREG +5V LM7805CT VS=35V	U2
3311-0028	IC LIN VREG +15V LM7815CT VS=35V	U3
3312-0074	IC LIN OP AMP LM358N DUAL	U4
3312-0093	IC LIN VIDEO AMP NE592N	U10
3313-0031	IC LIN SYNC SEP LM1881N	U11
3400-0039	AMPL,HYB.500MHZ MSA-304	U20,21
4200-0001	PKG,CAN,AL,.51SQINTL,.906H	L36,37
4500-0007	TRANSFORMER SPLITTER	T5
4500-0015	TRANSFORMER 6T 4:1	T12

PART NUMBER	DESCRIPTION	REFERENCE DESIGNATOR
5901-0343 ASSY PCB ATM-1600 VIDEO MODULATOR (cont.)		
4602-0337	INDUCTOR FXD MOLDED .33 UH 20%	L19,13
4602-1476	INDUCTOR FXD MOLDED 4.7 UH 10%	L11,39,43
4602-2106	INDUCTOR FXD MOLDED 10 UH 10%	L8,14,15,18 L30,31,32 L40,42
4611-1156	INDUCTOR FXD MOLDED 1.5 UH 10%	L34
4611-1336	INDUCTOR FXD MOLDED 3.3 UH 10%	L20
4611-2156	INDUCTOR FXD MOLDED 15 UH 10%	L41
4612-3105	INDUCTOR FXD MOLDED 100 UH 5%	L23
4614-1009	INDUCTOR FXD MOLDED .33 UH 5% /SCD	L16
4614-1013	INDUCTOR .47UH 5% MOLDED /SCD	L17
5216-0040	CONNECTOR F FEMALE RT ANGLE PC M	J4
5216-0104	CONN CARD EDGE RCPT 20 DL .156RTANG	J3
5222-0035	JUMPER MINI FOR	J2,5,6,7,8,10
5222-0037	3 POST JACK	J5,6,7,10
5222-0038	2 POST JACK	J9,16
5222-0039	JACK, CONNECTOR	J8,2
5413-1001	CRYSTAL 45.751 MHZ PER S.C.D	Y1
5900-0343	FAB PCB ATM-1600 VIDEO MODULATOR	
6163-0001	PAD TRANS FOR	Q14,18,19,20,40, 42
6820-0421	NUT,HEX 4-40 STD.PATT STL/ZINC	FOR J3
7114-0410	SCR,PAN,PHIL#4-40X5/8LG SS	FOR J3
7921-0014	CABLE,COAX.RG187A/U. TEFLON	
860010-118	CAP,MONO,.1UF,50V,20%	C2,77
860010-66	CAP.,VAR.,2-5PF	C60
860010-79	CAP AL 4.7UF 20% 35V 2000/85 RADIAL	C19,15,83
860020-3	CORE,BEAD B1,2,3	FOR Q17,21 AND R213
860026-13	DIODE	CR21,20
860026-29	DIODE	CR8,9,10,11
860049-115	IC LIN OP AMP CA3240AE VS=36V	U6,13
860049-32	IC LIN IF/RF AMP CA3028AS	U1
860049-64	IC LIN DRIVER LM3914N DISPLAY	U9
860049-86	IC LIN DRIVER LM3915N GRAPH DIS	U8
860100-15	THERMISTOR,100 OHMS	RT1
860101-1	HEATER,CRYSTAL	HR1
900048-32	CAP CER NPO DISC 20 PF 5% 500V	C17
900048-40	CAP CER N330 DISC 43 PF 5% 500V	C119
900048-44	CAP CER N750 DISC 62 PF 5% 500V	C52
900048-46	CAP CER N750 DISC 75 PF 5% 500V	C53,65
900048-49	CAP CER X5F DISC 100 PF 10% 500V	C1,84,115
900048-85	CAP CER X5F DISC 3300PF 10% 500V	C114,117,133
900066-1	SWITCH,SLIDE T.V.	SW1
900075-13	CAPACITOR,1675PF	C4
900075-18	CAPACITOR,MICA,125PF	C3

PART NUMBER	DESCRIPTION	REFERENCE DESIGNATOR
5901-0343 ASSY PCB ATM-1600 VIDEO MODULATOR (cont.)		
900075-2	CAPACITOR,207PF	C10,11
900075-24	CAPACITOR MICA,110PF	C5
900075-3	CAPACITOR,233PF	C7,8
900075-4	CAPACITOR,427PF	C12
900075-5	CAPACITOR,575PF	C9
900075-9	CAPACITOR,550PF	C6
900095-1	SAW FILTER 44.025 MHZ,CTI151	FL1
2061-5243	RESISTOR,24.3K,1/4W,1%	R109
2061-6280	RESISTOR,280K,1/4W,1%	R107
2061-3432	RESISTOR,432 OHMS,1/8W	R21
9001-2037 ASSY PCB BB ENCODER INTERFACE FOR ATM-1600		
153525-1	BASEBAND ENCODER	
5101-0251	ASSY CABLE 4 PIN CONNECTOR	
6820-0421	NUT,HEX 4-40 STD.PATT STL/ZINC	
6842-0002	WASHER FLAT #4 STL	
6851-0017	STANDOFF 4-40 1/4 HEX 1/2 LG.THRD.	
6852-0039	SPACER 1/4ID 3/8 OD.,.016 THK.	
7112-0414	SCR.PAN/PHIL.#4-40X7/8 STL/ZN.P	
7162-0404	SCR BINDER/PHIL 4-40X1/4 STL/ZINC	
7911-0006	WIRE,TW.PR,22GA.UL1429,7/30,BLK/YEL	
153525-1 BASEBAND ENCODER INTERFACE		
1015-3206	CAP MICA DIPPED 200PF 5% 500V	C2,4
1015-4104	CAP MICA DIPPED 1000PF 5% 100V	C3,5
1219-0023	CAP AL 100 UF 20% 25V 2000H/85C	C1
153526-1	BD,BASE BAND ENC INTRFACE	
153527	SCHEMATIC,BASE BD ENC INTERFACE	
153661-1	CONN ASY,4 PIN	
153662-1	COMM ASY,2 PIN	
2055-4220	RES FXD CARB FILM 1/4W 2.2K OHM 5%	R4
2055-4300	RES FXD CARB FILM 1/4W 3K OHM 5%	PR1
2055-4560	RES FXD CARB FILM 1/4W 5.6K OHM 5%	R10,11,17
2055-5100	RES FXD CARB FILM 1/4W 10K OHM 5%	R2,5,6,7,8
2055-5150	RES FXD CARB FILM 1/4W 15K OHM 5%	R18
2055-5270	RES FXD CARB FILM 1/4W 27K OHM 5%	R9
2055-5750	RES FXD CARB FILM 1/4W 75K OHM 5%	R14
2055-6160	RES FXD CARB FILM 1/4W 160K OHM 5%	R13
2226-0016	POT 5K 1/2W 10%	
3323-0014	IC DIG MULTIVIB MC14528B DUAL CMOS	U2
3332-0003	IC DIG ANALOG SW CD4066 QUAD MOS	U5

PART NUMBER	DESCRIPTION	REFERENCE DESIGNATOR
153525-1 BASEBAND ENCODER INTERFACE (cont.)		
6851-0028	STANDOFF L7/8I,1/4RD,ALM,4-40 THD.	
860010-115	CAP CER ML X7R DIPPD .01 UF,10% 50V	C7
860010-119	CAP,ELECT,RADIAL,1UF,50V	C6
860010-24	CAPACITOR,0.1UF,100V	C8
860010-84	CAPACITOR,0.33UF	C9
860049-112	IC DIG MULTIVIB 74C221 DUAL CMOS	U1
860049-113	IC LIN OP AMP LM359N	U4
860049-114	IC LIN OP AMP OP081-1P VS=18V	U6
860049-50	IC DIG NAND 2-IN CD4011AE QUAD	U3
860085-10	SOCKET,16 PIN DIP	
860085-9	SOCKET,14 PIN DIP	
900034-124	RES FXD CARB FILM 1/4W 120K OHM 5%	R3
900048-37	CAP CER NPO DISC 33 PF 5% 500V	C10
900048-57	CAP CER X5F DISC 220 PF 10% 500V	C11
8000-2610 ATM-1600 ACCESSORY KIT (F CONN)		
5120-1060	CABLE, COAX 6.00" (2) F CONN	
5211-0026	TERMINATOR MALE BNC	
6910-0015	PACKING SLIP	
7157-1010	SCR. PHIL W/NYLON WSHR 10-32 X 5/8"	
7600-0029	PLASTIC BAG, 9" X 12" X 4 MIL RECLOSABLE	
5218-0028	TERMINATION, 75 OHM, F DC-550 MHZ	
0020-5020	ATM-1600 BROADCAST TV MOD. MANUAL	
8000-2611 ATM-1600 ACCESSORY KIT (BNC CONN)		
5120-2050	CABLE, COAX 6.00" (2) BNC CONN	
5211-0026	TERMINATOR MALE BNC	
6910-0015	PACKING SLIP	
7157-1010	SCR. PHIL W/NYLON WSHR 10-32 X 5/8"	
7600-0029	PLASTIC BAG, 9" X 12" X 4 MIL RECLOSABLE	
5218-0028	TERMINATION, 75 OHM, F DC-550 MHZ	
0020-5020	ATM-1600 BROADCAST TV MOD. MANUAL	

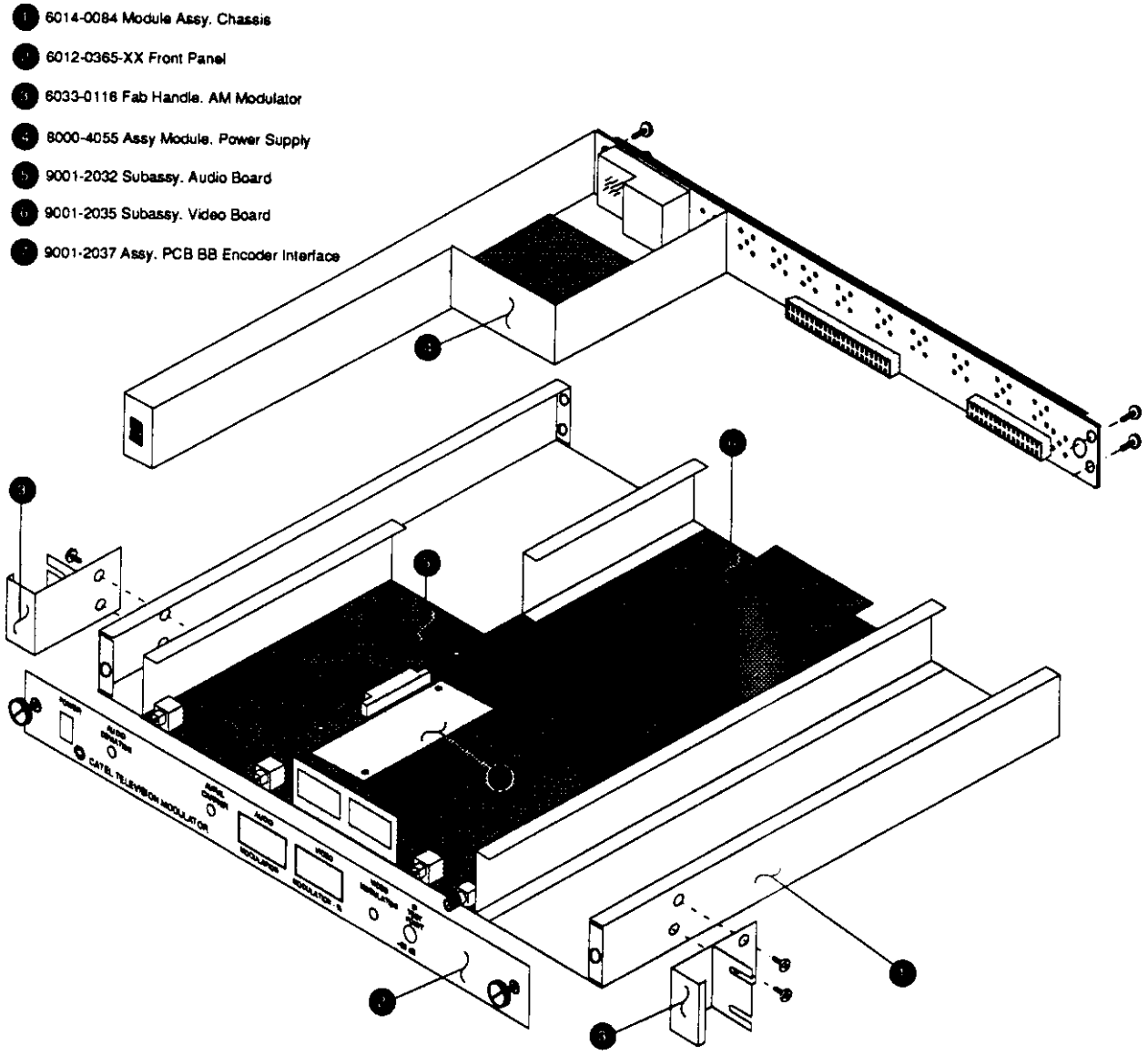

Figure 5-1
ATM-1600 Final Assembly
Internal View

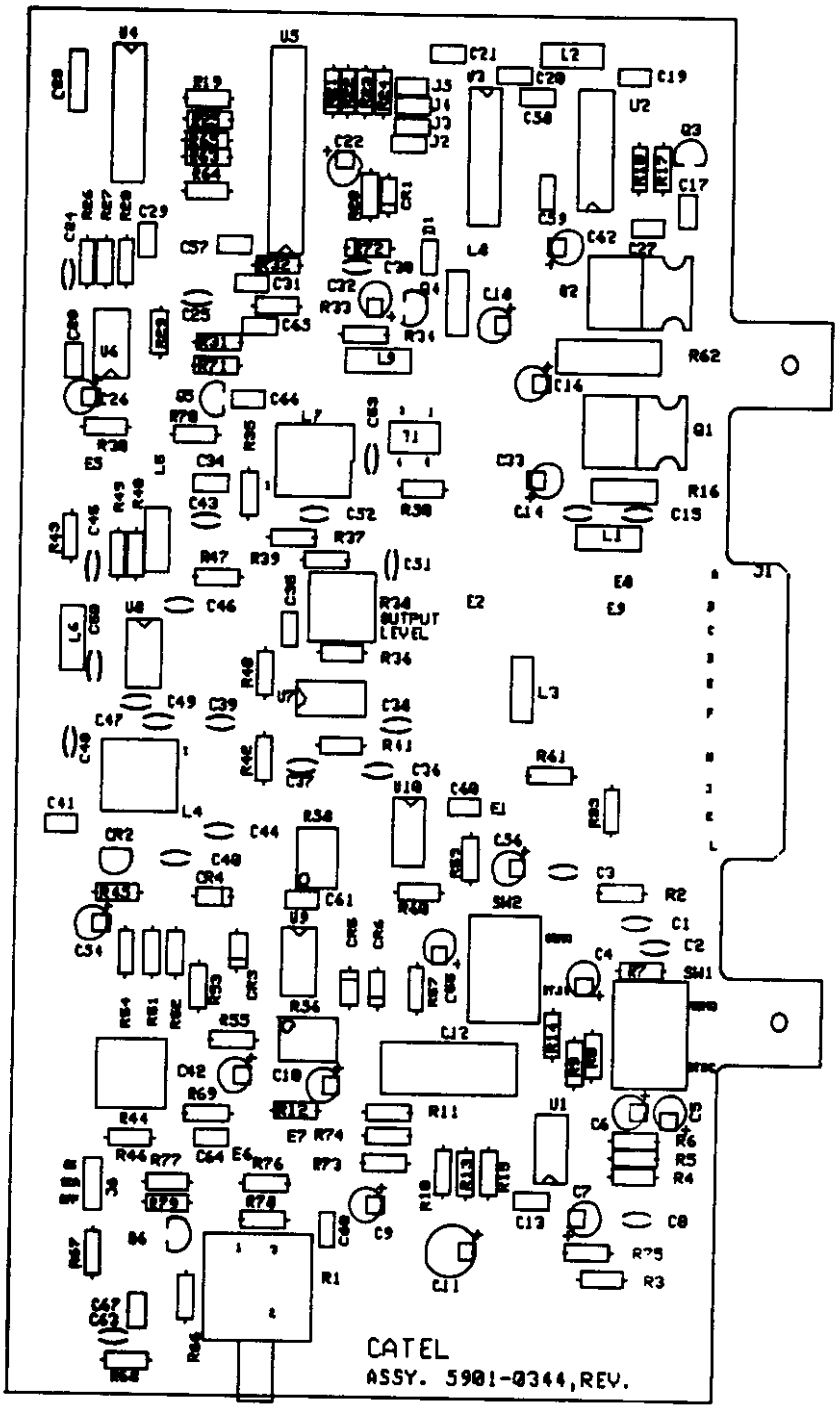

Figure 5-2
PCB Parts Location Diagram
Audio Modulator

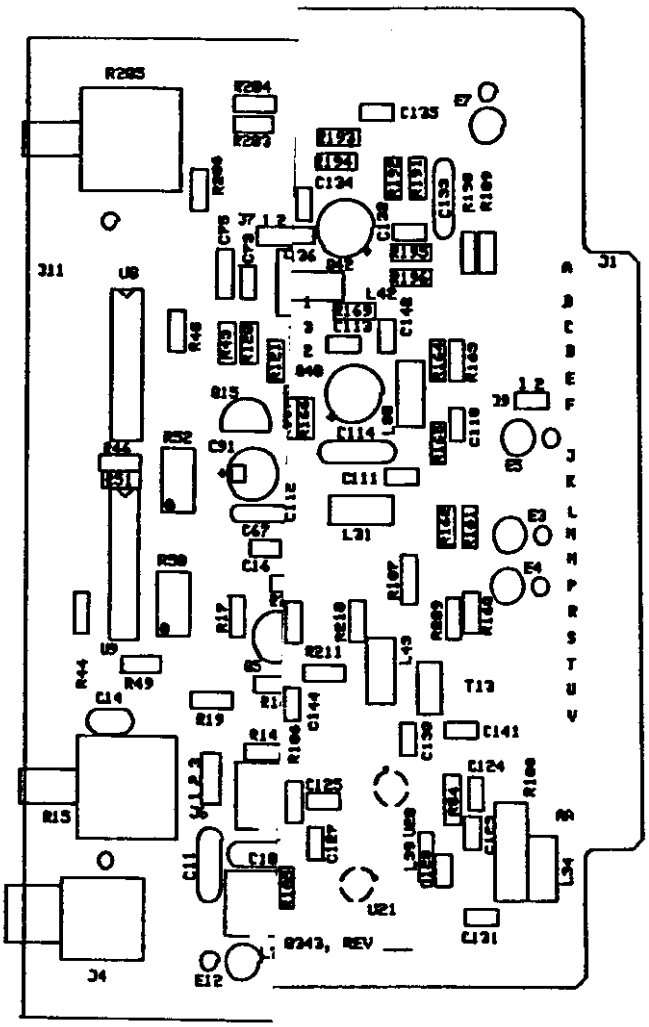

Figure 5-3
PCB Parts Location Diagram
Video Modulator