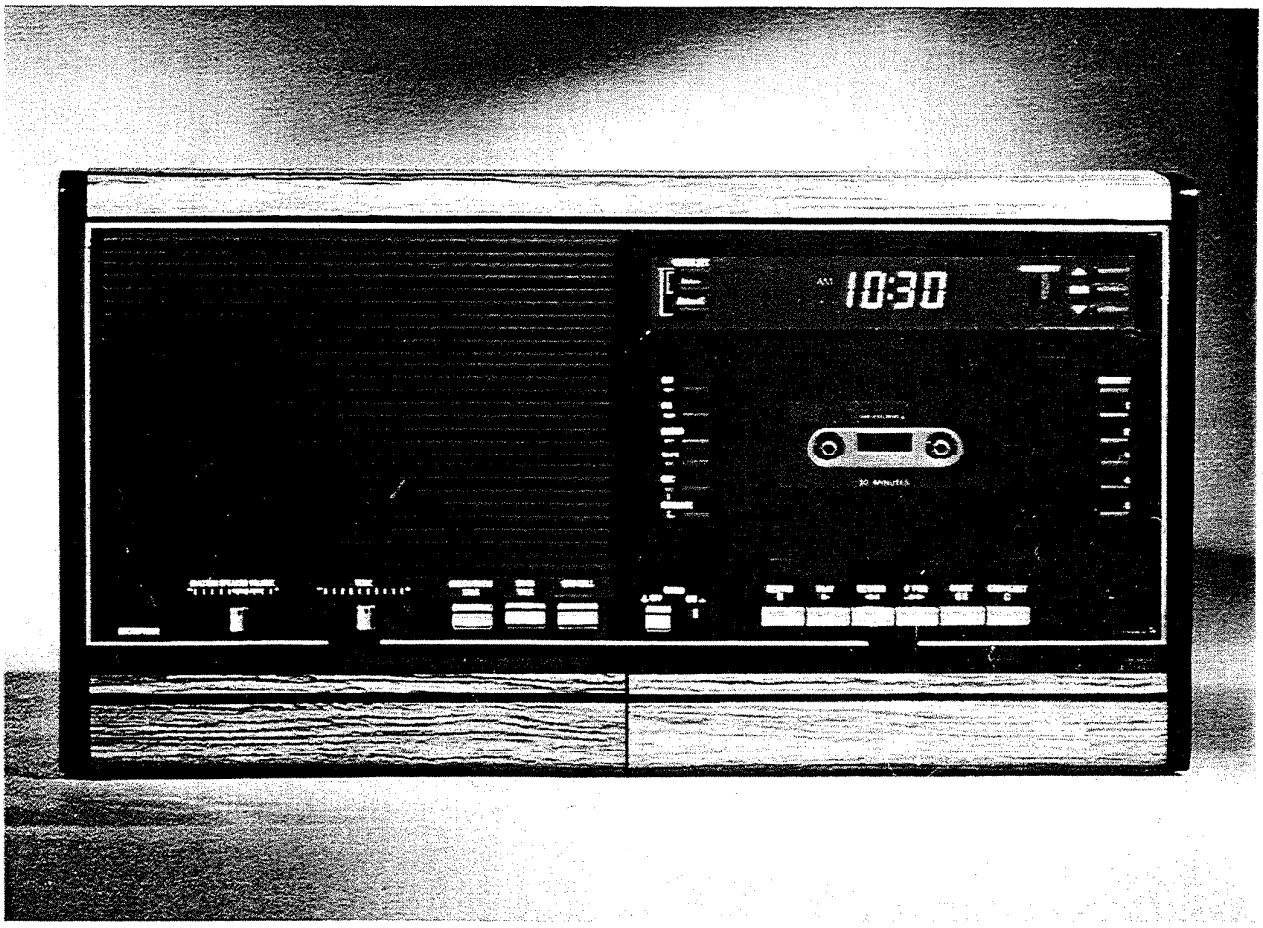
SERVICE MANUAL

MODEL IM-4006 RADIO-INTERCOM SYSTEM



NuTone

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REMOVING THE MASTER STATION FROM MODEL IR-103 ROUGH-IN FRAME

1. Remove two (2) screws from front of master panel (See Figure 1).
2. Remove two (2) screws and ground wire from transformer box cover. Remove cover and disconnect the white and red/white low voltage wires from the transformer (See Figure 2).
3. Remove the antenna connection from the tuner board (See Figure 3).
4. Unplug the D/10/A, M2, M1, B and R ribbon cables from terminal board.

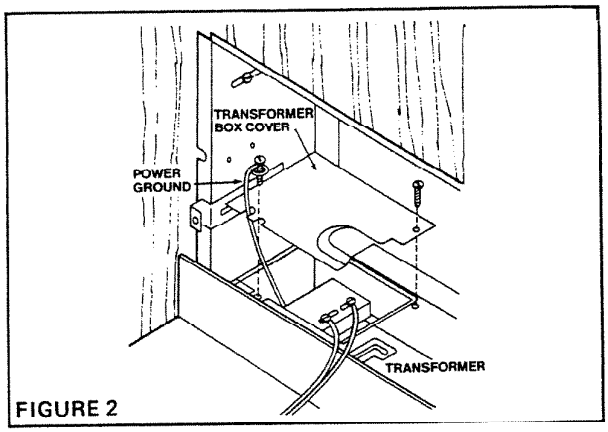


FIGURE 2

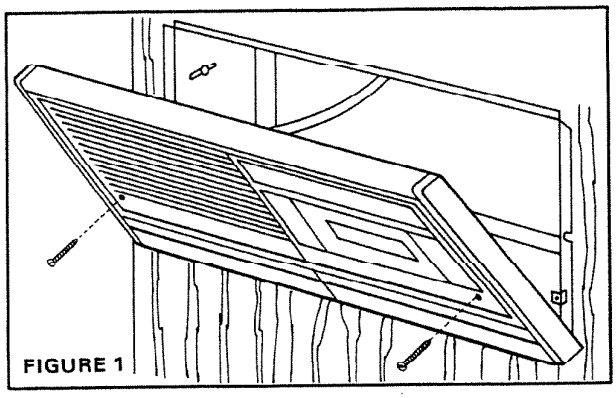


FIGURE 1

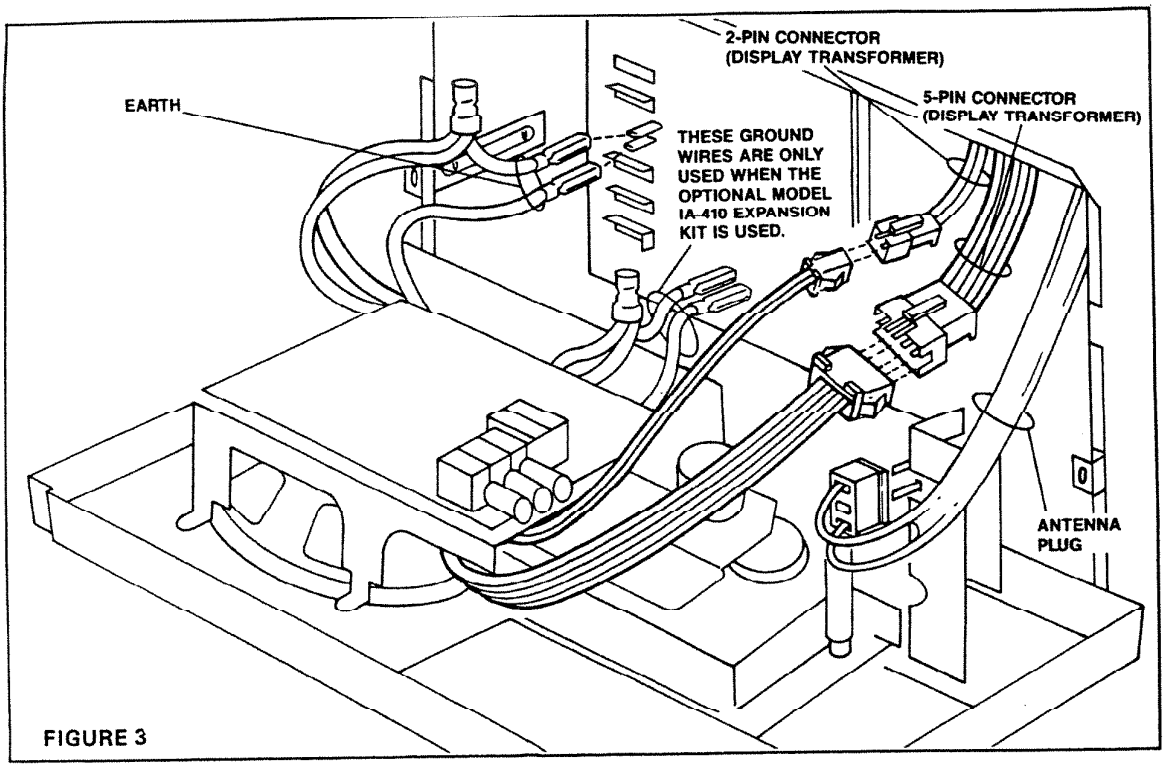


FIGURE 3

REMOVING THE MASTER STATION FROM MODEL IR-103 ROUGH-IN FRAME (continued)

5. Remove two earth cables from terminal board.
6. Remove Display Transformer from upper right corner of rough-in (See Figure 4).
7. While supporting the master station, unhook the support strap for the rough-in frame (See Figure 5).
8. Pull the master panel away from wall, slide to the left and remove (See Figure 6).

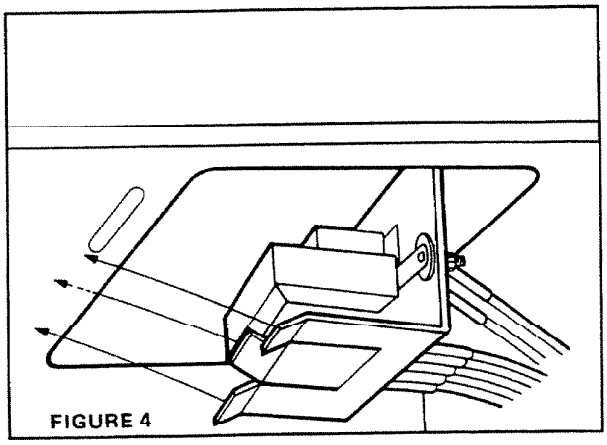


FIGURE 4

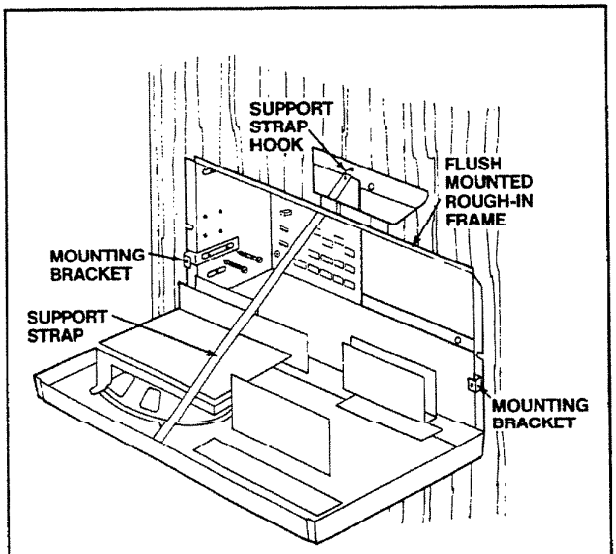


FIGURE 5

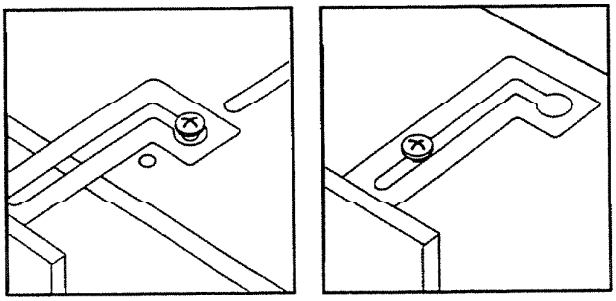


FIGURE 6

SERVICING THE MASTER STATION

1. A standard 20,000 ohm/volt multi-meter will suffice for most voltage and resistance measurements in this system. It is suggested that when a VTVM (or other high-impedance input meter) is available, it be used.
2. A VTVM with a DC scale of 0 to 1.5 volts will be especially useful when measuring base and emitter voltages.
3. The voltages included with the schematic diagram are for reference. Actual voltages may vary ±10% to 20%. THE RELATIONSHIP BETWEEN THE VOLTAGES ON THE DIFFERENT ELEMENTS SHOULD REMAIN FAIRLY CONSTANT TO ACHIEVE DESIGN PERFORMANCE.
4. To prevent leakage paths when measuring resistance of some components, it may be necessary to disconnect one side of the component under measurement.
5. OBSERVE POLARITY WHEN MAKING RESISTANCE MEASUREMENTS IN TRANSISTOR CIRCUITS. IMPROPER POLARITY MAY RESULT IN FALSE READINGS AND IN SOME CASES REVERSE POLARITY MAY EXCEED THE REVERSE BREAKDOWN RATINGS OF THE DEVICE.
6. Make certain that power is OFF when making resistance measurements and when replacing components.
7. Treat all printed circuit boards with care. Do not burn nor mutilate when making or breaking solder connections. Be careful of the foil paths.

NOTE: Hum and/or squeal may result if circuit grounds or commons are tied together. Be cautious not to produce this condition when connecting grounds of test instruments to master station.

THEORY OF OPERATION

TUNER

The FM and AM Tuner used in the IM-4006 Radio/Intercom is a PLL (Phase Lock Loop) design. All incoming radio signals are locked to the crystal reference (4.5 MHz) on the PLL PC Board. Both FM and AM signals enter the Tuner at the Antenna Connector. The description of their operation is broken into a FM and AM section.

FM SECTION

FM signals enter the Antenna Connector and are passed to the BPF (Band Pass Filter) through C1 (22pf). Diodes D1 and D2 are used to limit the input signal to approximately .6V P-P and provide a leakage path for any static build-up.

After the signal passes through the BPF, signals above and below the FM band (87.9 to 107.9) will be attenuated to prevent overloading the input RF Amplifies Q1.

Once the FM signal has been amplified by Q1, the signal is passed through C3 to Pin 1 of IC1 which consists of an RF amplifier, mixer, and oscillator. The RF output/mixer input is tuned via Pin 3 by L2, TC1 and Varactor Diode D3. The oscillator is tuned via Pin 8 by L3 and Varactor Diode D4. The mixer output is coupled from IC1 Pin 6 by Transformer T1. The output signal of Transformer T1 is matched to BPF CF1 by Resistor R8. The output of CF1 is then amplified by Transistor Q3.

After being amplified by Q3, the signal is then passed through a second BPF CF2 whose output is connected to Pin 1 of IC2. IC2 supplies IF amplification, Quadiature detector, AF preamplification and signal detection.

FM audio output leaves IC2 via Pin 10. After passing through R21 and C36, the FM audio leaves the Tuner PC Board via Connector T Pin 4.

The signal detector, which stops the Tuner on a strong radio station during Scan Tuning, leaves IC2 via Pin 8. When a strong FM station is tuned, IC2 Pin 8 will cause LED D9 to light and generate a negative going pulse at Connector Y Pin 1. This pulse is used to stop the PLL at the station tuned during Scan Tuning.

Tuning voltage from the PLL PC Board tunes Varactor Diodes D3 and D4. Tuning voltage normally ranges from 3 Volts (87.9MHz) to 8.5 Volts (107.9MHz).

A small amount of the local oscillator signal is coupled to Transistor Q2 via Capacitor C15. Transistor Q2 amplifies the local oscillator and sends it to the PLL PC Board via Connector Y Pin 5.

Power is supplied to the FM Tuner via Connector T Pin 2. Power to Pin 2 is only supplied during FM operation.

The signal level needed to stop the PLL during FM Scan Tuning is adjusted by VR1 and VR2. These controls are factory set to a stop point of 25uV or greater.

AM SECTION

AM signals enter through the Antenna Terminals and are passed through L5 and C2 to the Antenna Transformer T2. The Antenna Transformer T2 is tuned via TC2 and Varactor Diode D6. The output of T2 is connected to the AM RF Amplifier of IC2 via Pin 19.

IC2 supplies RF amplification, mixing, local oscillator, IF amplification, AM detection, local oscillator buffering for the PLL, and signal detection.

The local oscillator is tuned via T3, C16 and Varactor Diode D5. The oscillator circuit is connected to IC2 via Pin 21.

Transformer T4 and BPF CF3 set the bandwidth and frequency of the IF. AM audio output leaves IC2 via Pin 12. After passing through R25 and C37, the AM audio leaves the Tuner via Connector T Pin 5.

The signal detector, which stops the Tuner on a strong radio station during Scan Tuning, leaves IC2 via Pin 8. When a strong AM station is tuned, IC2 Pin 8 will cause LED 9 to light and generate a negative going pulse at Connector Y Pin 1. This pulse is used to stop the PLL at the station tuned during Scan Tuning.

Tuning voltage from the PLL PC Board tunes Varactor Diodes D5 and D6. Tuning voltage normally ranges from 1.8 Volts (530 KHz) to 8 Volts (1620 KHz).

The local oscillator signal from IC2 Pin 22 is sent to the PLL PC Board via Connector Y Pin 5.

Power is supplied to the AM Tuner via Connector T Pin 3. Power to Pin 3 is only supplied during AM operation.

The signal level needed to stop the PLL during AM Scan Tuning is adjusted by VR1 and VR2. These controls are factory set to a point of 50uV or greater.

POWER SUPPLY/POWER AMP

AC power is supplied to the Power Supply/Power Amplifier PC Board (PS/PA PCB) via a white/red pigtail lead connected to Z4.

The 16 Volts AC signal is split into two (2) different circuits.

1. **Display Power Supply.** In this circuit, the 16 Volts is supplied to Transformer T1. Transformer T1 has two (2) secondaries. Pins 1, 2, and 3 supply 3.7 VCT AC which drives the filament in the fluorescent display.
   Pins 4 & 5 supply 19 Volts AC to the Diode Bridge Pack D3. The negative 26V DC output from D3 is filtered by Capacitor C14 and is then sent to the PLL PC Board via Connector X Pin 3.
   The output of D3 is also connected to Zender Diode D4. D4 drops D3's output voltage by 5.1 Volts before connecting to the center tap (Pin 2) of T1. This lowered voltage is connected to the display filament via Connector W Pin 1 and 2 and is used to bias the filament negative.
2. **Diode Bridge Pack D1.** The output of D1 is filtered by Capacitor C5.
   The unregulated voltage (approximately 20 Volts DC) is fed to three (3) connectors (CN-15 Pin 2, U Pin 1 and G Pin 3).

The unregulated voltage is also sent through R1 to the collector of Q1 and Zener Diode D8. Transistor Q1 is used as a 15 Volt pass type regulator. The voltage at the emitter is set by the 15 Volt Zener Diode D2. The emitter of Q1 supplies the operating voltage for the Audio Amplifier IC1. Zener Diode D8 supplies power through D5, D6, and R4 to charge the 4.8 Volt Ni-Cad battery via Connector BATT Pin 2.

Transistor Q2 acts as a switch which is turned off when there is AC power supplied to the unit. However, when the AC fails, Transistor Q2 turns on and passes the battery voltage to Connector X Pin 2. The battery voltage is used to maintain time and AM/FM memory channels even though the rest of the unit will not function.

Audio amplifier IC1 drives all Remotes and Master Speaker. Audio into IC1 arrives at two (2) points:

1. Music and Intercom audio arrives via Connector U Pin 2. The audio is then passed through Capacitor C23 to Pin 5 of IC1.
2. Chime audio (both chime module and low level chime) arrives via Connector H Pin 1. The Audio is then sent through Resistor R7 and Capacitor C21 to Pin 6 of IC1. IC1 amplifies the input audio by 50+ db.

The output of IC1 is Pin 1. Pin 1 supplies output audio via coupling Capacitor C16 into Connector G Pin 1.

CASSETTE

The Cassette PC Board contains all the circuitry necessary to perform the following functions:
(1) POWER SUPPLY
(2) RECORD MODE
(3) PLAYBACK MODE.

POWER SUPPLY

Power to the Cassette PC Board arrives from the Power Supply PC Board via Connector CN-15 Pins 1 and 2.

Pin 1 supplies ground while Pin 2 supplies an unregulated 20 Volts DC. Power also arrives from the Master PC Board via Connector CN-Q Pin 5. The voltage at Pin 5 measures a regulated 12 Volts DC. Power arriving at Connector CN-15 Pin 2 supplies voltage to the collector of Transistor Q2. Transistor Q2 is a 13 Volt pass type regulator. The output voltage of Q2's emitter is set by Zener Diode ZD1. Voltage from the emitter of Q2 is supplied to the positive lead of the cassette motor M. The negative lead of the cassette motor is connected to motor Switch SW3. When SW3 is closed, (during Record, Playback, Fast Forward or Rewind) a ground return is supplied to the cassette motor's negative lead causing the motor to run.

Power arriving at Connector CN-Q splits into three (3) paths.

1. **To IC2.** IC2 is a 6 Volt regulator which supplies power to IC1 Record/Playback IC.
2. **To Record/Playback Switch SW1-c.** In the Playback mode, power is supplied through the Play Switch SW2 to Connector CN-Q Pin 6. Pin 6 is used to mute AM, FM, Phono or Ext. Tape audio during Cassette Playback.
3. **To Record/Playback Switch SW1-c.** During Record mode, power is supplied to the erase oscillator.

RECORD MODE

Audio to be recorded arrives from two (2) different paths.

1. **From Connector CN-Q Pin 2.** Pin 2 supplies audio from the AM, FM, Phono, or Ext. Tape inputs. Audio from Pin 2 is supplied to the Record input Pin (Pin 1) of IC1 via C12.
2. **From Connector CN-Q Pin 3.** Pin 3 supplies audio from the built-in microphone. Audio from Pin 3 is supplied to the "MIC" input Pin (Pin 7) of IC1 via R14 and C17.

During Record mode, IC1 performs the following functions: microphone amplification, line audio amplification, and ALC (automatic level control).

IC1 is selected to Record mode by Switch SW1-b. During Record mode SW1-b supplies +6 Volts DC to IC1 Pin 11 via R17.

After the input audio has been amplified and leveled by IC1, it leaves via Pin 16. Upon leaving Pin 16, it passes through Coupling Capacitor C11 into an RC equalizing network formed by R4 and C6.

Once leaving this network, it passes through a notch filter tuned to the erase oscillator's frequency (L1 and C5). The notch filter removes the erase oscillator's signal, which prevents any of the erase oscillator from feeding back into the ALC circuit and causing improper leveling of the signal being recorded.

CASSETTE (continued)

RECORD MODE (continued)

After passing through the notch filter, the audio is directed through Switch SW1-a to the Record/Playback head. Also at this point, a small amount of erase oscillator signal is mixed with the audio being recorded. This is accomplished by VR2 and C26.

Biasing of the magnetic tape during Record with the erase oscillator helps improve the overall frequency response of the recording.

The erase oscillator is formed by Transistor Q1 and Transformer T1. The CT output of Transformer T1 is fed directly to the erase head. Power to the erase oscillator is supplied by Switch SW1-c.

PLAYBACK MODE

Audio from the Record/Playback head is passed through Switch SW1-a to Pin 6 of IC1 via R5 and C8. During Playback, IC1 provides playback audio amplification and equalization.

Switch SW1-b causes IC1 to switch to the Playback mode by grounding Pin 11 through R16. After being amplified and equalized, the Playback audio leaves IC1 via Pin 3 through Coupling Capacitor C15 to Level Control VR1.

Level control VR1 is used to match the Playback audio to the audio being produced during AM and FM operation. As a result, all audio levels driving the power amplifier are approximately the same.

Audio from the wiper of VR1 is passed through Coupling Capacitor C13 to Connector CN-Q Pin 4.

MUSIC/MESSAGE/CHIME AUDIO/POWER SUPPLY

The Master PC Board contains most of the circuitry needed to process the music/chime audio as well as supply needed power to the music/chime source. This section contains information on the following operations:

(1) AM/FM AUDIO AND POWER SUPPLY
(2) PHONO/TAPE AUDIO PROCESSING
(3) CASSETTE AUDIO AND POWER SUPPLY
(4) LOCAL MESSAGE AUDIO AND POWER SUPPLY
(5) CHIME AUDIO AND POWER SUPPLY
(6) ALL MUSIC AUDIO PROCESSING AND POWER SUPPLY.

AM/FM AUDIO POWER SUPPLY

AM RADIO

The AM Radio is selected via the Function Switch PC Board. When the AM button is pressed on the Function Switch PC Board, a HI signal is sent to Connector S Pin 2. This signal is applied to three (3) locations:

1. **IC2 Pin 8.** This signals the PLL PC Board that the AM mode is being selected.
2. **R1 to the base of Transistor Q17.** This causes Q17 to saturate. The emitter of Q17 supplies a 7.6 Volt signal to Connector T Pin 3. This 7.6 Volts is used to power the AM Tuner.
3. **IC1 Pin 23.** IC1 supplies the following two (2) functions:
   3a. Selects 1 of 4 audio input lines and directs it to a single audio output line.
   3b. Supplies a drive voltage to the input which has been selected via the Function Switch PC Board. As a result, the 11.8 Volts will continue even though the AM Function switch is released. This will maintain the operating voltage for the AM Tuner and LED.

Audio arrives from the Tuner PC Board via Connector T Pin 5. The audio is then connected to IC4 Pin 1. IC4 is used as an audio gate. Normally, IC4's Control Pin (Pin 13) is HI. This causes audio to pass from Pin 1 to Pin 2 of IC4. Under the following conditions, Pin 13 will be LO and stop the audio from passing:

AM/FM AUDIO AND POWER SUPPLY (continued)

1. Phono/Tape has been selected.
2. Radio Power switch is off.
3. The AM Tuner is in the process of tuning a new station (as a result, noise between stations is not heard).

After the audio passes through IC4, it goes to IC1 Pin 6. Pin 6 is the AM Input Pin. Since AM has been selected, IC1 passes the AM audio to its output pin (Pin 11).

The audio is now passed to IC5 Pin 11. IC5 is another audio gate which is controlled by Pin 12. Normally, Pin 12 is HI, which would allow the audio to pass to Pin 10. However, during Cassette Playback, IC5 will be turned off. A HI signal generated by the Cassette PC Board arrives at Connector Q Pin 6. This HI signal is passed through R85 and R14 to the base of Transistor Q1 which causes Q1 collector to saturate to ground. Since Q1's Collector is connected to Pin 12 of IC5, it too goes to ground which causes IC5 to turn off. As can be seen from this description, the Cassette Player has the capabilities to override the AM Tuner audio. In fact, it has the same overriding ability with the FM Tuner and the Phono/Tape inputs.

After the audio passes through IC5 to Pin 10, it is coupled to the base of Transistor Q2. Audio from this point will be described in the section "All Music Audio Processing and Power Supply."

MUSIC/MESSAGE/CHIME/AUDIO/POWER SUPPLY (continued)

AM/FM AUDIO AND POWER SUPPLY (continued)

FM RADIO

The FM Radio is selected the same as the AM Radio via the Function Switch PC Board. When the FM button is pressed on the Function PC Board, a HI signal is sent to Connector S Pin 3. This signal is applied to three (3) locations:

1. **IC2 Pin 13.** This signals the PLL PC Board that the FM mode is being selected.
2. **R2 to the base of Transistor Q18.** This causes Q18 to saturate. The emitter of Q18 supplies an 8 Volt signal to Connector T Pin 2. This 8 Volts is used to power the FM Tuner.
3. **IC1 Pin 22.** IC1 supplies the following two (2) functions:
   a. Selects 1 of 4 audio input lines and directs it to a single audio output line.
   b. Supplies a drive voltage to the input which has been selected via the Function Switch PC Board. As a result, the 11.8 Volts will continue even though the FM Function switch is released. This will maintain the operating voltage for the FM Tuner and LED.

Audio arrives from the Tuner PC Board via Connector T Pin 4. The audio is then connected to IC4 Pin 9. IC4 is used as an audio gate. Normally, IC4's Control Pin (Pin 6) is HI. This causes audio to pass from Pin 9 to Pin 8 of IC4. Under the following conditions, Pin 6 will be LO and stop the audio from passing:

1. Phono/Tape has been selected.
2. Radio Power switch is off.
3. The FM Tuner is in the process of tuning a new station (as a result, noise between stations is not heard)

After the audio passes through IC4, it goes to IC1 Pin 7. Pin 7 is the FM Input Pin. Since FM has been selected, IC1 passes the FM audio to its output pin (Pin 11).

The audio is now passed to IC5 Pin 11. IC5 is another audio gate which is controlled by Pin 12. Normally, Pin 12 is HI, which would allow the audio to pass to Pin 10. However, during Cassette Playback, IC5 will be turned off. A HI signal generated by the Cassette PC Board arrives at Connector Q Pin 6. This HI signal is passed through R85 and R14 to the base of Transistor Q1 which causes Q1 collector to saturate to ground. Since Q1's Collector is connected to Pin 12 of IC5, it too goes to ground which causes IC5 to turn off. As can be seen from this description, the Cassette Player has the capabilities to override the FM Tuner audio. In fact, it has the same overriding ability with the AM Tuner and the Phono/Tape inputs.

After the audio passes through IC5 to Pin 10, it is coupled to the base of Transistor Q2. Audio from this point will be described in the section "All Music Audio Processing and Power Supply".

PHONO/TAPE AUDIO PROCESSING

The Phono or Tape inputs are selected via the Function Switch PC Board.

When the Phono button is pressed on the Function Switch PC Board, a HI signal is sent to Connector S Pin 4. This signal is applied to two (2) locations:

1. **IC1 Pin 21.**
   a. This directs IC1 to pass the Phono Audio arriving at Pin 8 to its output which is Pin 11.
   b. Supplies a drive voltage to the input which has been selected via the Function Switch PC Board. As a result, the 10.1 Volts will continue even though the Phono Function switch is released. This will maintain the operating voltage for the Phono LED.
2. **R93 to the base of Transistor Q21.** Q21 is used to short any Tape Audio signal (via its collector) to ground.

Audio arrives from the Phono input connector via Connector N Pin 1. Audio passes through R6, and arrives at IC1 Pin 8. The Audio signal leaves IC1 at Pin 11 and is passed to IC5 Pin 11 (refer to IC5 operation in the AM/FM section).

After the Audio passes through IC5 to Pin 10, it is coupled to the base of Transistor Q2. Audio from this point will be described in the section "ALL MUSIC AUDIO PROCESSING AND POWER SUPPLY".

The Tape input is selected the same as the Phono input via the Function Switch PC Board.

When the Tape button is pressed on the Function Switch PC Board, a HI signal is sent to Connector S Pin 5. This signal is applied to two (2) locations.

1. **IC1 Pin 20.**
   a. This directs IC1 to pass the Tape Audio arriving at Pin 9 to its output which is Pin 11.
   b. Supplies a drive voltage to the input which has been selected via the Function Switch PC Board. As a result, the 10.1 Volts will continue even though the Tape Function switch is released. This will maintain the operating voltage for the Tape LED.
2. **R92 to the base of Transistor Q20.** Q20 is used to short any Phono Audio signal (via its collector) to ground.

Audio arrives from the Tape input connector via Connector N Pin 2. Audio passes through R7, and arrives at IC1 Pin 9. The audio signal leaves IC1 at Pin 11 and is passed to IC5 Pin 11 (refer to IC5 operation in the AM/FM section).

After the Audio passes through IC5 to Pin 10 it is coupled to the base of Transistor Q2. Audio from this point will be described in the section "All Music Audio Processing and Power Supply".

MUSIC/MESSAGE/CHIME/AUDIO/POWER SUPPLY (continued)

CASSETTE AUDIO AND POWER SUPPLY

Power to operate the Cassette is sent via Connector Q Pin 5. The voltage at this point is 11.9 Volts DC. This voltage is always present regardless of the operation of the cassette.

Music to be recorded is derived from the collector of Transistor Q3. After the audio passes through C18 and R41, it arrives at IC4 Pin 3.

IC4 acts as an audio gate which is controlled via Pin 5. Normally, Pin 5 is HI, and the audio is passed to Pin 4 of IC4 (See "Local Message" section for IC4 Pin 5). After the Audio leaves IC4 Pin 4, it is passed to Connector Q Pin 2. This pin passes the Audio to the Cassette PC Board for recording.

During Playback, both Playback Audio and a control signal is generated. The control signal arrives via Connector Q Pin 6. Normally, (cassette not operating) this pin is LO, however, during Cassette Playback this pin goes HI which causes two (2) items to occur:

1. **IC4's control Pin (Pin 12) goes HI.** IC4 is used as an Audio gate. Any audio arriving at Pin 11 will be passed to Pin 10 of IC4.
2. **Transistor Q1 saturates.** As a result, its collector goes LO. When Q1's collector goes LO, it causes IC5 Pin 12 to also go LO which in turn stops any audio at Pin 11 from passing to Pin 10 of IC5.

Audio during Playback arrives via Connector Q Pin 4. The Audio is passed to IC4 Pin 11. As seen in the above description, IC4 Pin 12 is HI during Cassette Playback. Since IC4 is on, the Cassette Audio at Pin 11 is passed to Pin 10. After the Audio passes through IC4 to Pin 10, it is coupled to the base of Transistor Q2. Audio from this point will be described in the section "All Music Audio Processing and Power Supply".

LOCAL MESSAGE AUDIO AND POWER SUPPLY

Power to operate the Local Message Microphone is supplied through R29 and R28. Capacitor C35 is used to decouple any power supply noise supplied by R29.

Audio from the built-in microphone arrives via Connector V Pin 1. The Audio is then passed through coupling Capacitor C8 to Pin 3 of IC5. IC5 acts as an audio gate which when turned on will pass the MIC'S Audio to Pin 4 of IC5 and then to Connector Q Pin 3. At this point, the audio is sent to the Cassette PC Board to be recorded.

To cause IC5 to turn on, a HI signal must be present at Pin 5. To obtain a HI at IC5 Pin 5, the following must occur.

1. The MIC button must be pressed. This causes a HI signal to arrive at Connector S Pin 6.
2. The HI signal is sent through R69 to Pin 3 (clock input) of IC3. This causes IC3 Pin 2 to change from a HI state to a LO state. The LO signal is passed through R18 to the base of Transistor Q4 which causes its collector to go HI.

   The HI signal from the collector of Q4 feeds the following points:

LOCAL MESSAGE AUDIO AND POWER SUPPLY (continued)

   a. **R81 to the base of Transistor Q15.** This causes the collector of Q15 to saturate which energizes Relay RL2. Relay RL2 causes Contacts K2 to open which will mute any Audio at the Master Speaker. As a result, any Music or Intercom Audio which might be present at the Master will not be recorded along with the local message.
   b. **Pin 9 of IC3.** This is the data input of IC3. As a result, a HI going signal on Pin 11 will cause Pin 12 of IC3 to go LO.
   c. **IC2 Pin 1.**
   d. **D6 and R66 to Connector S Pin 8.** This pin feeds power to light the MIC LED.
   e. **IC5 Pin 5.** This causes IC5 to pass any microphone audio from IC5 Pin 3 to Pin 4.
   f. **R25 to the base of Transistor Q8.** This causes its collector to go LO. This LO signal is passed to IC4 Pin 5 which stops any Audio at Pin 3 from reaching Pin 4. The outcome being, any music audio present at the collector of Q3 will not be recorded along with the microphone audio.

To create a flash from the MIC LED, (to indicate a message) the following must occur:

1. The Message button must be pressed. This causes a HI signal to arrive at Connector S Pin 7. When the Message button is pressed the following occurs:
   a. A HI signal is applied to Pin 11 of IC3. This causes Pin 12 of IC3 to change from a HI state to a LO state.
   b. The LO at Pin 12 of IC3 is connected to Pin 2 of IC2. The LO at Pin 2 is combined with the HI at Pin 1 of IC2 which does not create a change at the output of IC2.

When the MIC button is pressed a second time the following occurs:

1. A HI signal arrives at Connector S Pin 6.
2. The HI signal is sent through R69 to Pin 3 of IC3. This now causes IC3 Pin 2 to change back from its LO state to a HI state. The HI signal is passed through R18 to the base of Transistor Q4 which causes its collector to go LO. The LO signal from Q4 causes the following to occur:
   a. Transistor Q15 turns off which returns the Audio to the Master Speaker.
   b. IC3 data line set so a HI signal on Pin 11 will cause Pin 12 of IC3 to go HI.
   c. IC2 Pin 1 will go LO.
   d. The MIC LED will go out.
   e. IC5 Pins 3 and 4 will open which will prevent any Microphone Audio from being recorded.
   f. Transistor Q8 will turn off. This will cause IC4 Pins 3 and 4 to pass any Music Audio to the Cassette recorder.

      IC2 Pins 1 and 2 are now both LO, this causes the output of IC2 (Pin 3) to go HI. The HI from IC2 Pin 3 is passed through R70 to the base of Transistor Q11 which causes the emitter of Q11 to switch from 0 Volts to 5.9 Volts.

MUSIC/MESSAGE/CHIME/AUDIO/POWER SUPPLY (continued)

LOCAL MESSAGE AUDIO AND POWER SUPPLY (continued)

This signal is fed to Transistors Q6 and Q7 through Resistors R21, R22, R23 and R24. Transistors Q6 and Q7 form a square wave generator at the rate of approximately 2Hz. The 2Hz signal leaves the collector of Q6 and is fed through R20 to the base of Transistor Q5. This causes the emitter of Q5 to switch from 0 Volts to 4.5 Volts at the rate of 2Hz.

The emitter of Q5 is fed through R67 to Connector S Pin 8. This pin feeds the 2Hz signal to the MIC LED. The MIC LED will in turn flash on and off at a 2Hz rate indicating there is a local message.

Once the message has been reviewed, the Message button is again pressed. When the Message button is pressed for the second time the following will occur:

1. Pin 12 of IC3 will change from a LO state to a HI state.
2. Transistor Q5's emitter will go LO.
3. Transistors Q6 and Q7 will stop generating a 2Hz signal, and the collector of Q6 and Q7 will be LO.
4. The MIC LED will stop flashing and go out.

CHIME AUDIO AND POWER SUPPLY

Chime Audio can arrive via the following two (2) points:

1. EXTERNAL LOW LEVEL CHIME
2. IA-28/IA-29 CHIME MODULE.

LOW LEVEL CHIME

The low level Chime Audio (produced by LA-52, LA-53, LB-55, LD-55, LB-76, and LA-60) arrives at Connector J Pin 1 on the Master PC Board. After arriving at Pin 1, Chime Audio is amplified by Transistors Q21 and Q20.

Audio leaves the Emitter of Q20 and is coupled through Capacitor C21 and Resistor R29 to Connector H Pin 1. Connector H Pin 1 of the Master PC Board feeds same Connector on the Power PC Board. Audio is then fed through Resistor R7 and Capacitor C21 to Pin 6 of IC1 on the Power PC Board.

IC1 amplifies the Chime signal and outputs it via Pin 1 of Connector G which feeds all Speakers selected to the Radio/Intercom on the Switch PC Board. Speakers selected in the Intercom Only, Off, or Monitor position will not receive the low level Chime Audio.

IA-28/IA-29 CHIME MODULE

Chime Module audio arrives at Connector I Pin 4. From Connector I, Audio is connected directly to Pin 1 of Connector H. Connector H Pin 1 of the Master PC Board feeds the same Connector on the Power PC Board. It also feeds Resistor R7 and Capacitor C21 to Pin 6 of IC1 on the Power PC Board.

IC1 amplifies the Chime signal and outputs it via Pin 1 of Connector G which feeds all Speakers selected to the Radio/Intercom and Intercom Only positions on the Switch PC Board. Speakers selected to the Off or Monitor position will not receive Chime Module Audio.

CHIME AUDIO AND POWER SUPPLY (continued)

The Chime Module supplies a muting signal via Connector I Pin 1 (6 Volts) which causes any program audio to mute when the Chime Module is operating. The 6 Volt signal passes through Diode D19 to the following two (2) points:

1. **Resistor R28 to the base of Transistor Q19.** This causes Q19 Collector to saturate, forcing its collector LO. This signal is fed to Connctor K Pin 3. Connector K Pin 3 feeds same connector on Master PC Board. This signal is then fed to Resistor R87, which in turn feeds IC5 Pin 6. This causes Pins 8 and 9 of IC5 to open preventing any program audio from passing onto the Power amplifier.
2. **Resistor R21 to the base of Transistor Q4.** This causes Q4 to saturate energizing Relay RL4. Relay RL4's Contacts K4 switch from the normally open to normally closed position. This causes any speakers selected to the Intercom Only position to be connected to the Audio Output during Chime Module operation only.

Power to the Chime Module (12 Volts) is supplied via Connector I Pin 2.

ALL MUSIC AUDIO PROCESSING AND POWER SUPPLY

All the Music and Local Message Audio is fed to the base of Transistor Q2 through coupling Capacitor C12. Transistor Q2 is configured as an emitter follower which prevents any loading of the audio circuits before the base of Q2. The audio from the emitter of Q2 feeds two (2) points:

1. **C16 to the base of Transistor Q3.** Q3 amplifies the signal and passes it to IC4 Pin 3 to be sent to the Cassette Recorder and through C19 and R42 to the Line Output Jack for use as a low level audio source or to an Ext. Tape Recorder.
2. **C15 to the Tone Control formed by VR2-1 and VR2-2/ associate circuitry.** In addition to the Tone Control, the circuit also has a Loudness switch which boast the low and high frequencies to allow for a richer sound at low volume settings.

The Loudness switch is connected via Connector P Pins 1, 2 and 3.

When the Loudness switch is on, Pins 1 and 2 of Connector P are connected together. This causes the junction of C29 and C36 to be connected to the junction of R58 and C39.

When the Loudness switch is off, Pins 2 and 3 of Connector P are connected together. This causes the junction of R58 and C39 to be connected to ground through R59.

After the audio has passed through the Tone and Loudness switch, it is coupled through C39 to the base of Transistor Q14. Q14 amplifies the signal and couples the signal to Pin 8 of IC5 through C41.

MUSIC/MESSAGE/CHIME/AUDIO/POWER SUPPLY (continued)

ALL MUSIC AUDIO PROCESSING AND POWER SUPPLY (continued)

IC5 acts as an audio gate which passes audio to Pin 9 except during the following two (2) operations:

a. The Door or Inside/Patio Intercom is in use. In this situation, IC5 Pin 6 goes LO which mutes the Music Audio so the Intercom Audio only will be heard.
b. A chime module (IA-28/IA-29) has been connected to the Master. In this situation, IC5 Pin 6 will go LO during chime operation to allow the chime to be heard without music.

After the audio leaves IC5 Pin 9, it is connected to Connector P Pin 4. Pin 4 connects to the hot side of the System Volume Control located on the Switch PC Board. The cold side of the System Volume Control is connected to Pin 6 of Connector P.

The wiper of the System Volume Control is connected to Pin 5 of Connector P. This pin feeds R51, which feeds Connector U Pin 2. Pin 2 feeds the Audio Power Amplifier located on the Power Supply/Power Amp PC Board.

The power needed for all the above circuitry is supplied via Connector U Pin 1. Pin 1 supplies approximately 20 Volts DC to IC6 which regulates the voltage to 12 Volts DC± .5 Volts.

PHASE LOCK LOOP

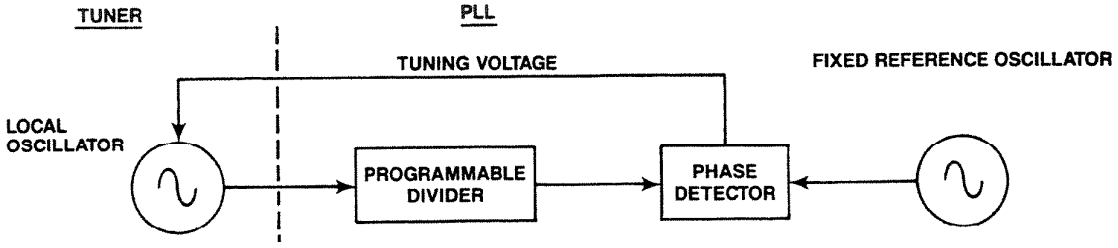
The PLL (Phase Lock Loop) PC Board contains all the circuitry needed to digitally tune the AM and FM Tuner; store 5 AM and 5 FM memory frequencies; display both the AM and FM frequencies on a fluorescent display; and generate/display a 12-hour clock. This section will review the operation of the following:

1. PHASE LOCK LOOP PC BOARD
2. DISPLAY PC BOARD
3. MEMORY PC BOARD

PHASE LOCK LOOP PC BOARD

TUNING THE AM/FM TUNER

IC2 on the PLL PC Board contains all the circuitry needed to frequency synthesize the AM and FM Tuner. IC2 tunes by taking the local oscillator of the Tuner PC Board, dividing it down by a programmable divider, and comparing its divided local oscillator with a reference oscillator (See below).

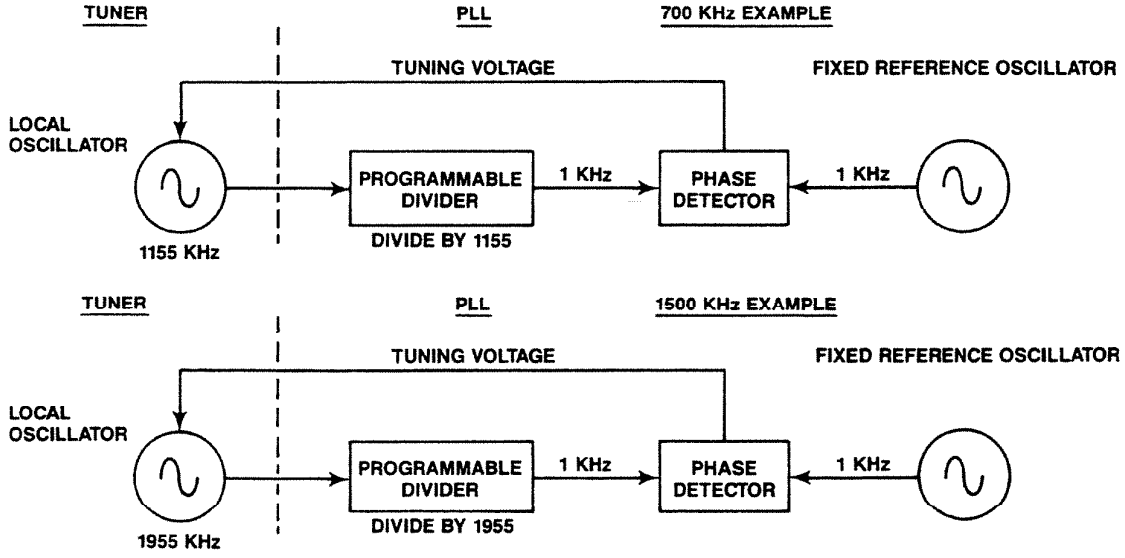


PHASE LOCK LOOP (continued)

PHASE LOCK LOOP PC BOARD (continued)

After comparing with the reference oscillator, a tuning voltage is generated. This voltage is used to tune the local oscillator in the Tuner PC Board. When all signals are correct, (in phase and frequency) the PLL is said to be locked. In otherwords, the divided local oscillator matches the reference oscillator in both frequency and phase. The following two (2) examples are used to show how a 700KHz and 1500KHz AM signal would be tuned.

NOTE: Examples below would be used with a 455 KHz IF Amplifier.
Example 1155KHz–455 KHz=700 KHz.



The AM local oscillator arrives from the Tuner PC Board via Connector Y in 5. From Pin 5, it passes through Coil L1 and Capicator C1 into Pin 28 of IC2. IC2's programmable divider is set via the Up/Down Tuning buttons, Scan button, or one of the 5 pre-programmed Memory Channels.

After the local oscillator is compared with the reference oscillator, a tuning voltage is derived via Pin 1 of IC2. This voltage is buffered and filtered by Transistors Q1 and Q2. After passing through Transistor Q1, the tuning voltage is sent to Connector Y Pin 2. This voltage is used to tune the local oscillator on the Tuner PC Board.

The FM local oscillator arrives from the Tuner PC Board via Connector Y Pin 5. From Pin 5 it passes through Capacitor C2 to IC1 Pin 2. IC1 is used to divide the FM local oscillator by a factor of 16 or 17 depending on the output from IC2. The divided local oscillator is derived from IC1 Pin 6. After leaving IC1, the divided local oscillator passes through Resistor R5 and Capicator C6 to Pin 4 of IC2. IC2's programmable divider is set via the Up/Down Tuning buttons, Scan button or one of the 5 pre-programmed Memory Channels.

After the local oscillator is compared with the reference oscillator, a tuning voltage is derived via Pin 1 of IC2. This voltage is buffered and filtered by Transistors Q1 and Q2. After passing through Transistor Q1, the tuning voltage is sent to Connector Y Pin 2. This voltage is used to tune the local oscillator on the Tuner PC Board.

INTERGRATED CIRCUIT 2 (IC2)

IC2 contains internal circuitry which performs the following transparent functions:

1. Audio muting output
2. Stop tuning input
3. Outputs for driving a fluorescent display
4. Inputs for selecting frequency, tuning mode, memory channel, and clock setting
5. AM/FM selection
6. Clock display override.

PHASE LOCK LOOP PC BOARD (continued)

Audio Muting Output

A muting signal is generated at Pin 8 of IC2 during the following conditions:

a. Scan Tuning

b. Actuation of either the Tune Up or Down pushbuttons.

During the above two (2) conditions, a 5 Volt signal is generated at Pin 8 of IC2. This saturates Transistor Q4 causing its collector to switch to 0 Volts DC.

This signal is sent to Connector R Pin 3. Connector R Pin 3 feeds same connector on the Master PC Board. This feeds IC4 Pins 6 and 13. This signal then turns off IC4 Pins 1 and 2 and Pins 8 and 9 preventing any AM or FM audio to pass to IC1.

Stop Tuning Input

The Stop Tuning signal arrives from the Tuner at Connector Y Pin 1. The normal voltage at this pin is approximately 11 Volts DC.

However, when a Stop Tune signal is sent from the Tuner PC Board, the voltage at Pin 1 switches to near 1 Volt for approximately 30 ms. This pulse causes Transistor Q3 to turn off allowing the collector to switch to approximately 5 Volts DC for the same 30ms. This pulse arrives at IC2 Pin 7 and causes the Scaning process to stop.

This process will continue at the rate of one tuning cycle every 5 seconds until the Scan button is pressed a second time.

Fluorescent Display Output

IC2 Pin 9 through Pin 13 are used to drive Transistor Q7 through Q11. These transistors are used to sink the current needed for each of the 5 digits. IC2 Pin 15 through Pin 21 are used to source the current needed for each segment of the 5 digits.

During normal operation, digit 1 is accessed and the appropriate segments are lit. After digit 1, digits 2 through 5 are accessed in a multiplexing manner. With this process, the display is continuously updated and appears to be continuously lit.

Input Selection

The input is configured in a 7 by 4 matrix. The same Pins (15 through 21) of IC2 used to drive the segments of the Display are also used to address the matrix switching.

The four return lines of the matrix are Pins 22 through 25 of IC2. This, in conjunction with the Display PC Board, is used to select the different modes of operation. During normal operation, the matrix is scanned at a rate high enough that the switches appear to continuously operate.

AM/FM Selection

AM tuning mode is selected via Connector R Pin 4. During AM operation, this pin will be LO. This causes Transistor Q6 to saturate which connects Pins 17 and 25 of IC2 together. As a result, IC2 selects the AM mode of operation.

FM tuning mode is selected via Connector R Pin 4. During FM operation, this pin will be HI. This causes Transistor Q6 to turn off which disconnects Pins 17 and 25 of IC2. As a result, IC2 selects the FM mode of operation.

PHASE LOCK LOOP PC BOARD (continued)

Clock Display Override

Whenever the Master is selected to the Phono, Tape, or Tuner Off mode, a signal is generated at Connector R Pin 1. During AM/FM mode, this pin is LO. However, when the Phono, Tape or Tuner Off mode is selected, this pin goes HI. This signal is used to turn off Transistor Q5, which disconnects Pin 17 and 22 of IC2. This causes IC2 to select the Clock Display mode of operation.

PLL OPERATING VOLTAGE

Operating voltage for the PLL PC Board arrives at three (3) points.

1. Connector R Pin 2 supplies 12 Volts DC to the Tuning voltage buffer/filter and IC3. IC3 is used to supply 6 Volts DC to IC1 and IC2.
2. Connector X Pin 2 supplies 5 Volts DC from the nicad battery pack during AC Power outage. This battery pack is used to back up the 5 AM/FM memories and the Clock.
3. Connector X Pin 3 supplies -26 Volts DC to drive the Fluorescent Display via Resistors R22 through R33.

DISPLAY PC BOARD

The Display PC Board contains the Fluorescent Display as well as the switches needed to perform the following functions:

1. Recall to Tuned Frequency
2. Set the Clock
3. Select Scan Mode Tuning
4. Select Up/Down Tuning

RECALL TO TUNED FREQUENCY

The Recall (frequency) switch (SW1) causes the Display to switch from Clock Display to Frequency Display for approximately 5 seconds. The Recall switch is connected to Connector Z1 Pins 1 and 8 through Diodes D6 and D13. Whenever the Recall switch is pressed, Pins 18 and 25 of IC2 on the PLL PC Board are connected together. This causes IC2 to switch to the Frequency Display mode.

SET THE CLOCK

Setting the Clock requires pressing 2 of 3 Clock settings switches.

To set the Hours, depress the Time Set (SW2) and Hour (SW3) switches simultaneously. The Time Set and Hour switches are connected to Connector Z1 Pins 3 and 8 through Diodes D8 and D13. Whenever the Time Set and Hour switches are pressed simultaneously, Pins 18 and 23 of IC2 on the PLL PC Board are connected together. This causes the IC2 to advance the Hour display at the rate of 1 hour per second.

To set the Minutes, depress the Time Set (SW2) and Minute (SW4) switches simultaneously. The Time Set and Minute switches are connected to Connector Z1 Pin 4 and 8 through Diodes D9 and D13. Whenever the Time Set and Minute switches are pressed simultaneously, Pin 18 and 22 of IC2 on the PLL PC Board are connected together. This causes the IC2 to advance the Minute Display at the rate of 1 minute per second.

PHASE LOCK LOOP (continued)

DISPLAY PC BOARD (continued)

SELECT SCAN MODE TUNING

Scan mode tuning is selected by pressing the Scan switch (SW5). The Scan switch is connected to Connector Z1 Pins 4 and 7 through Diodes D9 and D12. Whenever the Scan switch is pressed and released, Pins 19 and 22 of IC2 on the PLL PC Board are connected (when Scan switch is pressed). This causes IC2 to start Scanning for the next strong station. To cause the Scan mode of tuning to stop, depress the Scan switch a second time.

SELECT UP/DOWN TUNING

Up/Down Tuning mode is selected by pressing the Up/Down Switches (SW6 and SW7).

The Up switch is connected to Connector Z1 Pins 4 and 5 through Diodes D9 and D10. Whenever the Up switch is pressed and held, Pins 21 and 22 of IC2 on the PLL PC Board are connected. This causes IC2 to tune up in frequency until the Up switch is released.

The Down switch is connected to Connector Z1 Pins 3 and 5 through Diodes D8 and D10. Whenever the Down switch is pressed and held, Pins 21 and 23 of IC2 on the PLL PC Board are connected. This causes IC2 to tune down in frequency until the Down switch is released.

By momentarily pressing the Up switch or the Down switch, IC2 will increment in steps of 10KHz during AM operation and 200KHz FM operation.

FLUORESCENT DISPLAY

The Fluorescent Display contains all the digits and symbols necessary to display both frequency and time. Power to the filiment of the Fluorescent Display is supplied via Connector W Pins 1 and 2. This voltage normally measures 3.7 Volts AC.

MEMORY PC BOARD

The Memory PC Board contains the switches needed to program and select the five AM and FM memory frequencies.

PROGRAMMING MEMORY FREQUENCIES

IC2 on the PLL PC Board can store up to 5 AM and 5 FM frequencies.

To program an AM Frequency, first select the AM Radio mode. Tune the Radio to the desired frequency. Before the Display switches back to the Time Display mode, press the Memory switch and the desired memory number (1 through 5).

The Memory switch is connected to Connector Z2, Pins 3 and 6 through Diodes D10 and D7. Diode D10 is connected through Connector Z1 Pin 5 to IC2 Pin 21. Diode D7 is connected through Connector Z1 Pin 2 to IC2 Pin 24. Whenever the Memory switch is pressed, Pins 21 and 24 of IC2 on the PLL PC Board are connected. This causes IC2 to store the displayed frequency into memory.

To program an FM frequency, first select the FM Radio mode. Tune the radio to the desired frequency. Before the Display switches back to the Time Display mode, press the Memory switch and the desired memory number (1 through 5).

MEMORY PC BOARD (continued)

The Memory switch is connected to Connector Z2, Pins 3 and 6 through Diodes D10 and D7. Diode D10 is connected through Connector Z1 Pin 5 to IC2 Pin 21. Diode D7 is connected through Connector Z1 Pin 2 to IC2 Pin 24. Whenever the Memory switch is pressed, Pins 21 and 24 of IC2 on the PLL PC Board are connected. This causes IC2 to store the displayed frequency into memory.

MEMORY FREQUENCY SELECTION

Memory #1 switch (SW9) is connected to Connector Z2 Pins 2 and 4 through Diodes D11 and D9. Diode D11 is connected to Connector Z1 Pin 6 to IC2 Pin 20. Diode D9 is connected to Connector Z1 Pin 4 to IC2 Pin 22. Whenever SW9 is pressed in conjunction with the Memory switch, Pins 20 and 22 of IC2 on the PLL PC Board are connected. This causes the displayed frequency to be stored in Memory #1.

Memory #2 switch (SW10) is connected to Connector Z2 Pins 2 and 5 through Diodes D11 and D8. Diode D11 is connected to Connector Z1 Pin 6 to IC2 Pin 20. Diode D8 is connected to Connector Z1 Pin 3 to IC2 Pin 23. Whenever SW10 is pressed in conjunction with the Memory switch, Pins 20 and 23 of IC2 on the PLL PC Board are connected. This causes the displayed frequency to be stored in Memory #2.

Memory #3 switch (SW11) is connected to Connector Z2 Pins 2 and 6 through Diodes D11 and D7. Diode D11 is connected to Connector Z1 Pin 6 to IC2 Pin 20. Diode D7 is connected to Connector Z1 Pin 2 to IC2 Pin 24. Whenever SW11 is pressed in conjunction with the Memory switch, Pins 20 and 24 of IC2 on the PLL PC Board are connected. This causes the displayed frequency to be stored in Memory #3.

Memory #4 switch (SW12) is connected to Connector Z2 Pins 2 and 7 through Diodes D11 and D6. Diode D11 is connected to Connector Z1 Pin 6 to IC2 Pin 20. Diode D6 is connected to Connector Z1 Pin 1 to IC2 Pin 25. Whenever SW12 is pressed in conjunction with the Memory switch, Pins 20 and 25 of IC2 on the PLL PC Board are connected. This causes the displayed frequency to be stored in Memory #4.

Memory #5 switch (SW13) is connected to Connector Z2 Pins 1 and 6 through Diodes D12 and D7. Diode D12 is connected to Connector Z1 Pin 7 to IC2 Pin 19. Diode D7 is connected to Connector Z1 Pin 2 to IC2 Pin 24. Whenever SW13 is pressed in conjunction with the Memory switch, Pins 19 and 24 of IC2 on the PLL PC Board are connected. This causes the displayed frequency to be stored in Memory #5.

INTERCOM

The Intercom circuit operates in conjunction with the following PC Boards:
1. SWITCH PC BOARD
2. MASTER PC BOARD
3. CONTROL PC BOARD
4. POWER PC BOARD
5. TERMINAL PC BOARD

Refer to Intercom Logic Chart to assist in understanding the Intercom operation. **Note:** HI equals 13 Volts ±2 Volts DC. LO equals 0 to +1 Volt DC.

INSIDE/PATIO INTERCOM INITIATED AT MASTER

Initiating a call from the Master starts by pressing the Inside/Patio Talk button. Pressing the Inside/Patio Talk button causes the following functions to occur:
1. INSIDE/PATIO CONTROL SIGNAL IS GENERATED
2. INITIATING STATION ID IS GENERATED
3. MASTER SPEAKER IS CONNECTED TO AUDIO INPUT OF INTERCOM TRANSFORMER
4. REMOTE SPEAKERS (INTERCOM AUDIO OUTPUT).

INSIDE PATIO CONTROL SIGNAL IS GENERATED

Depressing the Inside/Patio Talk button on the Master PC Board causes S1-2 to short one end of Resistor R4 (330 ohms) to ground. The other end of R4 is connected through Diode D1, S3-1 to Connector F Pin 2 on the Master PC Board. Connector F Pin 2 feeds same connector on the Control PC Board. This feeds Pins 3, 5, and 12 of IC9.

The combination of Resistor R2 on the Control PC Board and R4 on the Master PC Board form a voltage divider which generates a 3.4 Volt DC signal which is applied to Pin 3 of IC9. This causes Pin 1 of IC9 to switch from HI to LO.

This signal is fed to Pin 3 of IC2 which inverts the signal and causes Pin 4 to switch from LO to HI. Pin 4 of IC2 feeds Pin 5 of IC4 which causes Pin 4 of IC4 to switch from HI to LO. Pin 4 of IC4 feeds Resistor R15 and Capacitor C27 which form an RC time constant (approximately .1 second). The output of the time constant feeds Pin 8 of IC4, Pin 8 of IC5, and Pin 2 of IC3.

Pin 10 of IC4 switches from LO to HI. This signal feeds Pin 9 of IC2 as well as Capacitor C7. C7 and R14 form an RC time constant which feeds a positive going pulse through Diode D4 to Connector K Pin 1. Connector K Pin 1 feeds the same connector on the Master PC Board. This feeds the positive going pulse through Resistor R64 to the base of Transistor Q16 which causes a momentary muting of the Intercom signal. This prevents any switching noise caused by the Inside/Patio switch from being audible.

Pin 8 of IC2 on the Control PC Board switches from HI to LO. This signal is fed to Pin 2 of IC1 and causes IC1 to reset.

The output of IC1 Pin 3 switches from LO to HI. This causes the following three (3) items to occur.
1. A HI signal is fed through Diode D87 to the following two (2) points:

INSIDE/PATIO INTERCOM INITIATED AT MASTER (continued)

   a. **Transistor Q4 through Resistor R21.** This causes Q4 to saturate and energize Relay RL4. RL4's contacts (K4) close shorting out Pins 2 and 3 of Connector L. This causes any speaker selected in the Intercom Only mode to be connected to the Audio Output Line.
   b. **Diode D89 Resistor R28 to the base of Q19.** This causes Q19 to saturate. The collector of Q19 is connected to Pin 3 of Connector K. Pin 3 of Connector K feeds same connector on the Master PC Board. This feeds Resistor R87 to Pin 6 of IC5. This causes IC5 Pins 8 and 9 to switch from a shorted condition to open, stopping any program audio from passing on to the Power Audio Amplifier.
2. Pin 3 of IC1 on the Control PC Board feeds Pin 5 of IC3. This causes Pin 4 of IC3 to switch from LO to HI. This signal is fed through Resistor R10 and Capacitor C30 which form an RC time constant (approximately 7 milliseconds). The output of the RC time constant feeds Pin 13 of IC5. IC5 Pins 8, 9, 10, 11, 12 and 13 form an RS latch. This causes Pin 10 of IC5 to switch from LO to HI. Pin 10 of IC5 feeds the following points.
   a. **Pin 1 of IC3.** This does not cause Pin 3 of IC3 to change states. This is due to a LO signal on Pin 2 of IC3.
   b. **IC6 Pins 1 and 6; IC7 Pins 1, 6, 8, and 13; IC8 Pins 1, 6, 8 and 13.** This will cause Pin 3 of IC6 to switch from LO to HI. This is due to Relay K7's contact K7-2 switching from a normally open to normally closed position. (See "Initializing Station ID is generated" section.) IC6 Pin 4, IC7 Pins 3, 4, 10 and 11; IC8 Pins 3, 4, 10, and 11 will remain LO.
   c. **IC6 Pins 8 and 9.** This will cause IC6 Pin 10 to switch from LO to HI. This signal feeds Connector 10 Pin 5. Connector 10 Pin 5 feeds same connector on Terminal PC Board. This feeds Connector 11 Pin 3 which is used to drive the Expansion Board (IA-410).
3. Pin 13 of IC2 on the Control PC Board. This causes Pin 12 of IC2 to switch from HI to LO. Pin 12 of IC2 feeds Pin 12 of IC4. Since Pin 13 of IC4 is HI, this causes Pin 11 of IC4 to switch from LO to HI. The HI signal from Pin 11 of IC4 feeds Connector K Pin 4. Connector K Pin 4 feeds same Connector on Master PC Board. This feeds Transistor Q12 emitter and IC5 Pin 13.

At the same time, Pin 12 of IC2 on the Control PC Board feeds Connector K Pin 2. Connector K Pin 2 feeds same connector on the Master PC Board. This feeds Resistor R72 and the base of Transistor Q12. The HI on the emitter of Q12, in conjunction with the LO on the base of Q12, causes a HI signal to be generated on the Collector of Q12. This feeds Resistor R73 and the base of Q13. This causes Transistor Q13 to saturate, shorting any program audio from Transistor Q14 via Capacitor C41 to ground.

In addition to the program audio being muted, the HI signal on Pin 13 of IC5 causes Pins 1 and 2 to change from a open state to a shorted condition. This allows any Intercom signal which has been amplified via Intercom Transformer T1 and Pre-amp Transistor Q10 to be passed on to the Power Amp via Connector U Pin 2.

INSIDE/PATIO INTERCOM INITIATED AT MASTER (continued)

INITIALIZING STATION ID IS GENERATED

Depressing the Inside Patio/Talk button on the Master PC Board causes S1-2 to short the cathod end of D3 to ground. The anode end of D3 feeds Connector F Pin 3. Connector F Pin 3 feeds same connector on the Control PC Board. The signal is fed to the anode end of Diode D86 and the cold end of Relay RL7.

Since the emitter of Transistor Q7 is HI, this causes RL7 to energize K7-1 and 2. (K7-1 will be discussed in "Master Speaker is Connected to Audio Input of Intercom Transformer").

K7-2's closure causes a HI signal to be placed on Pin 2 of IC6. This causes Pin 3 to go HI (Pin 1 of IC6 is already HI, see previous section, "Inside/Patio Control Signal is Generated"). The HI at Pin 3 of IC6 is fed through Diode D38 back to Pin 2 of IC6. This causes Pin 3 to remain Hi regardless of K7-2's contact position as long as a HI signal remains on Pin 1 of IC6 (in otherwords, D38 causes IC6 Pin 3 to latch into a HI state).

IC6 Pin 3 also feeds Resistor R7 and the base of Transistor Q8. This causes Transistor Q8 to saturate forcing the collector to ground. This causes RL7 to remain energized even though the Inside/Patio Talk button is released.

MASTER SPEAKER IS CONNECTED TO AUDIO INPUT OF INTERCOM TRANSFORMER

Master Speaker Intercom Audio is fed through Relay Contacts K2 Switch S1-1 on the Master PC Board to Connector F Pin 1 (initiating Station's Audio always bypasses that Station's Volume Control to allow for full Talkback Audio). Connector F Pin 1 feeds same connector on the Control PC Board. This feeds the Audio to K7-1 common contact.

Since K7-1 is energized, the Audio is then fed to the common of Contacts K6-2. K6-2 is not energized, therefore, the Audio flows through its normally closed contacts to Connector E2 Pin 2. Connector E2 Pin 2 feeds same connector on the Switch PC Board. This feeds Connector O Pin 2. Connector O Pin 2 feeds same connector on Master PC Board. This feeds the hot side of the Intercom Transformer T1. The output of Transformer T1 is fed to the base of Transistor Q10 via Capacitor C20.

Diodes D10 and D11 on the output of T1 form a soft limiter which prevents overloading of Transistor Q10. The Collector of Q10 feeds the amplified Intercom signal via Capacitor C23 to Pin 7 of Connector P.

Connector P Pin 7 feeds same connector on the Switch PC Board. This feeds the Intercom Volume Control VR1. VR1 is used to set the Intercom gain. The wiper of VR1 feeds Connector P Pin 8.

Connector P Pin 8 feeds same connector on Master PC Board. This feeds the Audio via Resistor R50 to Pin 1 of IC5. Since IC5 is the shorted condition, Audio passes on to Pin 2 and then to Pin 2 of Connector U. Connector U Pin 2 feeds same connector on the Power PC Board. This feeds the input of IC1 which is Pin 5.

INSIDE/PATIO INTERCOM INITIATED AT MASTER (continued)

REMOTE SPEAKERS (INTERCOM AUDIO OUTPUT)

Since the Remote Speakers were already connected to the Audio Output stage, there is no need to do any additional switching. Any Intercom signal arriving at the Audio Output IC will be sent to the Remote Speakers.

INSIDE/PATIO INTERCOM RELEASED TO LISTEN AT MASTER

After initiating a call at the Master by pressing the Inside/Patio Talk button, releasing this button causes the Master to switch into the Listen mode. This causes the following functions to occur:

1. INSIDE/PATIO CONTROL SIGNAL IS LOST
2. INITIATING STATION ID IS RETAINED
3. MASTER SPEAKER IS SWITCHED FROM THE AUDIO INPUT TO AUDIO OUTPUT
4. REMOTE SPEAKERS ARE SWITCHED FROM AUDIO OUTPUT TO AUDIO INPUT

INSIDE/PATIO CONTROL SIGNAL IS LOST

Releasing the Inside/Patio Talk button on the Master PC Board causes S1-2 to open. This releases Resistor R4 from ground. The other end of R4 is connected through Diodes D1, S3-1 to Connector F Pin 2 on the Master PC Board. Connector F Pin 2 feeds same connector on the Control PC Board. This feeds Pins 3, 5, and 12 of IC9.

Since Resistor R4 on the Master PC Board is now open, no voltage divider is formed, and the voltage on Connector F Pin 2 changes from 3.4 Volts DC to 12 Volts DC. This causes Pin 1 of IC9 on the Control PC Board to switch from LO to HI.

This signal is fed to Pin 3 of IC2 which inverts the signal and causes Pin 4 to switch from HI to LO. Pin 4 of IC2 feeds Pin 5 of IC4 which causes Pin 4 of IC4 to switch from LO to HI. Pin 4 of IC4 feeds Resistor R15 and Capacitor C27 which form an RC time constant (approximately .1 second). The output of the time constant feeds Pin 8 of IC4, Pin 8 of IC5, and Pin 2 of IC3.

Pin 10 of IC4 switches from HI to LO. This signal feeds Pin 9 of IC2 as well as Capacitor C7. C7 feeds the negative going pulse to Diode D4. However, D4 is reversed biased and does not feed the negative going pulse on to Connector K Pin 1.

Pin 8 of IC2 switches from LO to HI. This signal feeds Capacitor C8 and IC1 Pin 2. Capacitor C8 and Resistor R13 form an RC time constant which feeds a positive going pulse through Diode D5 to Connector K Pin 1. Connector K Pin 1 feeds same connector on the Master PC Board. This feeds the positive going pulse through Resistor R64 to the base of Transistor Q16 which causes a momentary muting of the Intercom signal. This prevents any switching noise caused by the release of the Inside/Patio Talk Button from being audible.

The positive going pulse at Pin 2 of IC1 on the Control PC Board does not cause IC1 to reset. Instead, IC1 starts timing. This will cause Pin 3 of IC1 to remain HI for approximately 20 seconds after the Inside/Patio Talk Button is released.

INSIDE/PATIO INTERCOM RELEASED TO LISTEN AT MASTER (continued)

Since IC1 Pin 3 has not changed status, all devices connected to said pin will remain in their same state.

The exception to this is the output of IC3 Pin 3, which now switches from a LO to HI. This causes Q3's collector to saturate energizing Relay RL6 and Contacts K6-1 and K6-2. The saturated collector of Q3 feeds Resistor R18 to the base of Transistor Q2 causing Q2 to saturate and feeding a HI signal from the emitter to collector. K6-1 will be discussed in the "Remote Speakers are Switched from Audio Output to Audio Input" section. K6-2 will be discussed in the "Master Speaker Switched from Audio Input to Audio Output" section.

The collector of Q2 feeds the HI signal to the base of Transistor Q1 causing it to saturate. The HI signal on the collector of Q1 is transferred to the emitter of Q1 to Diode D88 to emitters of Transistors Q9 through Q18.

The HI on the emitter of Q1 is also fed to Connector 10 Pin 7 on the Control PC Board. Connector 10 Pin 7 feeds same connector on the Terminal PC Board. This feeds the signal to Connector 11 Pin 5 for use by the Expansion Module (IA-410).

The HI signal on the emitters of Transistors Q10 through Q18 on the Control PC Board causes these transistors to saturate allowing the HI signal to pass on to the collectors of said transistors.

The HI signal on the collectors of Transistors Q10 through Q18 are connected to Connector M1 Pins 1 through 9. Connector M1 Pins 1 through 9 feed same connector on the Terminal PC Board. This feeds Pin 5 of each of the 9 Remote Stations connected to Terminal Board. This causes the Relay in each Remote to energize. Energizing the Remote Relays causes the Volume Control to be bypassed allowing full Talkback Audio to occur from each Remote.

Transistor Q9 on the Control PC Board does not saturate because the signal on the base is at a HI level. Since Q9 is not saturated, the collector will stay at its LO state. This prevents Relay RL1 on the Master PC Board from energizing allowing the Volume Control VR1 on the Master to control the Intercom level at the Master Speaker.

INITIATING STATION ID IS RETAINED

Releasing the Inside Patio/Talk button on the Master PC Board causes S1-2 to open at the cathod end of D3. The anode end of D3 feeds Connector F Pin 3. Connector F Pin 3 feeds same connector on the Control PC Board. The signal is fed to the anode end of Diode D86.

Since the cathod of D3 on the Master PC Board is currently not at ground potential, it would appear that Relay RL7 on the Control PC Board would de-energize. However, this is not the case. Since IC6 Pin 3 is HI which caused Transistor Q8 to saturate, RL7 will remain energized.

As can be seen from the foregone description, IC6 Pins 1, 2, and 3 form the Initiating Station ID. The only way the Initiating Station ID can be removed is by time-out of IC1 (approximately 20 seconds after release of the Inside/Patio Talk Button) or by pressing the End Call Button on the Master (See "Ending an Intercom Call" section for End Call).

INSIDE/PATIO INTERCOM RELEASED TO LISTEN AT MASTER (continued)

MASTER SPEAKER IS SWITCHED FROM AUDIO INPUT TO AUDIO OUTPUT

Release of the Inside/Patio Talk button causes the Master Speaker to be connected through Volume Control VR1 on the Master PC Board. VR1 will adjust the incoming Intercom Audio from all Remotes.

Audio feeding VR1 arrives at Connector F Pin 1. Connector F Pin 1 is fed from same connector on the Control PC Board. This is connected to the Common Terminal on Relay K7-1.

Since K7-1 is already energized, the Common Terminal is connected to the normally open contact. This contact is fed from Relay Common Terminal K6-2. Since K6-2 energized when the Inside/Patio Talk button was released, the Common Terminal now connects to the normally open contact.

The normally open contact is connected to Connector G Pin 1. Connector G Pin 1 is fed from same connector on the Power PC Board. (Pin 1 of IC1 which is the Audio Power Amplifier.) Audio from the Power PC Board is supplied from Audio Power Amplifier IC1 via Pin 1.

The Master Speaker will continue to receive Intercom Audio until the Inside/Patio Talk button on the Master PC Board is again depressed or the time-out timer IC1 on the Control PC Board reaches its 20 second time-out period.

REMOTE SPEAKERS ARE SWITCHED FROM AUDIO OUTPUT TO AUDIO INPUT

Audio to the Remote Speakers, as well as from the Remote Speakers, arrive at the Terminal Board via Remote Connector 1 through 9 Connectors, Pins 1 and 4.

Since the Remotes are now in the transmit (input) mode, Audio will be arriving at the Terminal Board. As an example, only Remote No. 1 will be used, although all 9 Remotes will react exactly the same.

Audio arrives at Remote Connector 1 Pin 1 and is fed through the common and normally closed contacts of Relay K1-1 to Connector R Pin 1. Connector R Pin 1 feeds same connector on Switch PC Board.

It is assumed for this example that Remote #1 has been selected into either the Radio/Intercom or the Intercom Only mode. If the Remote has been selected to the Radio/Intercom mode, Audio will pass through Switch S1-2 to Connector L Pin 3. This connector feeds the same connector on the Control PC Board.

After arriving at the Control PC Board, the signal is fed to the Common Terminal of Relay K6-1. Since K6-1 is energized, the Audio signal passes from the common terminal to the normally open terminal and then to Connector E2, Pin 2. E2 Pin 2 feeds the same connector on the Switch PC Board.

This feeds Connector O Pin 2. Connector O Pin 2 feeds same connector on Master PC Board. This feeds to the hot side of Intercom Transformer T1. The output of Transformer T1 is fed to the base of Transistor Q10 via Capacitor C20.

Diodes D10 and D11 on the output of T1 from a soft limiter which prevents overloading of Transistor Q10. The Collector of Q10 feeds the amplified Intercom signal via Capacitor C23 to Pin 7 of Connector P.

INTERCOM (Continued)

INSIDE/PATIO INTERCOM RELEASED TO LISTEN AT MASTER (continued)

Connector P Pin 7 feeds same connector on the Switch PC Board. This feeds the Intercom Volume Control VR1. VR1 is used to set the Intercom gain. The wiper of VR1 feeds Connector P Pin 8.

Connector P Pin 8 feeds same connector on Master PC Board. This feeds the Audio via Resistor R50 to Pin 1 of IC5. Since IC5 is in the shorted condition, Audio passes on to Pin 2 and then to Pin 2 of Connector U. Connector U Pin 2 feeds same connector on the Power PC Board. This feeds the input of IC1 which is Pin 5.

ENDING AN INTERCOM CALL

An intercom call can be ended in one of the two (2) following ways:

1. MANUAL END CALL
2. AUTOMATIC END CALL.

MANUAL END CALL

Depressing the End Call button on the Master PC Board causes S3-2 to short Connector F Pin 2 to ground (HI to LO). Connector F Pin 2 is connected to same connector on the Control PC Board.

This feeds Pin 12 of IC9 which causes Pin 14 of IC9 to switch from a HI to LO. This also causes Pin 10 of IC3 to switch from a HI to LO. A LO at Pin 4 of IC1 causes the timer to reset/cancel. This causes Pin 3 of IC1 to switch from a HI to LO. This transition causes the following three (3) items to occur:

1. A LO signal is fed through Diode D87 to the following two (2) points:
   a. **Transistor Q4 through Resistor R21.** This causes Q4 to open and de-energize Relay RL4. RL4's contacts (K4) removes the short between Pins 2 and 3 of Connector L. As a result, any Speaker selected in the Intercom Only mode becomes silent while any Speaker selected to the Radio Intercom mode returns to any Programmed Audio which has been selected.
   b. **Diode D89 Resistor R28 to the base of Q19.** This causes Q19 to open. The collector of Q19 is connected to Pin 3 of Connector K. Pin 3 of Connector K feeds same connector on Master PC Board. This feeds Resistor R87 to Pin 6 of IC5. This causes IC5 Pins 8 & 9 to switch from an open condition to a shorted condition allowing any program audio to pass on to the Power Audio Amplifier.
2. Pin 5 of IC3 on the Master PC Board. This causes Pin 4 of IC3 to switch from a HI to LO. This signal is fed through Resistor R10 and Capacitor C30 which form an RC time constant (approximately 7 milliseconds). The output of the RC time constant feeds Pin 13 of IC5. IC5 Pins 8, 9, 10, 11, 12 and 13 form an RS latch. This causes Pin 10 of IC5 to switch from HI to LO. Pin 10 of IC5 feeds the following points:
   a. **Pin 1 of IC3.** This causes Pin 3 of IC3 to change from HI to LO, resulting in Q3 to open which de-energizes Relay RL6. The open collector of Q3 feeds R18 to the base of Q2 causing Q2 to feed a LO signal to its collector. The collector of Q2 feeds a LO signal to the base of Transistor Q1 which causes it to open.

ENDING AN INTERCOM CALL (continued)

The LO signal on the emitter of Q1 is fed through Diode D88 to emitters of Transistors Q9 through Q18. The LO on the emitter of Q1 is also fed to Connector 10 Pin 7. Connector 10 Pin 7 feeds same connector on the Terminal PC Board. This feeds the signal to Connector 11 Pin 5 for use by the Expansion Module (IA-410).

The LO signal on the emitters of Transistors Q10 through Q18 causes the transistors to open which causes the collectors of said transistors to switch LO.

The LO signal on the collectors of Transistors Q10 through Q18 are connected to Connector M1 Pins 1 through 9. Connector M1 Pins 1 through 9 are connected to same connector on Terminal PC Board. This feeds Pin 5 of each of the 9 remote stations connected to said terminal Board. This causes the Relay in each Remote to de-energize. De-energizing the Remote Relays causes the Volume Control to be reconnected into the Audio Output path allowing for adjustment of any program audio present.

   b. **IC6 Pins 1 and 6; IC7 Pins 1, 6, 8, & 13; IC8 Pins 1, 6, 8, and 13.** This will cause Pin 3 of IC6 to switch from HI to LO. IC6 Pin 3 feeds a LO signal through R7 to Transistor Q8, which will cause Q8 to open, causing Relay K7 to de-energize.

   IC6 Pin 4; IC7 Pins 3, 4, 10 and 11; IC8 Pins 3, 4, 10 and 11 will remain LO.

   Since K7 is de-energized, the latch formed by IC6 Pins 1, 2, and 3 as well as Diode D38 is removed causing all initiating station ID's to go into the Standby mode.

   c. **IC6 Pins 8 and 9.** This will cause IC6 Pin 10 to switch from HI to LO. This signal feeds connector 10 Pin 5. Connector 10 Pin 5 feeds same connector on Terminal PC Board. This feeds Connector 11 Pin 3 which is used to drive the Expansion Board (IA-410).
3. Pin 13 of IC2 on the Control PC Board. This causes Pin 12 of IC2 to switch from LO to HI. Pin 12 of IC2 feeds Pin 12 of IC4. Since Pin 13 of IC4 is HI, this causes Pin 11 of IC4 to switch from HI to LO. The HI signal of Pin 11 of IC4 feeds Connector K Pin 4. Connector K Pin 4 feeds same Connector on Master PC Board. This feeds Transistor Q12 emitter and IC5 Pin 13.

   At the same time, Pin 12 of IC2 on the Control PC Board feeds Connector K Pin 2. Connector K Pin 2 feeds same connector on Master PC Board. This feeds Resistor R72 and the base of Transistor Q12. The LO on the emitter of Q12 in conjunction with the HI on the base of Q12, causes a LO signal to be generated on the Collector of Q12. This feeds Resistor of R73 and the base of Q13. This causes Transistor Q13 to open allowing any program audio from Transistor Q14 to pass to Pin 8 of IC5.

   The LO signal on Pin 13 of IC5 causes Pins 1 and 2 to change from a shorted condition to an open state. This prevents any Intercom signal from passing on to the power amplifier via Connector U Pin 2.

INTERCOM (Continued)

ENDING AN INTERCOM CALL (continued)

Pin 12 of IC2 on the Control PC Board also feeds Capacitor C9 and Resistor R11 to Diode D9. C9 and R11 cause a positive going pulse to occur at Diode D9. This pulse is fed to Connector K Pin 1. Connector K Pin 1 feeds same Connector on Master PC Board. This feeds Resistor R64 to the base of Transistor Q16 which causes a momentary muting of the Intercom signal. This prevents any switching noise caused by the End Call Button from being audible.

AUTOMATIC END CALL

Automatic End Call will occur in approximately 20 seconds assuming the Inside/Patio Talk button has not been depressed during that time frame.

Automatic End Call is caused by IC1 on the Control PC Board which is a resetable 20 second timer. As long as Pin 2 of IC1 is held LO or taken LO, at least once every 20 seconds, Pin 3 of IC1 will remain HI.

When Pin 2 of IC1 is taken LO, it causes Pins 6 and 7 of IC1 to be taken LO through Diode D6. This causes C11 to be held at or near ground.

If Pin 2 is not taken LO for approximately 20 seconds, Capacitor C11 is permitted to charge via Resistor R12. When C11 charges to a voltage of approximately 8 Volts DC, it causes IC1 to toggle which causes Pin 3 of IC1 to change from HI to LO.

Refer to the "Manual End Call" section for a description of occurances caused by IC1 Pin 3 changing from HI to LO.

INSIDE/PATIO INTERCOM INITIATED AT REMOTE NUMBER 1

Initiating a call from Remote No. 1 starts by pressing the Inside/Patio Talk button. Pressing the Inside/Patio Talk button causes the following functions to occur:

1. INSIDE/PATIO CONTROL SIGNAL IS GENERATED
2. INITIATING STATION ID IS GENERATED
3. REMOTE SPEAKER NO. 1 IS CONNECTED TO AUDIO INPUT OF INTERCOM TRANSFORMER
4. MASTER AND REMOTES 2 THROUGH 9 (INTERCOM AUDIO OUTPUT).

INSIDE/PATIO CONTROL SIGNAL IS GENERATED

Depressing the Inside/Patio Talk button on Remote #1 causes SW2 to short one end of Resistor R2 to ground. The other end of R2 is connected through Diode D3, SW4 to Remote Connector 1 Pin 3.

Remote Connector 1 Pin 3 is connected to same connector on the Terminal PC Board via the six-wire ribbon cable. This passes the control signal to Connector D/10/A Pin 3. Connctor D/10/A Pin 3 is connected to same connector on the Control PC Board. This connects to Pins 3, 5, and 12 of IC9.

The combination of Resistor R2 on the Remote #1 PC Board and Resistor R2 on the Control PC Board form a voltage divider which generates a 3.4 Volts DC signal which is applied to Pin 3 of IC9. This causes Pin 1 of IC9 to switch from HI to LO.

INSIDE/PATIO INTERCOM INITIATED AT REMOTE NUMBER 1 (continued)

This signal is fed to Pin 3 of IC2 which inverts the signal and causes Pin 4 to switch from LO to HI. Pin 4 of IC2 feeds Pin 5 of IC4 which causes Pin 4 of IC4 to switch from HI to LO. Pin 4 of IC4 feeds Resistor R15 and Capacitor C27 which form an RC time constant (approximately .1 second). The output of the time constant feeds Pin 8 of IC4, Pin 8 of IC5, and Pin 2 of IC3.

Pin 10 of IC4 switches from LO to HI. This signal feeds Pin 9 of IC2 as well as Capacitor C7. C7 and R14 form an RC time constant which feeds a positive going pulse through Diode D4 to Connector K Pin 1. Connector K Pin 1 feeds the same connector on the Master PC Board. This feeds the positive going pulse through Resistor R64 to the base of Transistor Q16 which causes a momentary muting of the Intrcom signal. This prevents any switching noise caused by the Inside/Patio Button from being audible.

Pin 8 of IC2 on the Control PC Board switches from HI to LO. This signal is fed to Pin 2 of IC1 and causes IC1 to reset.

The output of IC1 Pin 3 switches from LO to HI. This causes the following three (3) items to occur.

1. A HI signal is fed through Diode D87 to the following two (2) points:
   a. **Transistor Q4 through Resistor R21.** This causes Q4 to saturate and energize Relay RL4. RL4's contacts (K4) close shorting out Pins 2 and 3 of Connector L. This causes any speaker selected in the Intercom Only mode to be connected to the Audio Output Line.
   b. **Diode D89 Resistor R28 to the base of Q19.** This causes Q19 to saturate. The collector of Q19 is connected to Pin 3 of Connector K. Pin 3 of Connector K feeds same connector on the Master PC Board. This feeds Resistor R87 to Pin 6 of IC5. This causes IC5 Pins 8 and 9 to switch from a shorted condition to open, stopping any program audio from passing on to the Power Audio Amplifier.
2. Pin 3 of IC1 on the Control PC Board feeds Pin 5 of IC3. This causes Pin 4 of IC3 to switch from LO to HI. This signal is fed through Resistor R10 and Capacitor C30 which form an RC time constant (approximately 7 milliseconds). The output of the RC time constant feeds Pin 13 of IC5. IC5 Pins 8, 9, 10, 11, 12 and 13 form an RS latch. This causes Pin 10 of IC5 to swtich from LO to HI. Pin 10 of IC5 feeds the following points.
   a. **Pin 1 of IC3.** This does not cause Pin 3 of IC3 to change states. This is due to a LO signal on Pin 2 of IC3.
   b. **IC6 Pins 1 and 6; IC7 Pins 1, 6, 8 and 13; IC8 Pins 1, 6, 8 and 13.** This will cause Pin 4 of IC6 to switch from LO to HI. This is due to Relay K1-2 on the Terminal PC Board being energized (See "Initiating Station ID is Generated" section). IC6 Pin 3, IC7 Pins 3, 4, 10 and 11; IC8 Pins 3, 4, 10, and 11 will remain LO.
   c. **IC6 Pins 8 and 9.** This will cause IC6 Pin 10 to switch from LO to HI. This signal feeds Connector 10 Pin 5. Connector 10 Pin 5 feeds same connector on Terminal PC Board. This feeds Connector 11 Pin 3 which is used to drive the Expansion Board (IA-410).

INTERCOM (Continued)

INSIDE/PATIO INTERCOM INITIATED AT REMOTE NUMBER 1 (continued)

3. Pin 13 of IC2 on the Control PC Board. This causes Pin 12 of IC2 to switch from HI to LO. Pin 12 of IC2 feeds Pin 12 of IC4. Since Pin 13 of IC4 is HI, this causes Pin 11 of IC4 to switch from LO to HI. The HI signal from Pin 11 of IC4 feeds Connector K Pin 4. Connector K Pin 4 feeds same connector on Master PC Board. This feeds Transistor Q12 emitter and IC5 Pin 13.

At the same time, Pin 12 of IC2 on the Control PC Board feeds Connector K Pin 2. Connector K Pin 2 feeds same connector on the Master PC Board. This feeds Resistor R72 and the base of Transistor Q12. The HI on the emitter of Q12, in conjunction with the LO on the base of Q12, causes a HI signal to be generated on the Collector of Q12. This feeds Resistor R73 and the base of Q13. This causes Transistor Q13 to saturate, shorting any program audio from Transistor Q14 via Capacitor C41 to ground.

In addition to the program audio being muted, the HI signal on Pin 13 of IC5 causes Pins 1 and 2 to change from a open state to a shorted condition. This allows any Intercom signal which has been amplified via Intercom Transformer T1 and Pre-amp Transistor Q10 to be passed on to the Power Amp via Connector U Pin 2.

INITIATING STATION ID IS GENERATED

Depressing the Inside Patio/Talk button on the Remote #1 PC Board causes SW2 to short the cathod end of Diode D2 to ground. The anode end of D2 feeds Remote Connector 1 Pin 2. Remote Connector 1 Pin 2 feed same connector on the Terminal PC Board. This signal causes Relay RL1 to energize. This causes K1-1 and K1-2 contacts to move from the normally closed position to the normally open position.

Contacts K1-2 cause a HI signal to be generated at Connector B Pin 1. Connector B Pin 1 feeds same connector on Control PC Board.

This feeds Resistor R45 which causes a HI signal to be placed on Pin 5 of IC6. This causes Pin 4 of IC6 to go HI (Pin 6 of IC6 is already HI, see "Inside/Patio Control Signal is Generated" section). The HI at Pin 4 of IC6 is fed through Diode D48 back to Pin 5 of IC6. This causes Pin 4 to remain HI regardless of K1-2 contact positions as long as a HI signal remains on Pin 6 of IC6 (in otherwords, D48 causes IC6 Pin 4 to latch into a HI state). IC6 Pin 4 also feeds Diode D29 Resistor R56 to the base of Trasistor Q10.

REMOTE SPEAKER NO. 1 IS CONNECTED TO AUDIO INPUT OF INTERCOM TRANSFORMER

Intercom Audio on Remote Speaker No. 1 is fed through Switch SW2 to Remote Connector 1 Pin 1. Remote Connector 1 Pin 1 feeds same connector on Terminal PC Board. This feeds Relay Contacts K1-1.

Since K1-1 contacts have moved from its normally closed to normally open position, the Audio is passed to Connector D/10/A Pin 1. Connector D/10/A Pin 1 feeds same connector on Control PC Board.

This feeds Relay K6-2 common and normally closed contact to Connector E2 Pin 2. Connector E2 Pin 2 feeds same connector on Switch PC Board.

This feeds Connector O Pin 2. Connector O Pin 2 feeds same connector on Master PC Board. This feeds to the hot side of Intercom Transformer T1. The output of Transformer T1 is fed to the base of Transistor Q10 via Capacitor C20.

INSIDE/PATIO INTERCOM INITIATED AT REMOTE NUMBER 1 (continued)

Diodes D10 and D11 on the output of T1 form a soft limiter which prevents overloading of Transistor Q10. The Collector of Q10 feeds the amplified Intercom signal via Capacitor C23 to Pin 7 of Connector P.

Connector P Pin 7 feeds same connector on the Switch PC Board. This feeds the Intercom Volume Control VR1. VR1 is used to set the Intercom gain. The wiper of VR1 feeds Connector P Pin 8.

Connector P Pin 8 feeds same connector on Master PC Board. This feeds the Audio via Resistor R50 to Pin 1 of IC5. Since IC5 is in the shorted condition, Audio passes on to Pin 2 and then to Pin 2 of Connector U. Connector U Pin 2 feeds same connector on the Power PC Board. This feeds the input of IC1 which is Pin 5.

MASTER AND REMOTES 2 THROUGH 9 (INTERCOM AUDIO OUTPUT)

Since the Master Speaker and Remotes 2 through 9 were already connected to the Audio output stage, there is no need to do any additional switching. Any Intercom signal arriving at the Audio output will be sent to the Master and Remote Speakers 2 through 9.

After initiating a call at Remote No. 1 by pressing the Inside/Patio Talk button, releasing this button causes Remote No. 1 to switch into the Listen mode. This causes the following to occur:

1. INSIDE/PATIO CONTROL SIGNAL IS LOST
2. INITIATING STATION ID IS RETAINED
3. REMOTE NO. 1 IS SWITCHED FROM THE AUDIO INPUT TO THE AUDIO OUTPUT
4. MASTER SPEAKER AND REMOTES 2 THROUGH 9 SWITCH FROM AUDIO OUTPUT TO AUDIO INPUT.

INSIDE/PATIO INTERCOM RELEASED TO LISTEN AT REMOTE NO. 1

INSIDE/PATIO CONTROL SIGNAL IS LOST

Releasing the Inside Patio/Talk button on Remote #1 causes SW2 to open. This releases Resistor R2 from ground. The other end of R2 is connected through Diode D3, SW4 to Remote Connector 1 Pin 3.

Remote Connector 1 Pin 3 connects same connector on Terminal PC Board. This feeds Connector D/10/A Pin 3. Connector D/10/A Pin 3 feeds same connector on Control PC Board. This feeds Pins 3, 5, and 12 of IC9.

Since Resistor R2 on Remote #1 is now open, no voltage divider is formed, and the voltage changes from 3.4 Volts DC to 12 Volts DC. This causes Pin 1 of IC9 on the Control PC Board to switch from LO to HI.

This signal is fed to Pin 3 of IC2 which inverts the signal and causes Pin 4 to switch from HI to LO. Pin 4 of IC2 feeds Pin 5 of IC4 which causes Pin 4 of IC4 to switch from LO to HI. Pin 4 of IC4 feeds Resistor R15 and Capacitor C27 which form an RC time constant (approximately .1 second). The output of the time constant feeds Pin 8 of IC4, Pin 8 of IC5, and Pin 2 of IC3.

Pin 10 of IC4 switches from HI to LO. This signal feeds Pin 9 of IC2 as well as Capacitor C7. C7 feeds the negative going pulse to Diode D4. However, D4 is reversed biased and does not feed the negative going pulse on to Connector (21) K Pin 1.

INSIDE/PATIO INTERCOM INITIATED TO LISTEN AT REMOTE NUMBER 1 (continued)

Pin 8 of IC2 switches from LO to HI. This signal feeds Capacitor C8 and IC1 Pin 2. Capacitor C8 and Resistor R13 form and RC time constant which feeds a positive going pulse through Diode D5 to Connector K Pin 1. Connector K Pin 1 feeds same connector on the Master PC Board. This feeds the positive going pulse through Resistor R64 to the base of Transistor Q16 which causes a momentary muting of the Intercom signal. Ths prevents any switching noise caused by the release of the Inside/Patio Talk button from being audible.

The positive going pulse at Pin 2 of IC1 on the Control PC Board does not cause IC1 to reset. Instead, IC1 starts timing. This will cause Pin 3 of IC1 to remain HI for approximately 20 seconds after the Inside/Patio Talk button is released.

Since IC1 Pin 3 has not changed status, all devices connected to said pin will remain in their same state.

The exception to this is the output of IC3 Pin 3, which now switches from a LO to HI. This causes Q3's collector to saturate energizing Relay RL6 and Contacts K6-1 and K6-2. The saturated collector of Q3 feeds Resistor R18 to the base of Transistor Q2 causing Q2 to saturate and feeding a HI signal from the emitter to collector. K6-1 will be discussed in the "Master Speakers and Remotes 2 through 9 Switched from Audio Output to Audio Input" section. K6-2 will be discussed in the "Remote Speaker No. 1 is Switched from the Audio Input to the Audio Output" section.

The collector of Q2 feeds the HI signal to the base of Transistor Q1 causing it to saturate. The HI signal on the collector of Q1 is transferred to the emitter of Q1 to Diode D88 to emitters of Transistors Q9 through Q18.

The HI on the emitter of Q1 is also fed to Connector 10 Pin 7 on the Control PC Board. Connector 10 Pin 7 feeds same connector on the Terminal PC Board. This feeds the signal to Connector 11 Pin 5 for use by the Expansion Module (IA-410).

The HI signal on the emitters of Transistors Q9 and Q11 through Q18 on the Control PC Board cause these transistors to saturate allowing the HI signal to pass on to the collectors of said transistors.

The HI signal on the collector of Transistor Q9 is fed to Connector F Pin 4. Connector F Pin 4 feeds same connector on the Master PC Board. This signal feeds Relay RL1 causing contacts K1-1 and K1-2 to move from their normally closed to normally open positions.

K1-1 bypasses the Volume Control VR1 allowing for full Talkback Audio. K1-2 prevents the Master Station from causing any control functions (I/P Talk, Door Talk or End Call).

The HI signals on the collectors of Transistors Q11 through Q18 on the Control PC Board are connected to Connector M1 Pins 2 through 9. Connector M1 Pins 2 through 9 feed same connector on Terminal Board. This feeds Pin 5 of each Remote Speakers connected to said Terminal Board. This causes the Relay K1 in each remote to energize.

Energizing Relay K1a contacts causes Volume Control R3 to be bypassed in Remotes 2 through 9 allowing full Talkback Audio to occur from each Remote. Energizing Relay K1b prevents Remotes 2 through 9 from causing any control functions (I/P Talk, Door Talk or End Call).

INSIDE/PATIO INTERCOM INITIATED TO LISTEN AT REMOTE NUMBER 1 (continued)

Transistor Q10 on the Control PC Board does not saturate because the signal on the base is at a HI level. Since Q10 is not saturated, its collector will stay at a LO state. This prevents Relay K1 in Remote #1 from energizing allowing the Volume Control R3 on Remote #1 to control the Intercom level.

INITIATING STATION ID IS RETAINED

Releasing the Inside Patio/Talk button on Remote #1 causes SW2 to open at the cathod end of Diode D2. The anode end of D2 feeds Remote Connector 1 Pin 2. Remote Connector 1 Pin 2 feed same connector on the Terminal PC Board. This causes Relay RL1 to de-energize. This causes K1-1 and K1-2 Contacts to move from their normally open position to their normally closed position.

Contact K1-2 no longer generates a HI signal at Connector B Pin 1. Instead, Connector B Pin 1 is in an open state.

Connector B Pin 1 feeds same connector on the Control PC Board. Although a HI signal is not supplied through Resistor R45, a HI signal is still maintained at Pin 5 of IC6 via the latching loop caused by Pin 4 of IC6 and Diode D48.

As can be seen from the foregone description, IC6 Pins 4, 5 and 6 form the Initiating Station ID. The only way the Initiating Station ID can be removed is by time-out of IC1 (approximately 20 seconds after release of the Inside/Patio Talk button) or by pressing the End Call button at Remote #1 (See "Ending an Intercom Call" section for End Call).

REMOTE SPEAKER NO. 1 IS SWITCHED FROM THE AUDIO INPUT TO THE AUDIO OUTPUT

Releasing the Inside/Patio Talk button on Remote #1 causes the Speaker to be connected to Volume Control R3. R3 will adjust incoming Intercom Audio from the Master as well as Remotes 2 through 9.

Audio feeding Volume Control R3 arrives at Remote Connector 1 Pin 1. Audio feeding Connector 1 Pin 1 arrives from same connector on Terminal PC Board via 6 wire ribbon cable. This is fed from the normally closed contact of Relay K1-1. Relay K1 contacts remain energized because of drive supplied from IC6 Pin 4 on the Control PC Board via Connector M2 Pin 1 through Resistor R1 to the base of Transistor Q1 on the Terminal PC Board.

Audio feeds the common terminal of K1-1 from Connector D/10/A Pin 1 on the Terminal PC Board. Connector D/10/A Pin 1 is fed from same connector on the Control PC Board. Audio arrives from the Common Terminal of Relay K6-2. Since K6-2 is energized, Audio from Connector G Pin 1 will be fed through K6-2's normally open contacts to same Common Terminal.

MASTER SPEAKER & REMOTES 2 THROUGH 9 SWITCH FROM AUDIO OUTPUT TO AUDIO INPUT

Audio from Master Speaker is connector to Connector F Pin 1 on the Master PC Board. Connector F Pin 1 feeds same connector on the Control PC Board. This feeds the Common Terminal of Relay Contact K7-1. This feeds the normally closed contact of K7 to Connector L Pin 5. Connector L Pin 5 feeds same connector on the Switch PC Board. This feeds Switch S10-2.

INSIDE/PATIO INTERCOM INITIATED TO LISTEN AT REMOTE NUMBER 1 (continued)

Assuming the Master Speaker is selected in either the Radio/Intercom or Intercom Only positions, Audio will be connected to Connector L Pins 2 or 3.

Remotes 2 through 9 Audio arrives via Remote Connectors 2 through 9 Pin 1 on the Terminal PC Board. This is connected to Connector R Pins 2 through 9 via the normally closed contacts of Relays K2-1 through K9-1. Connector R Pins 2 through 9 are connected to same connector on Switch PC Board. This feeds switches S2-2 through S9-2.

Assuming Remotes are selected in either the Radio/ Intercom or Intercom Only positions, Audio will be connected to Connector L Pins 2 or 3. Connector L Pins 2 and 3 feeds same connector on Control PC Board.

Since Relay Contact K4 is energized, Audio arriving at Connector L Pins 2 and 3 will be combined and connected to the Common of Relay Contacts K6-1. Since K6-1 is energized, the Audio will be transferred to the normally open terminal to Connector E2 Pin 2. E2 Pin 2 feeds the same connector on the Switch PC Board.

This feeds Connector O Pin 2. Connector O Pin 2 feeds same connector on Master PC Board. This feeds to the hot side of Intercom Transformer T1. The output of Transformer T1 is fed to the base of Transistor Q10 via Capacitor C20.

Diodes D10 and D11 on the output of T1 form a soft limiter which prevents overloading of Transistor Q10. The Collector of Q10 feeds the amplified Intercom signal via Capacitor C23 to Pin 7 of Connector P.

Connector P Pin 7 feeds same connector on the Switch PC Board. This feeds the Intercom Volume Control VR1. VR1 is used to set the Intercom gain. The wiper of VR1 feeds Connector P Pin 8.

Connector P Pin 8 feeds same connector on Master PC Board. This feeds the Audio via Resistor R50 to Pin 1 of IC5. Since IC5 is in the shorted condition, Audio passes on to Pin 2 and then to Pin 2 of Connector U. Connector U Pin 2 feeds same connector on the Power PC Board. This feeds the input of IC1 which is Pin 5.

DOOR INTERCOM INITIATED AT MASTER

Initiating a call from the Master starts by pressing the Door Talk button. Pressing the Door Talk button causes the following functions to occur:

1. DOOR TALK CONTROL SIGNAL IS GENERATED
2. MASTER SPEAKER IS CONNECTED TO AUDIO INPUT OF INTERCOM TRANSFORMER
3. DOOR SPEAKER AND REMOTE SPEAKERS TO AUDIO OUTPUT.

DOOR CONTROL SIGNAL IS GENERATED

Depressing the Door Talk button on the Master PC Board causes S2-2 to short one end of Resistor R3 (1K ohm) to ground. The other end of R3 is connected through Diode D1, S3-1 to Connector F Pin 2 on the Master PC Board. Connector F Pin 2 feeds same connector on the Control PC Board. This feeds Pins 3, 5, and 12 of IC9.

DOOR INTERCOM INITIATED AT MASTER (continued)

The combination of Resistor R2 on the Control PC Board and R3 on the Master PC Board form a voltage divider which generates a 6.6 Volt DC signal which is applied to Pin 5 of IC9. This causes Pin 7 of IC9 to switch from HI to LO.

This signal is fed to Pin 1 of IC2 which inverts the signal and causes Pin 2 to switch from LO to HI. Pin 2 of IC2 feeds Pin 1 of IC4 which causes Pin 3 of IC4 to switch from HI to LO. Pin 3 of IC4 feeds Resistor R74 and Capacitor C5 which form an RC time constant (approximately .1 second). The output of the time constant feeds Pin 9 of IC4, Pin 6 of IC5, and Pin 12 of IC3.

Pin 10 of IC4 switches from LO to HI. This signal feeds Pin 9 of IC2 as well as Capacitor C7. C7 and R14 form an RC time constant which feeds a positive going pulse through Diode D4 to Connector K Pin 1. Connector K Pin 1 feeds the same connector on the Master PC Board. This feeds the positive going pulse through Resistor R64 to the base of Transistor Q16 which causes a momentary muting of the Intercom signal. This prevents any switching noise caused by the Door Talk button from being audible.

Pin 8 of IC2 on the Control PC Board switches from HI to LO. This signal is fed to Pin 2 of IC1 and causes IC1 to reset.

The output of IC1 Pin 3 switches from LO to HI. This causes the following two (2) items to occur.

1. A HI signal is fed through Diode D87 to the following three (3) points:
   a. **Transistor Q4 through Resistor R21.** This causes Q4 to saturate and energize Relay RL4. RL4's contacts (K4) close shorting out Pins 2 and 3 of Connector L. This causes any speaker selected in the Intercom Only mode to be connected to the Audio Output Line.
   b. **Diode D89 Resistor R28 to the base of Q19.** This causes Q19 to saturate. The collector of Q19 is connected to Pin 3 of Connector K. Pin 3 of Connector K feeds same connector on the Master PC Board. This feeds Resistor R87 to Pin 6 of IC5. This causes IC5 Pins 8 and 9 to switch from a shorted condition to open, stopping any program audio from passing on to the Power Audio Amplifier.
   c. **Pin 12 of IC6.** This causes Pin 11 of IC6 to switch from LO to HI. This signal is fed through Resistor R9 and Capacitor C29 which form and RC time constant (approximately 7 milliseconds). The output of the RC time constant feeds Pin 1 of IC5. IC5 Pins 1, 2, 3, 4, 5 and 6 form an RS latch. This causes Pin 4 of IC5 to switch from LO to HI and Pin 3 to switch from HI to LO. Pin 4 of IC5 feeds Pin 13 of IC3. This does not cause Pin 11 of IC3 to change state. This is due to a LO signal on Pin 12 of IC3. Pin 3 of IC5 feeds Resistor R23 to the base of Transistor Q6. This causes Q6 to saturate and energize Relay RL1 which controls the Door Speaker Audio.
2. Pin 3 of IC1 on the Control PC Board feeds Pin 13 of IC2. This causes Pin 12 of IC2 to switch from HI to LO. Pin 12 of IC2 feeds Pin 12 of IC4. Since Pin 13 of IC4 is HI, this causes Pin 11 of IC4 to switch from LO to HI. The HI signal from Pin 11 of IC4 feeds Connector K Pin 4. Connector K Pin 4 feeds same connector on Master PC Board. This feeds Transistor Q12 emitter and IC5 Pin 13.

INTERCOM (Continued)

DOOR INTERCOM INITIATED AT MASTER (continued)

At the same time, Pin 12 of IC2 on the Control PC Board feeds Connector K Pin 2. Connector K Pin 2 feeds same connector on Master PC Board. This feeds Resistor R72 and the base of Transitor Q12. The HI on the emitter of Q12, in conjunction with the LO on the base of Q12, causes a HI signal to be generated on the Collector of Q12. This feeds Resistor R73 and the base of Q13. This causes Transitor Q13 to saturate, shorting any program audio from Transistor Q14 via Capacitor C41 to ground.

In addition to the program audio being muted, the HI signal on Pin 13 of IC5 causes Pins 1 and 2 to change from a open state to a shorted condition. This allows any Intercom signal which has been amplified via Intercom Transformer T1 and Pre-amp Transistor Q10 to be passed on to the Power Amp via Connector U Pin 2.

MASTER SPEAKER IS CONNECTED TO AUDIO INPUT OF INTERCOM TRANSFORMER

Master Speaker Intercom Audio is fed through Relay Contacts K2 Switch S2-1 on the Master PC Board to Connector F Pin 1 (initiating Station's Audio always bypasses that Station's Volume Control to allow for full Talkback Audio). Connector F Pin 1 feeds same connector on the Control PC Board. This feeds the audio to K7-1 common contact.

Since K7-1 is energized, the Audio is then fed to the common of Contacts K6-2. K6-2 is not energized, therefore, the Audio flows through its normally closed contacts to Connector E2 Pin 2. Connector E2 Pin 2 feeds same connector on the Switch PC Board. This feeds Connector O Pin 2. Connector O Pin 2 feeds same connector on Master PC Board. This feeds the hot side of the Intercom Transformer T1. The output of Transformer T1 is fed to the base of Transistor Q10 via Capacitor C20.

Diodes D10 and D11 on the output of T1 form a soft limiter which prevents overloading of Transistor Q10. The Collector of Q10 feeds the amplified Intercom signal via Capacitor C23 to Pin 7 of Connector P.

Connector P Pin 7 feeds same connector on the Switch PC Board. This feeds the Intercom Volume Control VR1. VR1 is used to set the Intercom gain. The wiper of VR1 feeds Connector P Pin 8.

Connector P Pin 8 feeds same connector on Master PC Board. This feeds the Audio via Resistor R50 to Pin 1 of IC5. Since IC5 is in the shorted condition, Audio passes on to Pin 2 and then to Pin 2 of Connector U. Connector U Pin 2 feeds same connector on the Power PC Board. This feeds the input of IC1 which is Pin 5.

DOOR SPEAKER AND REMOTE SPEAKERS TO AUDIO OUTPUT

Since Relay RL1 on the Control PC Board is energized, Contracts K1, normally open and common, will be connected allowing any Audio from the Power Amplifier arriving at Connector G Pin 1 to pass to Connector D Pin 9.

Connector D Pin 9 is connected to same connector on the Terminal PC Board. This feeds the Door Speaker Screw Terminal on the Terminal PC Board.

Remote speakers were already connected to the Audio Output stage. There is no need to do any additional switching. Any Intercom signal arriving at the Audio Output IC will be sent to the Remote Speakers.

DOOR TALK RELEASED TO LISTEN AT MASTER AND ALL REMOTES

After initializing a call at the Master by pressing the Door Talk button, releasing this button causes the Master to switch into the Listen mode (remotes remain in Listen mode). This causes the following functions to occur:

1. DOOR TALK CONTROL SIGNAL IS LOST
2. MASTER SPEAKER IS SWITCHED FROM AUDIO INPUT TO AUDIO OUTPUT
3. DOOR SPEAKER IS SWITCHED FROM AUDIO OUTPUT TO AUDIO INPUT.

DOOR TALK CONTROL SIGNAL IS LOST

Releasing the Door Talk button on the Master PC Board causes S2-2 to open. This releases Resistor R3 from ground. The other end of R3 is connected through Diodes D1, S3-1 to Connector F Pin 2. Connector F Pin 2 is connected to the same connector on Control PC Board via 6 wire ribbon cable. This feeds Pins 3, 5, and 12 of IC9.

Since Resistor R3 on the Master PC Board is now open, no voltage divider is formed and the voltage on Connector F Pin 2 changes from 6.6 Volts DC to 12 Volts DC. This causes Pin 7 of IC9 on the Control PC Board to switch from LO to HI.

This signal is fed to Pin 1 of IC2 which inverts the signal and causes Pin 2 to switch from HI to LO. Pin 2 of IC2 feeds Pin 1 of IC4 which causes Pin 3 of IC4 to switch from LO to HI. Pin 3 of IC4 feeds Resistor R74 and Capacitor C5 which form an RC time constant (approximately .1 second). The output of the time constant feeds Pin 9 of IC4, Pins 6 of IC5, and Pin 12 of IC3.

Pin 10 of IC4 switches from HI to LO. This signal feeds Pin 9 of IC2 as well as Capacitor C7. C7 feeds the negative going pulse to Diode D4. However, D4 is reversed biased and does not feed the negative going pulse on to Connector K Pin 1.

Pin 8 of IC2 switches from LO to HI. This signal feeds Capacitor C8 and IC1 Pin 2. Capacitor C8 and Resistor R13 form an RC time constant which feeds a positive going pulse through Diode D5 to Connector K Pin 1. Connector K Pin 1 feeds same connector on Master PC Board. This feeds the positive going pulse through Resistor R64 to the base of Transistor Q16 which causes a momentary muting of the Intercom signal. This prevents any switching noise caused by the release of the Door Talk button from being audible.

The positive going pulse at Pin 2 of IC1 on the Control PC Board does not cause IC1 to reset. Instead, IC1 starts timing. This will cause Pin 3 of IC1 to remain HI for approximately 20 seconds after the Door Talk button is released.

Since IC1 Pin 3 has not changed status, all devices connected to said pin will remain in their same state.

The exception to this is the output of IC3 Pin 11, which now switches from a LO to HI. This causes Q5's collector to saturate energizing Relay RL2 and Contacts K2. (K2 will be discussed in the "Door Speaker is Switched From Audio Output to Audio Input" section).

In addition to energizing Relay RL2, the collector of Q5 removes drive from Transistor Q7. This causes the emitter of Q7 to switch from HI to LO removing any drive to Relay RL7 on the Control PC Board and Relays RL1 through RL9 on the Terminal PC Board.

INTERCOM (Continued)

DOOR TALK RELEASED TO LISTEN AT MASTER AND ALL REMOTES (continued)

MASTER SPEAKER IS SWITCHED FROM AUDIO INPUT TO AUDIO OUTPUT

Release of the Door Talk button causes the Master Speaker to be connected through Volume Control VR1 on the Master PC Board. VR1 will adjust the incoming Intercom Audio from the Door Speaker.

Audio feeding VR1 arrives at Connector F Pin 1. Connector F Pin 1 is fed from same connector on the Control PC Board. This is connected to the Common Terminal on Relay K7-1.

Since K7-1 is de-energized, the Common Terminal is connected to the normally closed contact. This contact is fed from Connector L Pin 5. Connector L Pin 5 is fed from same connector on Switch PC Board. Connector L Pin 5 is fed from Switch S10-2.

Switch S10-2 is fed from Connector L Pins 2 and 3, assuming the Master Speaker is selected in the Radio/ Intercom or Intercom Only position. Connector L Pins 2 and 3 are fed from same connector on Control PC Board.

Since Contacts K4 are closed, Audio at the Common Terminal of K6-1 will feed both Pins 2 and 3 of Connector L.

Relay K6-1 is de-energized so its common terminal is connected to its normally closed contact. Audio feeding K6-1 normally closed contact arrives from Connctor G Pin 1. This connector is supplied audio from the Power PC Board via Pin 1 of IC1 which is the Audio Power Amplifier.

The Master Speaker will continue to receive Door Speaker Audio until the Door Talk button on the Master PC Board is again depressed or the time-out timer IC1 on the Control PC Board has reached its 20 second time-out period.

DOOR SPEAKER IS SWITCHED FROM AUDIO OUTPUT TO AUDIO INPUT

Audio from the Door Speaker arrives at the Door Speaker Terminal on the Terminal PC Board. Audio from the Door Terminal is fed to Connector D Pin 9. Connector D Pin 9 feeds same connector on Control PC Board. This feeds the Common Terminal of Relay K1.

Since K1 is energized, the Audio from its Common Terminal is fed to its normally open contact. Audio from K1's normally open contact is fed to the common terminal of Relay K2. Since K2 is now energized via Transistor Q5 saturation, the Audio is passed from K2's common terminal to its normally open contact. K2's normally opened contact feeds the Door Audio to the common terminal of Relay K6-2.

Since K6-2 is de-energized, the common terminal is connected to the normally closed contact. Audio from K6-2's normally closed contact is fed to Connector E2 Pin 2. E2 Pin 2 feeds the same connector on the Switch PC Board.

This feeds Connector O Pin 2. Connector O Pin 2 feeds same connector on Master PC Board. This feeds to the hot side of Intercom Transformer T1. The output of Transformer T1 is fed to the base of Transistor Q10 via Capacitor C20.

Diodes D10 and D11 on the output of T1 form a soft limiter which prevents overloading of Transistor Q10. The Collector of Q10 feeds the amplified Intercom signal via Capacitor C23 to Pin 7 of Connector P.

DOOR TALK RELEASED TO LISTEN AT MASTER AND ALL REMOTES (continued)

Connector P Pin 7 feeds same connector on the Switch PC Board. This feeds the Intercom Volume Control VR1. VR1 is used to set the Intercom gain. The wiper of VR1 feeds Connector P Pin 8.

Connector P Pin 8 feeds same connector on Master PC Board. This feeds the Audio via Resistor R50 to Pin 1 of IC5. Since IC5 is in the shorted condition, Audio passes on to Pin 2 and then to Pin 2 of Connector U. Connector U Pin 2 feeds same connector on the Power PC Board. This feeds the input of IC1 which is Pin 5.

DOOR INTERCOM INITIATED AT REMOTE NO. 1

Initiating a call from Remote #1 starts by pressing the Door Talk button. Pressing the Door Talk button causes the following functions to occur:

1. DOOR TALK CONTROL SIGNAL IS GENERATED
2. REMOTE SPEAKER #1 IS CONNECTED TO AUDIO INPUT OF INTERCOM TRANSFORMER
3. DOOR SPEAKER, MASTER SPEAKER AND REMOTES 2 THROUGH 9 TO AUDIO OUTPUT.

DOOR CONTROL SIGNAL IS GENERATED

Depressing the Door Talk button on Remote #1 causes SW3 to short one end of Resistor R1 (1K ohm) to ground. The other end of R1 is connected through Diode D3, SW4 to Remote Connector 1 Pin 3. Remote Connector 1 Pin 3 is connected to same connector on the Terminal PC Board via the six-wire ribbon cable.

This passes the control signal to Connector D/10/A Pin 3. Connector D/10/A Pin 3 is connected to same connector on Control PC Board. This connects to Pins 3, 5, and 12 of IC9.

The combination of Resistor R3 on the Remote #1 PC Board and Resistor R2 on the Control PC Board form a voltage divider which generates a 6.6 Volt DC signal which is applied to Pin 5 of IC9. This causes Pin 7 of IC9 to switch from HI to LO.

This signal is fed to Pin 1 of IC2 which inverts the signal and causes Pin 2 to switch from LO to HI. Pin 2 of IC2 feeds Pin 1 of IC4 which causes Pin 3 of IC4 to switch from HI to LO. Pin 3 of IC4 feeds Resistor R74 and Capacitor C5 which form an RC time constant (approximately .1 second). The output of the time constant feeds Pin 9 of IC4, Pin 6 of IC5, and Pin 12 of IC3.

Pin 10 of IC4 switches from LO to HI. This signal feeds Pin 9 of IC2 as well as Capacitor C7. C7 and R14 form an RC time constant which feeds a positive going pulse through Diode D4 to Connector K Pin 1. Connector K Pin 1 feeds the same connector on the Master PC Board. This feeds the positive going pulse through Resistor R64 to the base of Transistor Q16 which causes a momentary muting of the Intercom signal. This prevents any switching noise caused by the Door Talk button from being audible.

Pin 8 of IC2 on the Control PC Board switches from HI to LO. This signal is fed to Pin 2 of IC1 and causes IC1 to reset.

The output of IC1 Pin 3 switches from LO to HI. This causes the following two (2) items to occur.

DOOR INTERCOM INITIATED AT REMOTE NUMBER 1 (continued)

1. A HI signal is fed through Diode D87 to the following three (3) points:
   a. **Transistor Q4 through Resistor R21.** This causes Q4 to saturate and energize Relay RL4. RL4's contacts (K4) close shorting out Pins 2 and 3 of Connector L. This causes any speaker selected in the Intercom Only mode to be connected to the Audio Output Line.
   b. **Diode D89 Resistor R28 to the base of Q19.** This causes Q19 to saturate. The collector of Q19 is connected to Pin 3 of Connector K. Pin 3 of Connector K feeds same connector on the Master PC Board. This feeds Resistor R87 to Pin 6 of IC5. This causes IC5 Pins 8 and 9 to switch from a shorted condition to open, stopping any program audio from passing on to the Power Audio Amplifier.
   c. **Pin 12 of IC6.** This causes Pin 11 of IC6 to switch from LO to HI. This signal is fed through Resistor R9 and Capacitor C29 which form an RC time constant (approximately 7 milliseconds). The output of the RC time constant feeds Pin 1 of IC5. IC5 Pins 1, 2, 3, 4, 5 and 6 form an RS latch. This causes Pin 4 of IC5 to switch from LO to HI and Pin 3 to switch from HI to LO. Pin 4 of IC5 feeds Pin 13 of IC3. This does not cause Pin 11 of IC3 to change state. This is due to a LO signal on Pin 12 of IC3. Pin 3 of IC5 feeds Resistor R23 to the base of Transistor Q6. This causes Q6 to saturate and energize Relay RL1 which controls the Door Speaker Audio.
2. Pin 3 of IC1 on the Control PC Board feeds Pin 13 of IC2. This causes Pin 12 of IC2 to switch from HI to LO. Pin 12 of IC2 feeds Pin 12 of IC4. Since Pin 13 of IC4 is HI, this causes Pin 11 of IC4 to switch from LO to HI. The HI signal from Pin 11 of IC4 feeds Connector K Pin 4. Connector K Pin 4 feeds same connector on Master PC Board. This feeds Transistor Q12 emitter and IC5 Pin 13.

At the same time, Pin 12 of IC2 on the Control PC Board feeds Connector K Pin 2. Connector K Pin 2 feeds same connector on Master PC Board. This feeds Resistor R72 and the base of Transistor Q12. The HI on the emitter of Q12, in conjunction with the LO on the base of Q12, causes a HI signal to be generated on the Collector of Q12. This feeds Resistor R73 and the base of Q13. This causes Transistor Q13 to saturate, shorting any program audio from Transistor Q14 via Capacitor C41 to ground.

In addition to the program audio being muted, the HI signal on Pin 13 of IC5 causes Pins 1 and 2 to change from a open state to a shorted condition. This allows any Intercom signal which has been amplified via Intercom Transformer T1 and Pre-amp Transistor Q10 to be passed on to the Power Amp via Connector U Pin 2.

REMOTE SPEAKER #1 IS CONNECTED TO AUDIO INPUT OF INTERCOM TRANSFORMER

Remote Speaker #1 Intercom is fed through Switch SW3 to Remote Connector 1 Pin 1. Remote Connector 1 Pin 1 is connected to same connector on the Terminal PC Board via the six-wire ribbon cable. This feeds Relay K1-1's common terminal.

DOOR INTERCOM INITIATED AT REMOTE NUMBER 1 (continued)

Since K1-1 is energized, its common terminal is connected to its normally open contact. Audio from the normally opened contacts of Relay K1-1 is passed to Connector D/10/A Pin 1. Connector D/10/A Pin 1 feeds same connector on Control PC Board. This feeds Relay K6-2 normally closed contacts to Connector E2 Pin 2. Connector E2 Pin 2 feeds the same connector on the Switch PC Board.

This feeds Connector O Pin 2. Connctor O Pin 2 feeds same connector on Master PC Board. This feeds to the hot side of Intercom Transformer T1. The output of Transformer T1 is fed to the base of Transistor Q10 via Capacitor C20.

Diodes D10 and D11 on the output on T1 form a soft limiter which prevents overloading of Transistor Q10. The Collector of Q10 feeds the amplified Intercom signal via Capacitor C23 to Pin 7 of Connector P.

Connector P Pin 7 feeds same connector on the Switch PC Board. This feeds the Intercom Volume Control VR1. VR1 is used to set the Intercom gain. The wiper of VR1 feeds Connector P Pin 8.

Connector P Pin 8 feeds same connector on Master PC Board. This feeds the Audio via Resistor R50 to Pin 1 of IC5. Since IC5 is in the shorted condition, Audio passes on to Pin 2 and then to Pin 2 of Connector U. Connector U Pin 2 feeds same connector on the Power PC Board. This feeds the input of IC1 which is Pin 5.

DOOR SPEAKER, MASTER SPEAKER AND REMOTES 2 THROUGH 9 TO AUDIO OUTPUT

Audio for the Door Speaker arrives at Connector G Pin 1 on the Control PC Board. This feeds normally closed contact of Relay K6-1. Since RL6 is not energized. the normally closed contact feeds the Common Terminal. The Common Terminal of K6-1 feeds the normally closed contact of RL2. Since K2 is not energized, the audio is fed to its Common Terminal. Common Terminal of K2 feeds the normally open contact of K1. Since Relay RL1 is energized, the Audio on the normally open contact of K1 will be passed to the Common Terminal. K1 Common Terminal feeds Connector D/10/A Pin 9. Connector D/10/A Pin 9 feeds same connector on Terminal PC Board. This feeds the Door Speaker Screw Terminal.

Master Speaker and Remotes 2 through 9 were already connected to the Audio Output stage. There is no need to do any additional switching. Any Intercom signal arriving at the Audio Output IC will be sent to the Master and Remote Speakers.

DOOR TALK RELEASED TO LISTEN AT MASTER AND REMOTES

After initializing a call at the Remote #1 by pressing the Door Talk button, releasing this button causes the Remote #1 to switch into the Listen mode (Remotes 2 through 9 and Master remain in Listen mode). This causes the following functions to occur:

1. DOOR TALK CONTROL SIGNAL IS LOST
2. REMOTE #1 IS SWITCHED FROM AUDIO INPUT TO AUDIO OUTPUT
3. DOOR SPEAKER IS SWITCHED FROM AUDIO OUTPUT TO AUDIO INPUT.

DOOR TALK RELEASED TO LISTEN AT MASTER AND REMOTES (continued)

DOOR TALK CONTROL SIGNAL IS LOST

Releasing the Door Talk button on Remote #1 causes SW3 to open. This releases Resistor R1 from ground. The other end of R1 is connected through Diodes D3, SW4 to Remote Connector 1 Pin 3. Remote Connector 1 Pin 3 is connected to same connector on the Terminal PC Board via the six-wire ribbon cable.

This passes the control signal to Connector D/10/A Pin 3. Connector D/10/A Pin 3 feeds same connector on the Control PC Board. This connects Pins 3, 5, and 12 of IC9 on the Control PC Board.

Since Resistor R1 on Remote #1 is now open, no voltage divider is formed and the voltage changes from 6.6 Volts DC to 12 Volts DC. This causes Pin 7 of IC9 on the Control PC Board to switch from LO to HI.

This signal is fed to Pin 1 of IC2 which inverts the signal and causes Pin 2 to switch from HI to LO. Pin 2 of IC2 feeds Pin 1 of IC4 which causes Pin 3 of IC4 to switch from LO to HI. Pin 3 of IC4 feeds Resistor R74 and Capacitor C5 which form an RC time constant (approximately .1 second). The output of the time constant feeds Pin 9 of IC4, Pins 6 of IC5, and Pin 12 of IC3.

Pin 10 of IC4 switches from HI to LO. This signal feeds Pin 9 of IC2 as well as Capacitor C7. C7 feeds the negative going pulse to Diode D4. However, D4 is reversed biased and does not feed the negative going pulse on to Connector K Pin 1.

Pin 8 of IC2 switches from LO to HI. This signal feeds Capacitor C8 and IC1 Pin 2. Capacitor C8 and Resistor R13 form an RC time constant which feeds a positive going pulse through Diode D5 to Connector K Pin 1. Connector K Pin 1 feeds same connector on the Master PC Board. This feeds the positive going pulse through Resistor R64 to the base of Transistor Q16 which causes a momentary muting of the Intercom signal. This prevents any switching noise caused by the release of the Door Talk button from being audible.

The positive going pulse at Pin 2 of IC1 on the Control PC Board does not cause IC1 to reset. Instead, IC1 starts timing. This will cause Pin 3 of IC1 to remain HI for approximately 20 seconds after the Door Talk button is released.

Since IC1 Pin 3 has not changd states, all devices connected to said pin will remain in their same state.

The exception to this is the output of IC3 Pin 11, which now switches from a LO to HI. This causes Q5's collector to saturate energizing Relay RL2 and Contacts K2. (K2 will be discussed in the "Door Speaker Switched from Audio Output to Audio Input" section).

In addition to energizing Relay RL2, the collector of Q5 removes drive from Transistor Q7. This causes the emitter of Q7 to switch from HI to LO removing any drive to Relay RL7 on the Control PC Board and Relays RL1 through RL9 on the Terminal PC Board.

DOOR TALK RELEASED TO LISTEN AT MASTER AND REMOTES (continued)

REMOTE #1 IS SWITCHED FROM AUDIO INPUT TO AUDIO OUTPUT

Releasing the Door Talk button on Remote #1 causes the Speaker to be connected to Volume Control R3. R3 will adjust incoming Door Audio. Audio feeding R3 arrives at Remote Connector 1 Pin 1. Remote Connector 1 Pin 1 is fed from the Terminal PC Board via a 6-wire ribbon cable. This is fed from K1-1 common terminal.

Since RL1 on the Terminal PC Board is no longer energized, the Common Terminal of K1-1 will be connected to its normally closed contact. Audio arrives at K1-1 via Connector R Pin 1. Connector R Pin 1 is fed from same connector on Switch PC Board.

Assuming Remote #1 is selected in the Radio/Intercom or Intercom Only position on Switch S1-2, Audio is received from Connector L Pins 2 and 3. Connector L Pins 2 and 3 is fed from same connector on the Control PC Board.

Since Contacts K4 are closed, Audio arriving from the Common Terminal of K6-1 will arrive at Connector L Pins 2 and 3. Relay K6-1 is de-energized so its common terminal is connected to its normally closed contact. Audio feeding the normally closed contact of K6-1 arrives from Connector G Pin 1. This connector is supplied Audio from the Power PC Board via Pin 1 of IC1 which is the Audio Power Amplifier.

Remote #1 will continue to receive Door Speaker Audio until the Door Talk button is again depressed or the time-out timer IC1 on the Control PC Board has reached its 20 second time-out period.

DOOR SPEAKER SWITCHED FROM AUDIO OUTPUT TO AUDIO INPUT

Audio from the Door Speaker arrives at the Door Speaker Terminal on the Terminal PC Board. Audio from the Door Terminal is fed to Connector D/10/A Pin 9. Connector D/10/A Pin 9 feeds same connector on the Control PC Board. This feeds the Common Terminal of Relay K1.

Since K1 is energized, the Audio from its Common Terminal is fed to its normally open contact. Audio from K1's normally open contact is fed to the Common Terminal of Relay K2. Since K2 is now energized via Transistor Q5 saturation. the Audio is passed from K2's Common Terminal to its normally open contact. K2's normally opened contact feeds the Door Audio to the Common Terminal of Relay K6-2.

Since K6-2 is de-energized, the Common Terminal is connected to the normally closed contact. Audio from K6-2's normally closed contact is fed to Connector E2 Pin 2. E2 Pin 2 feeds the same connector on the Switch PC Board. This feeds Connector O, Pin 2. Connector O Pin 2 feeds same connector on Master PC Board. This feeds the hot side of the Intercom Transformer T1. The output of Transformer T1 is fed to the base of Transistor Q10 via Capacitor C20.

Diodes D10 and D11 on the output of T1 form a soft limiter which prevents overloading of Transistor Q10. The Collector of Q10 feeds the amplified Intercom signal via Capacitor C23 to Pin 7 of Connector P.

Connector P Pin 7 feeds same connector on the Switch PC Board. This feeds the Intercom Volume Control VR1. VR1 is used to set the Intercom gain. The wiper of VR1 feeds Connector P Pin 8.

DOOR TALK RELEASED TO LISTEN AT MASTER AND REMOTES (continued)

Connector P Pin 8 feeds same connector on Master PC Board. This feeds the Audio via Resistor R50 to Pin 1 of IC5. Since IC5 is in the shorted condition, Audio passes on to Pin 2 and then to Pin 2 of Connector U. Connector U Pin 2 feeds same connector on the Power PC Board. This feeds the input of IC1 which is Pin 5.

SPEAKER SELECTED TO OFF AT MASTER

The Master Speaker, as well as any Remote Speaker (1 through 9), maybe selected to the Off position. When selected to the Off position, the following occurs:

Both Radio and Intercom Audio leaves IC1 Pin 1 on Power PC Board and arrives at Connector G Pin 1. Connector G Pin 1 feeds same connector on Control PC Board.

This feeds the normally closed contacts of K6-1 to Pins 2 and 3 of Connector L (assuming K4 is closed during Intercom operation). Connector L Pins 2 and 3 feed same connector on Switch PC Board. This feeds Switches S1-2 through S10-2, Contacts IP/R and IP.

As can be seen on the IM-4006 Schematic, any Remote Speaker or Master Speaker selected to the Off position would not be connected to the Audio output, and therefore would not receive any Intercom or Radio Audio.

SPEAKERS SELECTED TO MONITOR AT MASTER

The Master Speaker as well as any Remote Speaker (1 through 9) may be selected to the Monitor position. When a Speaker is selected to the Monitor position, the following occurs:

1. MONITOR CONTROL SIGNAL IS GENERATED (Master Speaker)
2. MONITORED SPEAKER IS CONNECTED TO THE AUDIO INPUT OF INTERCOM TRANSFORMER (i.e. Master Speaker)
3. SPEAKERS IN THE RADIO/INTERCOM POSITION WILL RECEIVE MONITORED AUDIO.

MONITOR CONTROL SIGNAL IS GENERATED (Master Speaker)

Monitor Control signal is initiated when Switch S10-1 on the Switch PC Board is placed in the Monitor position. This causes a HI signal to be placed on Connector L Pin 4. Connector L Pin 4 feeds same connector on Control PC Board. This feeds the following two (2) points:

1. **Anode of Diode D66 which feeds Connector F Pin 4.** This feeds same connector on the Master PC Board. Connector F Pin 4 feeds Relay RL1. Since RL1 is now energized, Relay K1-1 switches from its normally closed to its normally open position.
2. **Pin 5 of IC11.** IC11, as well as IC10, are nothing more than a four input/six input orgate. Since a HI signal has been placed on Pin 5 of IC11, its output (Pin 1) will also go HI. This output feeds the following two (2) points:
   a. **Pin 11 of IC2.** IC2 inverts a signal and causes Pin 10 to switch from HI to LO. Pin 10 of IC2 feeds Pin 13 of IC4. Since Pin 12 of IC4 is HI, Pin 11 of IC4 switches from LO to HI. Pin 11 of IC4 feeds Connector K Pin 4. Connector K Pin 4 feeds the same connector on the Master PC Board.

SPEAKERS SELECTED TO MONITOR AT MASTER (continued)

This HI signal is fed through Resistor R86 to the Control Pin (13) of IC5. This causes Pins 1 and 2 of IC5 to switch from an open state to a shorted condition. This allows any Monitored signal which has been amplified via Intercom Transformer T1 and Pre-amp Transistor Q10 to pass onto the Power Amp via Connector U Pin 2.

b. **Connector 10 Pin 6.** This feeds the same connector on the Terminal PC Board. After arriving at the Terminal PC Board, the signal is fed to Connector 11 Pin 4 where it is available for use by the Expansion Module (IA-410).

MONITORED SPEAKER IS CONNECTED TO THE AUDIO INPUT OF INTERCOM TRANSFORMER (i.e. Master Speaker)

Master Speaker Audio passes through K2, S1-1, S2-1, and K1 on the Master PC Board to Connector F Pin 1. (This allows for full Talkback Audio from the Master Speaker.) Connector F Pin 1 feeds same connector on Control PC Board. This feeds the common and normally closed contacts of Relay K7-1 to Connector L Pin 5.

Connector L Pin 5 feeds same connector on Switch PC Board. This feeds Switch S10-2. Since S10-2 is in the Monitor position, the Audio is fed through Resistor R10 to Connector O Pin 2. Connector O Pin 2 feeds same connector on Master PC Board. This feeds the hot side of the Intercom Transformer T1. The output of Transformer T1 is fed to the base of Transistor Q10 via Capacitor C20.

Diodes D10 and D11 on the output of T1 form a soft limiter which prevents overloading of Transistor Q10. The Collector of Q10 feeds the amplified Intercom signal via Capacitor C23 to Pin 7 of Connector P.

Connector P Pin 7 feeds same connector on the Switch PC Board. This feeds the Intercom Volume Control VR1. VR1 is used to set the Intercom gain. The wiper of VR1 feeds Connector P Pin 8.

Connector P Pin 8 feeds same connector on Master PC Board. This feeds the Audio via Resistor R50 to Pin 1 of IC5. Since IC5 is in the shorted condition, Audio passes on to Pin 2 and then to Pin 2 of Connector U. Connector U Pin 2 feeds same connector on the Power PC Board. This feeds the input of IC1 which is Pin 5.

SPEAKERS IN THE RADIO/INTERCOM POSITION WILL RECEIVE MONITORED AUDIO

All Speakers selected to the Radio/Intercom mode are already connected to the Audio Output stage. It is not necessary to do any additional switching.

Audio received by the Monitor Speaker will be heard along with any program Audio (radio, tape, or phono), assuming program Audio has been selected. With the absence of program Audio, only monitored audio will be heard.

Note: Speakers selected to Monitor will not receive program Audio, Intercom Audio, Chime Audio, or other Speakers selected to Monitor.

PROBLEM AREA: CASSETTE

PROBLEM	MEASURE/CHECK	CORRECT RESULT	REPLACE/REPAIR
Recorder won't record from any source. (Record Mode)	Unplug CN-15 plug from Cassette PC Board. Measure Pin 2 of plug.	Voltage should measure 21VDC.	Power Supply/Power Amp PC Board.
	Plug CN-15 into Cassette PC Board. Measure Pin 2 of CN-15.	Voltage should measure 21VDC.	Cassette PC Board.
	Base of Transistor Q2 on Cassette PC Board.	Voltage should measure 13VDC.	Cassette PC Board or R18, ZD1, C24, Q2, C23 Cassette motor.
	Emitter of Transistor Q2 on Cassette PC Board.	Voltage should measure 12.5VDC.	Cassette PC Board or Q2, C23/Cassette Motor.
	CN-14 Pin 1 on Cassette PC Board.	Voltage should measure 0VDC.	Switch SW3 (Cassette Motor Switch).
	Unplug CN-Q plug from Cassette PC Board. Measure Pin 5 of plug.	Voltage should measure 12VDC.	Master PC Board
	Plug CN-Q into Cassette PC Board. Measure Pin 5 of CN Q.	Voltage should measure 12VDC.	Cassette PC Board.
	Positive end of C22 on Cassette PC Board.	Voltage should measure 6VDC.	Cassette PC Board or IC2, C22, IC1/associate circitry.
	IC1 Pin 11 on Cassette PC Board.	Voltage should measure 6VDC.	Cassette PC Board or R17, Switch SW1, C19/IC1.
	CN-Q Pin 2 on Cassette PC Board (FM Radio playing).	Audio should measure approximately 40mV P-P. Note: Kill Record oscillator by grounding base of Q1.	Master PC Board.
	IC1 Pin 16 on Cassette PC Board.	Audio should measure approximately 600mV P-P. Note: Kill Record oscillator by grounding base of Q1.	Cassette PC Board, IC1 or associate circuitry.
	CN-12 Pin 3 on Cassette PC Board.	Audio should measure approximately 600mV P-P. Note: Kill record oscillator by grounding base of Q1.	Cassette PC Board or Components C11, R4, C6, L1, C5, SW1 or Record/Playback head.
	CN-12 Pin 4 on Cassette PC Board.	Audio should measure approximately 15mV P-P. Note: Kill Record oscillator by gounding base Q1.	Record/Playback head or R22.
Recorder won't Record from MIC. All other sources functioning. (Record Mode)	Connector V Pin 1 on Master PC Board.	Measure approximately 2.5VDC. Measure approximately 15mV P-P audio when talking 6" from MIC.	Microphone.
	IC5 Pin 4 on Master PC Board.	Measure approximately 15mV P-P audio when talking 6" from MIC.	Master PC Board or IC5, Q4, IC3/associate components on Master PC Board.
	See "Recorder won't record from any source".		
Recorder won't record from AM/FM, Phono or Ext. Tape - MIC input functioning. (Record Mode) (Select FM Radio as Recording Test Source)	Collector of Q3 on Master PC Board.	Audio should measure approximately 3V P-P.	Master PC Board or Q3/associate circuitry.
	IC4 Pin 5 on Master PC Board.	Voltage should measure 12 VDC.	Master PC Board or Q8. Q4, IC3/associate circuitry.
	IC4 Pin 4 on Master PC Board.	Audio should measure approximately 40mV P-P.	Master PC Board or IC4.
Recorder won't playback. (Playback mode)	Unplug CN-15 plug from Cassette PC Board. Measure Pin 2 of plug.	Voltage should measure 21VDC.	Power Supply/Power Amp PC Board.
	Plug CN-15 into Cassette PC Board. Measure Pin 2 of CN-15.	Voltage should measure 21VDC.	Cassette PC Board.

PROBLEM AREA: CASSETTE (continued)

PROBLEM	MEASURE/CHECK	CORRECT RESULT	REPLACE/REPAIR
Recorder won't playback. (Playback Mode) (Continued)	Base of Transistor Q2 on Cassette PC Board.	Voltage should measure 13VDC.	Cassette PC Board or R18, ZD1, C24, Q2, C23 Cassette Motor.
	Emitter of Transistor Q2 on Cassette PC Board.	Voltage should measure 12.5VDC.	Cassette PC Board or Q2, C23/Cassette Motor.
	CN-14 Pin 1 on Cassette PC Board.	Voltage should measure 0VDC.	Switch SW3.
	Unplug CN-Q plug from Cassette PC Board. Measure Pin 5 of plug.	Voltage should measure 12VDC.	Master PC Board.
	Plug CN-Q into Cassette PC Board. Measure Pin 5 of CN-Q.	Voltage should measure 12VDC.	Cassette PC Board.
	Positive end of C22 on Cassette PC Board.	Voltage should measure 6VDC.	Cassette PC Board or IC2, C22, IC2/associate circuitry.
	CN-12 Pin 3 to P contact on SW1-a with ohm meter.	Should measure 0 ohms.	Cassette PC Board or SW1.
	IC1 Pin 3 on Cassette PC Board.	Audio should measure approximately 200mV P-P.	Cassette PC Board or IC1/associate components.
	CN-Q Pin 4 on Cassette PC Board.	Audio should measure approximately 175mV P-P.	Cassette PC Board or C15, VR1/C13.
	IC4 Pin 12 on Master PC Board.	Voltage should measure 12 VDC.	Cassette PC Board or SW1/SW2.
	IC4 Pin 10 on Master PC Board.	Audio should measure approximately 175mV P-P.	Master PC Board or IC4.
Recorder won't mute Radio during playback. (Playback Mode)	Connector Q Pin 6 on Master PC Board.	Voltage should measure 12VDC.	Cassette PC Board or SW1/SW2.
	Collector of Q1 on Master PC Board.	Voltage should measure near 0VDC.	Master PC Board or R14/Q1.
	IC5 Pin 10 on Master PC Board while playing back blank tape.	Low level white noise only. No AM/FM, phono or ext. tape audio should be present.	Master PC Board or IC5.
Recorder won't erase and/or recording sound distorted. (Record Mode)	Record terminal on Switch SW1-c of Cassette PC Board.	Should measure 12VDC.	Cassette PC Board or SW1.
	Collector of Q1 on Cassette PC Board	Should measure approximately 6VDC.	Cassette PC Board or Q1, T1/associate Components.
	Connector CN-12 Pin 1 on Cassette PC Board.	Meaure 70V P-P @ 60KHz.	Cassette PC Board or Q1, T1, Erase Head/associate components.
MIC button won't mute Radio Audio at Master when Recording.	Connector S Pin 6 on Master PC Board.	Measure 12VDC when MIC button is pressed and held.	Function PC Board or MIC Switch.
	IC3 Pin 2 on Master PC Board.	Alternate between 12VDC and 0VDC when MIC button is pressed.	Master PC Board or IC3/associate components.
	Collector of Q4 on Master PC Board.	Alternate between 12VDC and 0VDC when MIC button is pressed.	Master PC Board or Q4/associate components.
	Collector of Q15 on Master PC Board.	Alternate between 12VDC and 0VDC when MIC button is pressed.	Master PC Board or Q15/associate components.
	K2 normally closed contacts on Master PC Board.	Alternate between open and closed when MIC button is pressed (measured with ohm meter).	Master PC Board or Relay RL2.

PROBLEM AREA: CASSETTE (continued)

PROBLEM	MEASURE/CHECK	CORRECT RESULT	REPLACE/REPAIR
Message LED won't flash.	Connector S Pin 7 on Master PC Board.	Measure 12VDC when message button is pressed and held.	Function PC Board or Message Switch.
	IC3 Pin 12 on Master PC Board.	Alternate between 12VDC and 0VDC when message button is pressed.	Master PC Board or IC3/associate components.
	IC2 Pin 3 on Master PC Board.	Alternate between 12VDC and 0VDC when message button is pressed.	Master PC Board or IC2, IC3, Q4/associate components.
	Emitter of Q11 on Master PC Board.	Alternate between 6VDC and 0VDC when Message button is pressed.	Master PC Board or Q11/associate components.
	Collector of Q6 on Master PC Board.	Alternate between 6VDC and 0VDC when Emitter of Q11 is at 6VDC.	Master PC Board or Q6, Q7/associate components.
	Emitter of Q5 on Master PC Board.	Alternate between 5VDC and 0VDC when Emitter of Q11 is at 6VDC.	Master PC Board or Q5/associate components.
	Connector S Pin 8 on Master PC Board.	Alternate between 2VDC and 0VDC when Emitter of Q11 is at 6VDC.	Master PC Board or R67/D94 or Function PC Board.

PROBLEM AREA: TUNER/DISPLAY

No Display.	Check 2 and 5 pin connectors on Display Transformer.	Both plugs must be plugged in.	
	Measure between Pins 4 and 5 on 5 Pin Display Transformer plug.	Voltage should measure 18VAC.	Display transformer.
	Connector X Pin 3 on Power PC Board.	Voltage should measure 26VDC.	Power PC Board or D3/associate components.
	Connector W on Power PC Board measure between Pins 1 and 2.	Voltage should measure 3.7VAC.	Display Transformer.
	Connector W Pin 1 on Power PC Board.	Voltage should measure 21VDC.	Power PC Board or T1, D4/associate components.
	Connector R Pin 2 on Master PC Board.	Voltage should measure 12VDC.	Master PC Board or IC6/associate components.
	Anode of D3 on PLL PC Board.	Voltage should measure 6VDC.	PLL PC Board or Display PC Board.
Display shows AM/FM frequency only-will not display clock.	Measure across frequency (SW1) switch on Display PC Board.	Switch should measure open when not pressed (measure with ohm meter. Power should be removed from Master during measurement.)	Display PC Board or Switch SW1. If SW1 is satisfactory, replace/ repair Display PC Board.
Display won't display AM/FM frequency when frequency button is pressed.	Measure across frequency (SW1) Switch on Display PC Board.	Switch should measure 0 ohms when pressed (measure with ohm meter. Power should be removed from Master during measurement.)	Display PC Board or Switch SW1. If SW1 is satisfactory, replace/ repair Display PC Board.
Can't set clock (minutes or hours).	Measure across "Time Set" (SW2) Switch on Display PC Board.	Switch should measure 0 ohms when pressed (measure with ohm meter. Power should be removed from Master during measurement.)	Display PC Board or SW2/associate components.

PROBLEM AREA: TUNER/DISPLAY (continued)

PROBLEM	MEASURE/CHECK	CORRECT RESULT	REPLACE/REPAIR
Can't set minutes on clock, hour setting ok.	Measure across "Minutes" (SW4) Switch on Display PC Board.	Switch should measure 0 ohms when pressed (measure with ohm meter. Power should be removed from Master during measurement).	Display PC Board or SW4/associate components.
Can't set minutes on clock, minute setting ok.	Measure across "Hour" (SW3) Switch on Display PC Board.	Switch should measure 0 ohms when pressed (measure with ohm meter. Power should be removed from Master during measurement).	Display PC Board or SW3/associate components.
No Radio Audio, however, frequency does tune and display.	Connector T Pin 4 for AM, Connector T Pin 5 for FM.	Voltage should measure apporximately 100mV P-P.	Tuner PC Board or IC1, IC2, Q1, Q2 Q3/associate components.
	IC2 Pin 8 on PLL PC Board.	Voltage should measure approximiately 0VDC.	PLL PC Board or IC2/associate components.
	Connector R Pin 3 on PLL PC Board.	Voltage should measure 12VDC.	PLL PC Board or Q4/associate components.
	Cathod of D33 on Master PC Board.	Voltage should measure near 0VDC.	Master PC Board or IC1/associate components.
No Radio Audio, however, frequency does tune and display.	Collector of Q22 on Master PC Board.	Voltage should measure 12VDC.	Master PC Board or Q22/associate components.
	IC4 Pin 2 for AM, IC4 Pin 8 for FM on Master PC Board.	Voltage should measure approximately 100mV P-P.	Master PC Board or IC4/associate components.
	IC1 Pin 11 on Master PC Board.	Voltage should measure approximately 100mV P-P.	Master PC Board or IC1/associate components.
Display locks up during AM/FM operation -can't scan up.	Connector T Pin 3 for AM, Connecotr T Pin 2 for FM on Master PC Board.	Voltage should measure 11VDC.	Master PC Board or Q17, Q18/associate components.
	Connector Y Pin 1 on Truner PC Board.	Voltage should measure .8VDC.	(If less than .6VDC) Turner PC Board or D7, D8, R20, IC2/associate components. (If more than 4VDC) PLL PC Board or Q3/associate components.
	Collector of Q3 on PLL PC Board.	Voltage should measure approximately 0VDC.	PLL PC Board or Q3/asociate components.
Radio dead-no background noise on AM or FM.	Connector S Pin 2 of AM, Connector S Pin 3 for FM on Master PC Board.	Voltage should measure 12VDC when AM or FM buttons are pressed (SW5/SW6).	Function PC Board or SW5, SW6/associate components.
		Voltage should remain @ 12VDC when AM or FM buttons are released (SW5/SW6).	Master PC Board or IC1/associate components.
	Connector T Pin 3 for AM, Connector T Pin 2 for FM on Master PC Board.	Voltage should measure 11VDC.	Master PC Board or Q17, Q18/associate components.
	See "No Radio Audio, however, frequency does tune and display" or "Display locks up during AM/FM operation-can't Scan up" section.		

PROBLEM AREA: TUNER/DISPLAY (continued)

PROBLEM	MEASURE/CHECK	CORRECT RESULT	REPLACE/REPAIR
No Search up.	SW6 on Display PC Board.	Switch should measure 0 ohms when pressed (measure with ohm meter. Power should be removed from Master during measurement).	Display PC Board or SW6/associate components. If SW6 is ok, replace PLL PC Board or IC2/associate components.
No search down.	SW7 on Display PC Board.	Switch should measure 0 ohms when pressed (measure with ohm meter. Power should be removed from Master during measurement).	Display PC Board or SW7/associate components. If SW7 is ok, replace PLL PC Board or IC2/associate components.
No memory set.	SW8 through SW13 on Memory PC Board.	Switch should measure 0 ohms when pressed (measure with ohm meter. Power should be removed from Master during measurement).	Memory PC Board or SW8-SW13/associate components. If SW8-SW13 are ok, replace PLL PC Board or IC2/associate components.
Loss of time and frequency memory during power failure.	Connector BATT Pin 2 at Battery.	Voltage should measure 5.5VDC	Replace Ni-Cad battery and check battery charging components D5, D6, D8, R4 and Q2 on Power PC Board.
	Connector X Pin 2 on Power PC Board-measure with AC Power removed from unit.	Voltage should measure 4.8VDC	Power PC Board or Q2/associate components.
Clock runs slow or fast.	IC2 Pin 6 on PLL PC Board (use 4.5MHz clock aligment procedure).	Frequency should measure 4.5MHz $\pm$15Hz	Adjust timer TC1 on PLL PC Board.

PROBLEM AREA: SYSTEM/SYSTEM AUDIO

Entire System dead.	Primary of 105T Power Transformer.	Voltage should measure 120VAC.	Check wiring between transformer and circuit breaker.
	Secondary of 105T Power Transformer.	Measure 16 to 20VAC.	105T Transformer.
	Wiring between Power Transformer and IM4006.	Be certain correct wires are connected to Power Transformer. Correct wires are labeled with red "low voltage only" label.	
	Positive (+) end of C5 on Power PC Board.	Voltage should measure approximately 20VDC.	Power PC Board or D1/associate components.
No AM Radio Audio. All other operations normal.	Connector T Pin 3 on Tuner PC Board.	Voltage should measure 7.6VDC.	Master PC Board or Q17, IC1/associate components.
	Connector T Pin 5 on Tuner PC Board.	AM Audio should approximately 200mV P-P.	See Tuner/Display section.
	IC4 Pin 2 on Master PC Board.	AM Audio should measure approximately 200mV P-P.	Master PC Board or IC4, IC1/associated components.
	IC1 Pin 11 on Master PC Board.	AM Audio should measure approximately 200mV P-P.	Master PC Board or IC1/associate components.
No FM Radio Audio. All other operations normal.	Connector T Pin 2 on Tuner PC Board.	Voltage should measure 8.0VDC.	Master PC Board or Q18, IC1/associate components.
	Connector T Pin 4 on Tuner PC Board.	AM Audio should measure approximately 200mV P-P.	See Tuner/Display section.

PROBLEM AREA: SYSTEM/SYSTEM AUDIO (continued)

PROBLEM	MEASURE/CHECK	CORRECT RESULT	REPLACE/REPAIR
No FM Radio Audio. All other operations normal. (continued).	Connector T Pin 4 on Tuner PC Board.	AM Audio Shouold Measure approximately 200mV P-P.	See Tuner/Display section.
	IC4 Pin 8 on Master PC Board.	AM Audio should measure approximately 200mV P-P.	Master PC Board on IC4, IC1/associate components.
	IC1 Pin 11 on Master PC Board.	AM Audio should measure approximately.	Master PC Board on IC1/associate components.
No Phono Audio. All other operations normal.	Connector N Pin 1 on Master PC Board.	Voltage should measure 100mV P-P to 1V P-P depending on record changer used.	Check cable between N Connector on Master PC Board and Control PC Board.
	IC1 Pin 8 on Master PC Board.	Measure approximately 30% of what was measured in above step.	Master PC Board or R6, Q20, IC1/associate components.
	IC1 Pin 11 on Master PC Board.	Measure same as on IC1 Pin 8 on Master PC Board.	Master PC Board or IC1/associate components.
No Ext Tape Audio. All other operations normal.	Connector N Pin 2 on Master PC Board.	Voltage should measure 100mV P-P to 1V P-P depending on recorder used.	Check cable between N Connector on Master PC Board and Control PC Board.
	IC1 Pin 9 on Master PC Board.	Measure approximately 30% of what was measured in previous step.	Master PC Board or R7, Q21, IC1/associate components.
	IC1 Pin 11 on Master PC Board.	Measures same as on IC1 Pin 9 on Master PC Board.	Master PC Board or IC1/associate components.
No Cassette Audio. All other operations normal.	Connector CN-15 Pin 2 on Cassette PC Board.	Voltage should measure approximately 20VDC.	Check Cable CN-15 between Cassette PC Board and Power PC Board.
	Connector CN-Q Pin 5 on Cassette PC Board.	Voltage should measure 11.9VDC.	Check Cable CN-Q between Cassette PC Board and Master PC Board
	Connector CN-Q Pin 4 on Cassette PC Board.	Cassette Audio should measure approximately 200mV P-P.	See Cassette section
	Connector CN-Q Pin 6 on Cassette PC Board.	Voltage should measure 11.9VDC.	See Cassette section.
	IC4 Pin 10 on Master PC Board.	Cassette Audio should measure approximately 200mV P-P.	Master PC Board or IC4/associate components.
Cassette won't record Program Audio. (Select FM Radio as recording test source.)	Collector of Transformer Q3 on Master PC Board.	Voltage should Measure approximately 3V P-P.	Master PC Board or Q3/associate components.
	IC4 Pin 3 on Master PC Board.	Voltage should measure approximately 40mV P-P.	Master PC Board or C18/R41.
	IC4 Pin 5 on Master PC Board.	Voltage should measure 11.8VDC.	Master PC Board or Q8, Q4, IC3/associate components.
	IC4 Pin 4 on Master PC Board.	Voltage should measure approximately 40mV P-P.	Master PC Board or IC4.
	Connector CN-Q Pin 2 on Cassette PC Board.	Voltage should measure approximately 40mV P-P.	Check CN-Q cable between Cassette PC Board and Master PC Board.

PROBLEM AREA: SYSTEM/SYSTEM AUDIO (continued)

PROBLEM	MEASURE/CHECK	CORRECT RESULT	REPLACE/REPAIR
No Record output Audio. All other operations normal (Select FM Radio as recording test source).	Connector of Transistor Q3 on Master PC Board.	Voltage should measure approximately 3V P-P.	Master PC Board or Q3/associate components.
	Connector 12 Pin 1 on Master PC Board.	Voltage should measure approximately 3V P-P.	Master PC Board or C19/R42.
Cassette Audio normal. All other Program Audio fails to operate. (Select FM Radio as program test audio.	IC5 11 on Master PC Board.	Voltage should measure approximately 200mV P-P.	See "No FM Radio Audio" in this problem area.
	IC5 Pin 12 on Master PC Board.	Voltage should measure 11.8VDC.	Master PC Board or Q1/associate components.
	IC5 Pin 10 on Master PC Board.	Voltage should measure approximately 200mV P-P.	Master PC Board or IC5.
All Program Audio dead. (Select FM Radio as program test audio).	Base of Transistor Q2 on Master PC Board.	Voltage should measure approximately 200mV P-P.	See "No FM Radio Audio" in this problem area.
	Collector of Transistor Q2 on Master PC Board.	Voltage should measure approximately 200mV P-P.	Master PC Board or Q2/associate components.
	Base of Transistor Q14 on Master PC Board.	Voltage should measure approximately 10mV P-P.	Master PC Board or VR2, Loudness Switch S11/associate components.
	IC5 Pin 8 on Master PC Board.	Voltage should measure approxmately 150mV P-P.	Master PC Board or Q14/associate components.
	IC5 Pin 6 on Master PC Board.	Voltage should measure 11.8VDC.	Check Connector K between Master PC Board and Control PC Board. Also check Q19/associate components on Control PC Board.
	IC5 Pin 9 on Master PC Board.	Voltage should measure approximately 150mV P-P.	Master PC Board or IC5.
	Connector U Pin 2 on Master PC Board.	Voltage should measure approximately 10mV P-P. NOTE: System Volume Control set at ½ max.	Check Connector P between Master PC Board and Switch PC xBoard. Also check System Volume Potentiometer VR2 on Switch PC Board.

PROBLEM AREA: FIELD TROUBLESHOOTING

Entire system dead.	Voltage into and out of Power transformer.	120V AC into transformer, 17 Volts out of transformer.	Wiring to transformer on Power transformer.
No Display, all other operation ok.	2 Pin and 5 Pin plug on Display Transformer.	Display transformer must be connected for Display to operate.	
Weak Program Audio on all Speakers.	System Volume Control at Master.	Control should be set at approximately 11 o'clock.	
	Unplug one Remote Speaker at a time at Terminal PC Board.	If Audio level rises greatly when one or more Remotes are unpluged, check wiring to Speaker, plugs at each end of Speaker cable, and Remote.	Wiring, speaker plugs or Remote Speaker.
No Program Audio on any Speaker.	System Volume control at Master	Control should be set at approximately 11 o'clock.	
	Radio Intercom/ Intercom Only/Off/ Monitor switches at Master	all speakers should be selected to Radio Intecom position to receive Program Audio.	

PROBLEM AREA: FIELD TROUBLESHOOTING (continued)

PROBLEM	MEASURE/CHECK	CORRECT RESULT	REPLACE/REPAIR
No Program Audio on any Speaker.	Unplug one remote speaker at a time at Terminal PC Board.	If Audio returns when one or more Remotes are unpluged, check wiring to Speaker, plugs at each end of speaker cable and Remote.	Wiring, speaker plugs or Remote Speaker.
No Program Audio at some Remote Speakers.	Radio Intercom/ Intercom Only/Off/ Monitor switches at Master.	Remote Speaker should be selected to Radio Intercom position to receive Program Audio.	
	Unplug defective Remote at PC Board, substitute a known good Remote and cable in place of defective Remote.	If known good Remote operates, check wiring, speaker plugs and Remote Speaker.	Wiring, Speaker plugs or Remote Speaker.
Program Audio distorted at all Speakers.	System Volume Control at Master.	Control should be set at approximately 11 o'clock.	
Weak Intercom.	Intercom Volume Control at Master.	Adjust Intercom Volume Control CW to increase Intercom Volume.	
No Intercom.	Intercom Volume Control at Master.	Adjust Intercom Volume Control CW to increase Intercom Volume.	
	Radio Intercom/ Intercom Only/Off/ Monitor switch at Master.	Remotes Speaker should be selected to Radio Intercom or Intercom Only to receive Intercom.	
	Unplug all Remote Speakers for Terminal PC Board at Master. Push and release I/P Talk button at Master.	Program Audio should stop for approximately 20 seconds the return. Isolate defective Speaker y pluging in one Remote Speaker at a time until Intercom fails to operate.	Wiring, Speaker Plugs or Remote Speaker.
No Intercom at some Remotes.	Radio Intercom/ Intercom Only/Off/ Monitor.	Remote Speakers should be selected to Radio Intercom Only to receive Intercom.	
	Unplug defective Remotes at Terminal PC Board. Substitute a known good Remote and cable in place of defective Remote.	If known good Speaker operates, check wiring, Speaker plugs and Remote Speaker.	
AM/FM Station weak.	Antenna Connector at Master.	Antenna must be fully extended. Repositioning antenna may improve reception.	
	AC ground in IR-103 rougn in.	Ground may be needed for proper AM reception.	
Weak Cassette Audio.	Record/Playback Head.	Clean Head with isopropyl alcohol or commercial tape head cleaner.	

PROBLEM AREA: INTERCOM CONTROL

No I/P Talk from Master (Push I/P Talk at Master during measurement).	Connector F Pin 2 on Master PC Board.	Voltage should measure 3.4VDC.	If voltage measures approximately 12 VDC, replace Master PC Board or R4, D1, S1-2/associate components. If voltage is 0VDC, replace Control PC Board or IC9/associate components.
	IC9 Pins 1 and 7 Control PC Board.	Signals should be LO.	Control PC Board or IC9/associate components.
	Refer to Intercom Timing Chart for specific signals onControl PC Board during "I/P Talk pushed at Master".	See Intercom Timing Chart.	

PROBLEM AREA: INTERCOM CONTROL (continued)

PROBLEM	MEASURE/CHECK	CORRECT RESULT	REPLACE/REPAIR
No I/P Talk from Master (Push I/P Talk at Master during measurement). (continued)	See System/System Audio for Intercom Audio troubleshooting.		
No I/P Listen at Master (Push and release I/P Talk at Master, repeat every 15 seconds to prevent automatic "End Call").	Connector F Pin 2 on Master PC Board.	Voltage should Measure 12VDC.	Control PC Board or IC9, R2, D1/associate components.
	IC9 Pins 1, 7 and 14 on Control ol PC Board or IC9/associate components. PC Board.	Signals should measure HI.	Control PC Board or IC9/associate components.
	Refer to Intercom Timing Chart for specific signals on Control PC Board during "I/P Talk released at Master".	See Intercom Timing Chart.	
	See System/System Audio for Intercom Audio troubleshooting.		
No Door Talk from Master (Push Door Talk at Master during measurement).	Connector F Pin 2 on Master PC Board.	Voltage should measure 6.6VDC.	If voltage measures approximately 12VDC, replace Master PC Board or R3, D1, S2-2/associate components. If voltage is 0VDC, replace Control PC Board.
	IC9 Pin 7 on Control PC Board.	Signals should measure LO.	Control PC Board or IC9/associate components.
	Refer to Intercom Timing Chart for specific signals on Control PC Board during "Door Talk pushed at Master".	See Intercom Timing Chart.	
	See System/System Audio for Intercom Audio troubleshooting.		
No Door Listen at Master (push and release Door Talk at Master, repeat every 15 seconds to prevent automatic "End Call".	Connector F Pin 2 on Master PC Board.	Voltage should measure 12VDC.	Control PC Board or IC9, R2, D1/associate components.
	IC9, Pins 1, 7, and 14 on Control PC Board.	Signals should measure HI.	Control PC Board or IC9/associate components.
	Refer to Intercom Timing chart for specific signals on Control PC Board during "Door Talk released at Master".	See Intercom Timing Chart.	
	See System/System audio for Intercom Audio troubleshooting.		
No End Call from Master (Push End Call at Master during measurement).	Connector F Pin 2 on Master PC Board.	Voltage should measure 0VDC.	Master PC Board or S3-2.
	IC9 Pins 1, 7, and 14 on Control PC Board.	Signals should measure LO.	Control PC Board or IC9/associate components.
	Refer to Intercom Timing Chart for specific signals on Control PC Board during "End Call pushed at Master".	See Intercom Timing Chart.	

PROBLEM AREA: INTERCOM CONTROL (continued)

PROBLEM	MEASURE/CHECK	CORRECT RESULT	REPLACE/REPAIR
No Monitor from Master Speaker (Master Speaker selected to Monitor positon).	Connector L Pin 4 on Switch PC Board.	Signal should measure HI.	Switch PC Board or S10-1.
	IC10 Pin 4 on Control PC Board.	Signal should measure HI.	Control PC Board or IC11.
	Refer to Intercom Timing Chart for specific signals on Control PC Board during "Master Speaker to Monitor".	See Intercom Timing Chart.	
	See System/System Audio for Intercom Audio troubleshooting.		
No I/P Talk from Remote Speaker #1 (Push I/P talk at Remote #1 during measurements).	Connector A Pin 3 on Control PC Board.	Voltage should measure 3.4VDC.	If voltage measures 12VDC check Remote Speaker, wiring between REM 1 on Terminal PC Board and Connector A on Control PC Board. If voltage is 0VDC, replace Control PC Board or IC9/associate components.
	IC9 Pins 1 and 7 on Control PC Board.	Signals should be LO.	Control PC Board or IC9/associate components.
	Refer to Intercom Timing Chart for specific signals on Control PC Board during "I/P Talk pushed at Remote #1".	See Intercom Timing Chart.	
	See System/System Audio for Intercom Audio troubleshooting.		
NO I/P Listen from Remote Speaker #1 (Push and release I/P Talk at Remote #1, repeat every 15 seconds to prevent automatic "End Call").	Connector A Pin 3 on Control PC Board.	Voltage should measure 12VDC.	Control PC Board or IC9, R2, D1/associate components.
	IC9 Pins 1, 7 and 14 on Control PC Board.	Signal should measure HI.	Control PC Board or IC9/associate Components.
	Refer to Intercom Timing Chart for specific signals on Control PC Board during "I/P Talk released at Remote #1".	See Intercom Timing Chart.	
	See System/System Audio for Intercom Audio troubleshooting.		
No Door Talk from Remote #1 (Push Door Talk at Remote #1 during measurement).	Connector A pin 3 on Control.	Voltage should measure 6.6VDC.	IF voltage measured 12VDC, check Remote Speaker, wiring between REM 1 onTerminal PC Board and Connector A on Control PC Board. If voltage is 0VDC, replace Control PC Board or IC9/associate components.
	IC9 Pin 7 on Control PC Board.	Signal should be LO.	Control PC Board or IC9/associate components.

PROBLEM AREA: INTERCOM CONTROL (continued)

PROBLEM	MEASURE/CHECK	CORRECT RESULT	REPLACE/REPAIR
No Door Talk from Remote #1 (Push Door Talk at Remote #1 during measurement.	Refer to Intercom TimingChart for specific signals on Control PC Board during "Door Talk pushed at Remote #1".	See Intercom Timing Chart.	
	See System/System. Audio for Intercom Audio troubleshooting.		
No door Listen at Remote #1 (Push and release Door Talk at Remote #1, repeat every 15 seconds to prevent automatic "End Call").	Connector A Pin 3 on Control PC Board.	Voltage should measure 12VDC.	Control PC Board or IC9, R2, D1/associate components.
	IC9 Pins 1, 7 and 14 on Control PC Board.	Signal should measure HI.	Control PC Board or IC9/asociate components.
	Refer to Intercom Timing Chart for specific signals on Control PC Board during "Door Talk released at Remote #1".		
	See System/System Audio for Intercom Audio trouble shooting.		
No End Call from Remote #1 (Push End Call at Remote #1 during measurements).	Connector A Pin 3 on Control PC Board.	Voltage should measure 0VDC.	Remote Speaker, wiring between Remote Connector 1 on Terminal PC Board and Connector A on Control PC Board.
	IC9 Pins 1, 7 and 14 on Control PC Board.	Signal should measure LO.	Control PC Board or IC9/associate components.
	Refer to "Intercom Timing Chart" for specific signals on Control PC Board during "End Call pushed at Remote #1".	See Intercom Timing Chart.	
No Monitor from Remote #1 (Remote #1 selected to Monitor position).	Connector C Pin 1 on Switch PC Board.	Signal should measure HI.	Switch PC Board on S1-1.
	IC10 Pin 4 on Control PC Board.	Signal should measure HI.	Control PC Board or IC10.
	Refer to "Intercom Timing Chart" for specific signals or Control PC Board during "Remote Speaker #1 to Monitor".	See Intercom Timing Chart.	
	See System/System Audio for Intercom Audio troubleshooting.		
		NOTE: Remotes 2 through 9 react the same as Remote #1 although they are not wired to the same points on the Terminal PC Board. Use schematic to trace points used on Remotes 2 through 9.	

CASSETTE P.C. BOARD VOLTAGE CHARTS

PIN	IC1	IC1
#	RECORD	PLAYBACK
1	0	0
2	0	0
3	2.1	2.1
4	.6	.6
5	0	0
6	.6	.6
7	.6	.6
8	.1	0
9	0	0
10	0	0
11	5.9	.1
12	5.9	5.8
13	5.9	5.9
14	5.5	.1
15	.4	.4
16	2.	2.5

PIN	IC2	IC2
	RECORD	PLAYBACK
INPUT	12.0	12.0
GND	0	0
OUT-PUT	6.0	6.0

TERMINAL	Q1	Q1	Q2	Q2
	RECORD	PLAYBACK	RECORD	PLAYBACK
C			5.5	0
B	14	14	.6	0
E	13.5	13.5	.2	0

CONNECTOR "CN-Q"		RECORD	PLAYBACK
PIN NO.	1	0	0
	2	0	0
	3	0	0
	4	0	0
	5	12.0	12.0
	6	0	12.0
CONNECTOR "CN15"		RECORD	PLAYBACK
PIN NO.	1	0	0
	2	19.0	19.0
CONNECTOR "CN14"		RECORD	PLAYBACK
PIN NO.	1	0	0
	2	13.5	13.5
	3	0	0
CONNECTOR "CN13"		RECORD	PLAYBACK
PIN NO.	1	0	12.0
	2	0	12.0
	3	0	0
	4	0	0
CONNECTOR "CN12"		RECORD	PLAYBACK
PIN NO.	1	0	0
	2	0	0
	3	0	0
	4	0	0
	5	0	0

CONTROL P.C. BOARD VOLTAGE CHARTS

IC #	+15V	GND
IC1	PIN 8	PIN 1
IC2	PIN 14	PIN 7
IC3	PIN 14	PIN 7
IC4	PIN 14	PIN 7
IC5	PIN 14	PIN 7
IC6	PIN 14	PIN 7
IC7	PIN 14	PIN 7
IC8	PIN 14	PIN 7
IC9	PIN 4	PIN 11

TERMINAL	Q20	Q21
C	13	3.9
B	8.6	.7
E	8.0	.1

TERMINAL	IC12
IN	20V
GND	0
OUT	15V

NOTE : Voltage/Logic Levels for Transistors Q1 through Q19 and IC's IC1 through IC11 are shown on Intercom Timing Chart.

	CONNECTOR														
PIN #	D/10/A	B	C	E2	F	G	H	I	J	K	L	M1	M2	N	12
1	NOTE 1	NOTE 3	NOTE 3	NOTE 1	NOTE 3	NOTE 6	NOTE 7	NOTE 8	NOTE 10	NOTE 3	15V	NOTE 3	NOTE 3	NOTE14	NOTE16
2	0	NOTE 3	NOTE 3	0	NOTE 3	0	0	x	0	NOTE3	NOTE11	NOTE 3	NOTE3	NOTE15	0
3	NOTE 2	NOTE 3	NOTE 3	0	NOTE 2	20V		0		NOTE 3	NOTE12	NOTE 3	NOTE 3	0	
4	NOTE 3	NOTE 3	NOTE 3		NOTE 5			NOTE 9		NOTE 3	NOTE13	NOTE 3	NOTE 3		
5	NOTE 3	NOTE 3	NOTE 3								NOTE 5	NOTE 3	NOTE 3		
6	NOTE 3	NOTE 3	NOTE 3									NOTE 3	NOTE 3		
7	NOTE 3	NOTE 3	NOTE 3									NOTE 3	NOTE 3		
8	0	NOTE 3	NOTE 3									NOTE 3	NOTE 3		
9	NOTE 4	NOTE 3	NOTE 3									NOTE 3	NOTE 3		
10		15V											NOTE 3		

NOTE 1: Intercom Audio.

NOTE 2: Control Signal
6.6VDC = Door Talk
3.4VDC = I/P Talk
0VDC = End Call
12VDC = Standby/Door Listen/I/P Talk

NOTE 3: See Intercom TimingChart and Theory of Operation.

NOTE 4: Door Speaker Input/Output Audio.

NOTE 5: Master Speaker Audio.

NOTE 6: Power Audio Output.

NOTE 7: Chime Audio to Power Audio Amplifier.

NOTE 8: Switches from 0VDC to 6VDC when IA28/IA29.
Chime Module is playing - used to mute program audio.

NOTE 9: Chime Audio from Chime Module (IA-28/IA-29).

NOTE 10: Chime Audio from Ext. Chime.

NOTE 11: Intercom only Audio.

NOTE 12: Program & Intercom Audio.

NOTE 13: Measure 0VDC except when master is in monitor.

NOTE 14: Phono Input Audio.

NOTE 15: Ext. Tape Input Audio.

NOTE 16: Record Output Audio.

MASTER P.C. BOARD VOLTAGE CHARTS (During AM Mode)

PIN#	IC1	IC2	IC3	IC4	IC5
1	0	LO	NC	AUDIO	AUDIO
2	11.9	HI	HI	AUDIO	AUDIO
3	0	LO	LO	AUDIO	AUDIO
4	0	x	LO	AUDIO	AUDIO
5	0	x	HI	HI	LO
6	0	x	LO	HI	HI
7	0	0	0	0	0
8	.4	HI	LO	AUDIO	AUDIO
9	.4	HI	LO	AUDIO	AUDIO
10	NC	LO	LO	AUDIO	AUDIO
11	0	HI	LO	AUDIO	AUDIO
12	0	LO	HI	LO	HI
13	NC	LO	NC	HI	LO
14	NC	11.9	11.9	11.9	11.9
15	0				
16	0				
17	0				
18	0				
19	0				
20	0				
21	0				
22	0				
23	11.8				
24	11.9				

PIN	IC6
INPUT	20V
GND	0
OUTPUT	12.0

x-Does Not Apply

TERMINAL	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q10	Q11	Q12	Q13	Q14	Q15
C	11.9	8.1	2.9	0	11.7	0	0	11.8	3.7	5.9	0	0	2.3	11.9
B	0	6.5	1.0	11.9	0	0	0	0	.8	0	9.8	0	.8	0
E	0	5.9	4	11.7	0	0	0	0	.2	0	0	0	.2	0

TERMINAL	Q16	Q17	Q18	Q20	Q21	Q22
C	0	11.2	11.2	.4	.4	11.4
B	0	8.2	0	0	0	0
E	0	7.6	0	0	0	0

	CONNECTOR											
PIN #	F	K	N	O	P	Q	R	S	T	U	V	12
1	AUDIO	0	AUDIO	0	0	0	LO	11.9	0	20	2.5	AUDIO
2	12.2	12.3	AUDIO	AUDIO	0	AUDIO	11.9	11.8	0	AUDIO	0	0
3	14.5	HI	0		0	AUDIO	HI	0	7.6	0		
4	0	LO			AUDIO	AUDIO	LO	0	AUDIO			
5					AUDIO	11.9		0	AUDIO			
6					0	0		0				
7					AUDIO			0				
8					AUDIO			0				
9					0			0				
10					3			11.9				

MASTER P.C. BOARD VOLTAGE CHARTS (During FM Mode)

PIN#	IC1	IC2	IC3	IC4	IC5
1	0	LO	NC	AUDIO	AUDIO
2	11.9	HI	HI	AUDIO	AUDIO
3	0	LO	LO	AUDIO	AUDIO
4	0	x	LO	AUDIO	AUDIO
5	0	x	HI	HI	LO
6	.4	x	LO	HI	HI
7	.4	0	0	0	0
8	0	LO	LO	AUDIO	AUDIO
9	0	LO	LO	AUDIO	AUDIO
10	NC	HI	LO	AUDIO	AUDIO
11	0	LO	LO	AUDIO	AUDIO
12	0	HI	HI	LO	HI
13	NC	HI	NC	HI	LO
14	NC	11.9	11.9	11.9	11.9
15	0				
16	0				
17	0				
18	0				
19	0				
20	0				
21	0				
22	11.8				
23	0				
24	11.9				

PIN	IC6
INPUT	20V
GND	0
OUTPUT	12.0

x-Does Not Apply

TERMINAL	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q10	Q11	Q12	Q13	Q14	Q15
C	11.9	8.1	2.9	0	11.7	0	0	11.8	3.7	5.9	0	0	2.3	11.9
B	0	6.5	1.0	11.9	0	0	0	0	.8	0	9.8	0	.8	0
E	0	5.9	.4	11.7	0	0	0	0	.2	0	0	0	.2	0

TERMINAL	Q16	Q17	Q18	Q20	Q21	Q22
C	0	11.2	11.2	.4	.4	11.4
B	0	0	8.6	0	0	0
E	0	0	8.0	0	0	0

	CONNECTOR											
PIN #	F	K	N	O	P	Q	R	S	T	U	V	12
1	AUDIO	0	AUDIO	0	0	0	LO	11.9	0	20	2.5	AUDIO
2	12.2	12.3	AUDIO	AUDIO	0	AUDIO	11.9	0	8.0	AUDIO	0	0
3	14.5	HI	0		0	AUDIO	HI	11.8	0	0		
4	0	LO			AUDIO	AUDIO	HI	0	AUDIO			
5					AUDIO	11.9		0	AUDIO			
6					0	0		0				
7					AUDIO			0				
8					AUDIO			0				
9					0			0				
10								11.9				

MASTER P.C. BOARD VOLTAGE CHARTS (Phono Mode)

PIN#	IC1	IC2	IC3	IC4	IC5
1	0	LO	NC	AUDIO	AUDIO
2	11.9	HI	HI	AUDIO	AUDIO
3	0	LO	LO	AUDIO	AUDIO
4	0	x	LO	AUDIO	AUDIO
5	0	x	HI	HI	LO
6	.4	x	LO	LO	HI
7	.4	0	0	0	0
8	0	x	LO	AUDIO	AUDIO
9	0	x	LO	AUDIO	AUDIO
10	NC	x	LO	AUDIO	AUDIO
11	0	x	LO	AUDIO	AUDIO
12	0	x	HI	LO	HI
13	NC	x	NC	LO	LO
14	NC	11.9	11.9	11.9	11.9
15	0				
16	0				
17	0				
18	0				
19	0				
20	0				
21	10.1				
22	0				
23	0				
24	11.8				

PIN	IC6
INPUT	20V
GND	0
OUTPUT	12.0

x-Does Not Apply

TERMINAL	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q10	Q11	Q12	Q13	Q14	Q15
C	11.9	8.1	2.9	0	11.7	0	0	11.8	3.7	5.9	0	0	2.3	11.9
B	0	6.5	1.0	11.9	0	0	0	0	.8	0	9.8	0	.8	0
E	0	5.9	.4	11.7	0	0	0	0	.2	0	0	0	.2	0

TERMINAL	Q16	Q17	Q18	Q20	Q21	Q22
C	0	11.7	11.7	0	0	0
B	0	0	0	0	.6	.6
E	0	0	0	0	0	0

x-Does Not Apply

	CONNECTOR											
PIN #	F	K	N	O	P	Q	R	S	T	U	V	12
1	AUDIO	0	AUDIO	0	0	0	HI	x	0	20	2.5	AUDIO
2	12.2	12.3	AUDIO	AUDIO	0	AUDIO	11.9	0	0	AUDIO	0	0
3	14.5	HI	0		0	AUDIO	5.9	0	0	0		
4	0	LO			AUDIO	AUDIO	x	10.1	AUDIO			
5					AUDIO	11.9		0	AUDIO			
6					0	0		0				
7					AUDIO			0				
8					AUDIO			0				
9					0			0				
10								11.9				

MASTER P.C. BOARD VOLTAGE CHARTS (During Ext. Tape Mode)

PIN#	IC1	IC2	IC3	IC4	IC5
1	0	LO	NC	AUDIO	AUDIO
2	11.9	HI	HI	AUDIO	AUDIO
3	0	LO	LO	AUDIO	AUDIO
4	0	x	LO	AUDIO	AUDIO
5	0	x	HI	HI	LO
6	.4	x	LO	LO	HI
7	.4	0	0	0	0
8	0	x	LO	AUDIO	AUDIO
9	0	x	LO	AUDIO	AUDIO
10	NC	x	LO	AUDIO	AUDIO
11	0	x	LO	AUDIO	AUDIO
12	0	x	HI	LO	HI
13	NC	x	NC	LO	LO
14	NC	11.9	11.9	11.9	11.9
15	0				
16	0				
17	0				
18	0				
19	0				
20	10.1				
21	0				
22	0				
23	0				
24	11.8				

PIN	IC6
INPUT	20V
GND	0
OUTPUT	12.0

x-Does Not Apply

TERMINAL	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q10	Q11	Q12	Q13	Q14	Q15
C	11.9	8.1	2.9	0	11.7	0	0	11.8	3.7	5.9	0	0	2.3	11.9
B	0	6.5	1.0	11.9	0	0	0	0	.8	0	9.8	0	.8	0
E	0	5.9	.4	11.7	0	0	0	0	.2	0	0	0	.2	0

TERMINAL	Q16	Q17	Q18	Q20	Q21	Q22
C	0	11.7	11.7	0	0	0
B	0	0	0	.6	0	.6
E	0	0	0	0	0	0

x-Does Not Apply

	CONNECTOR											
PIN #	F	K	N	O	P	Q	R	S	T	U	V	12
1	AUDIO	0	AUDIO	0	0	0	HI	x	0	20	2.5	AUDIO
2	12.2	12.3	AUDIO	AUDIO	0	AUDIO	11.9	0	0	AUDIO	0	0
3	14.5	HI	0		0	AUDIO	5.9	0	0	0		
4	0	LO			AUDIO	AUDIO	x	10.1	AUDIO			
5					AUDIO	11.9		0	AUDIO			
6					0	0		0				
7					AUDIO			0				
8					AUDIO			0				
9					0			0				
10								11.9				

MASTER P.C. BOARD VOLTAGE CHARTS (During Cassette Record Mode)

PIN#	IC1	IC2	IC3	IC4	IC5
1	0	LO	NC	AUDIO	AUDIO
2	11.9	HI	HI	AUDIO	AUDIO
3	x	LO	LO	AUDIO	AUDIO
4	0	x	LO	AUDIO	AUDIO
5	x	x	HI	HI	LO
6	x	x	LO	x	HI
7	x	0	0	0	0
8	x	x	LO	AUDIO	AUDIO
9	x	x	LO	AUDIO	AUDIO
10	NC	x	LO	AUDIO	AUDIO
11	x	x	LO	AUDIO	AUDIO
12	0	x	HI	LO	HI
13	x	x	NC	x	LO
14	NC	11.9	11.9	11.9	11.9
15	NC				
16	x				
17	x				
18	x				
19	x				
20	x				
21	x				
22	x				
23	x				
24	11.9				

PIN	IC6
INPUT	20V
GND	0
OUTPUT	12.0

x-Does Not Apply

TERMINAL	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q10	Q11	Q12	Q13	Q14	Q15
C	11.9	8.1	2.9	0	11.7	0	0	11.8	3.7	5.9	0	0	2.3	11.9
B	0	6.5	1.0	11.9	0	0	0	0	.8	0	9.8	0	.8	0
E	0	5.9	.4	11.7	0	0	0	0	.2	0	0	0	.2	0

TERMINAL	Q16	Q17	Q18	Q20	Q21	Q22
C	0	11.2	11.2	x	x	x
B	0	x	x	x	x	x
E	0	x	x	0	0	0

x-Does Not Apply

	CONNECTOR											
PIN #	F	K	N	O	P	Q	R	S	T	U	V	12
1	AUDIO	0	AUDIO	0	0	0	x	x	0	20	2.5	AUDIO
2	12.2	12.3	AUDIO	AUDIO	0	AUDIO	11.9	x	x	AUDIO	0	0
3	14.5	HI	0		0	AUDIO	x	x	x	0		
4	0	LO			AUDIO	AUDIO	x	x	AUDIO			
5					AUDIO	11.9		x	AUDIO			
6					0	0		0				
7					AUDIO			0				
8					AUDIO			0				
9					0			0				
10								11.9				

MASTER P.C. BOARD VOLTAGE CHARTS (During Cassette PlayBack Mode)

PIN#	IC1	IC2	IC3	IC4	IC5
1	0	LO	NC	AUDIO	AUDIO
2	11.9	HI	HI	AUDIO	AUDIO
3	x	LO	LO	AUDIO	AUDIO
4	0	x	LO	AUDIO	AUDIO
5	x	x	HI	HI	LO
6	x	x	LO	x	HI
7	x	0	0	0	0
8	x	x	LO	AUDIO	AUDIO
9	x	x	LO	AUDIO	AUDIO
10	NC	x	LO	AUDIO	AUDIO
11	x	x	LO	AUDIO	AUDIO
12	0	x	HI	HI	LO
13	x	x	NC	x	LO
14	NC	11.9	11.9	11.9	11.9
15	NC				
16	x				
17	x				
18	x				
19	x				
20	x				
21	x				
22	x				
23	x				
24	11.9				

PIN	IC6
INPUT	20V
GND	0
OUTPUT	12.0

x-Does Not Apply

TERMINAL	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q10	Q11	Q12	Q13	Q14	Q15
C	0	8.1	2.9	0	11.7	0	0	11.8	3.7	5.9	0	0	2.3	11.9
B	.6	6.5	1.0	11.9	0	0	0	0	.8	0	9.8	0	.8	0
E	0	5.9	.4	11.7	0	0	0	0	.2	0	0	0	.2	0

TERMINAL	Q16	Q17	Q18	Q20	Q21	Q22
C	0	11.2	11.2	x	x	x
B	0	x	x	x	x	x
E	0	x	x	0	0	0

x-Does Not Apply

	CONNECTOR											
PIN #	F	K	N	O	P	Q	R	S	T	U	V	12
1	AUDIO	0	AUDIO	0	0	0	x	x	0	20	2.5	AUDIO
2	12.2	12.3	AUDIO	AUDIO	0	AUDIO	11.9	x	x	AUDIO	0	0
3	14.5	HI	0		0	AUDIO	x	x	x	0		
4	0	LO			AUDIO	AUDIO	x	x	AUDIO			
5					AUDIO	11.9		x	AUDIO			
6					0	12.0		0				
7					AUDIO			0				
8					AUDIO			0				
9					0			0				
10								11.9				

MASTER P.C. BOARD VOLTAGE CHARTS (During Intercom Mode)

PIN#	IC1	IC2	IC3	IC4	IC5
1	0	LO	NC	AUDIO	AUDIO
2	11.9	HI	HI	AUDIO	AUDIO
3	x	LO	LO	AUDIO	AUDIO
4	0	x	LO	AUDIO	AUDIO
5	x	x	HI	HI	LO
6	x	x	LO	x	LO
7	x	0	0	0	0
8	x	x	LO	AUDIO	AUDIO
9	x	x	LO	AUDIO	AUDIO
10	NC	x	LO	AUDIO	AUDIO
11	x	x	LO	AUDIO	AUDIO
12	0	x	HI	x	x
13	x	x	NC	x	HI
14	NC	11.9	11.9	11.9	11.9
15	NC				
16	x				
17	x				
18	x				
19	x				
20	x				
21	x				
22	x				
23	x				
24	11.9				

PIN	IC6
INPUT	20V
GND	0
OUTPUT	12.0

x-Does Not Apply

TERMINAL	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q10	Q11	Q12	Q13	Q14	Q15
C	x	8.1	2.9	0	11.7	0	0	11.8	3.7	5.9	14.7	0	2.3	11.9
B	x	6.5	1.0	11.9	0	0	0	0	.8	0	14.1	.7	.8	0
E	0	5.9	.4	11.7	0	0	0	0	.2	0	14.7	0	.2	0

TERMINAL	Q16	Q17	Q18	Q20	Q21	Q22
C	0	11.2	11.2	x	x	x
B	NOTE 1	x	x	x	x	x
E	0	x	x	0	0	0

NOTE 1:
Voltage switches from 0VDC to .7VDC for approximately .5 second when I/P talk or Door talk is pressed or released.

x-Does Not Apply

	CONNECTOR											
PIN #	F	K	N	O	P	Q	R	S	T	U	V	12
1	AUDIO	NOTE 3	AUDIO	0	0	0	x	x	0	20	2.5	AUDIO
2	NOTE 1	7.1	AUDIO	AUDIO	0	AUDIO	11.9	x	x	AUDIO	0	0
3	NOTE 2	LO	0		0	AUDIO	x	x	x	0		
4	0	HI			AUDIO	AUDIO	x	x	AUDIO			
5					AUDIO	11.9		x	AUDIO			
6					0	x		0				
7					AUDIO			0				
8					AUDIO			0				
9					0			0				
10								11.9				

NOTE 1: Press I/P talk, voltage will measure 3.4VDC.
Press Door talk, voltage will measure 6.6VDC.
Press End Call, voltage will measure 0VDC.

NOTE 2: If Master is initiating station voltage will measure .6VDC
When I/P talk or Door talk is pressed.

NOTE 3: Voltage switches from 0VDC to 11.9VDC for approximately .5 seconds when I/P Talk or Door Talk is pressed or released

MASTER P.C. BOARD VOLTAGE CHARTS (During Monitor Mode)

PIN#	IC1	IC2	IC3	IC4	IC5
1	0	LO	NC	AUDIO	AUDIO
2	11.9	HI	HI	AUDIO	AUDIO
3	x	LO	LO	AUDIO	AUDIO
4	0	x	LO	AUDIO	AUDIO
5	x	x	HI	HI	LO
6	x	x	LO	x	HI
7	x	0	0	0	0
8	x	x	LO	AUDIO	AUDIO
9	x	x	LO	AUDIO	AUDIO
10	NC	x	LO	AUDIO	AUDIO
11	x	x	LO	AUDIO	AUDIO
12	0	x	HI	x	x
13	x	x	NC	x	HI
14	NC	11.9	11.9	11.9	11.9
15	NC				
16	x				
17	x				
18	x				
19	x				
20	x				
21	x				
22	x				
23	x				
24	11.9				

PIN	IC6
INPUT	20V
GND	0
OUTPUT	12.0

x-Does Not Apply

TERMINAL	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q10	Q11	Q12	Q13	Q14	Q15
C	x	8.1	2.9	0	11.7	0	0	11.8	3.7	5.9	0	0	2.3	11.9
B	x	6.5	1.0	11.9	0	0	0	0	.8	0	14.7	0	.8	0
E	0	5.9	.4	11.7	0	0	0	0	.2	0	14.8	0	.2	0

TERMINAL	Q16	Q17	Q18	Q20	Q21	Q22
C	0	11.2	11.2	x	x	x
B	0	x	x	x	x	x
E	0	x	x	0	0	0

x-Does Not Apply

	CONNECTOR											
PIN #	F	K	N	O	P	Q	R	S	T	U	V	12
1	AUDIO	0	AUDIO	0	0	0	x	x	0	20	2.5	AUDIO
2	12.2	12.3	AUDIO	AUDIO	0	AUDIO	11.9	x	x	AUDIO	0	0
3	14.5	HI	0		0	AUDIO	x	x	x	0		
4	U	HI			AUDIO	AUDIO	x	x	AUDIO			
5					AUDIO	11.9		x	AUDIO			
6					0	x		0				
7					AUDIO			0				
8					AUDIO			0				
9					0			0				
10								11.9				

MASTER P.C. BOARD VOLTAGE CHARTS (During Mic Mode)

PIN#	IC1	IC2	IC3	IC4	IC5
1	0	HI	NC	AUDIO	AUDIO
2	11.9	HI	LO	AUDIO	AUDIO
3	x	LO	NOTE 1	AUDIO	AUDIO
4	0	x	LO	AUDIO	AUDIO
5	x	x	LO	LO	HI
6	x	x	LO	x	HI
7	x	0	0	0	0
8	x	x	LO	AUDIO	AUDIO
9	x	x	HI	x	x
10	NC	x	LO	x	x
11	x	x	LO	x	x
12	0	x	HI	x	x
13	x	x	NC	x	
14	NC	11.9	11.9	11.9	11.9
15	NC				
16	x				
17	x				
18	x				
19	x				
20	x				
21	x				
22	x				
23	x				
24	11.9				

PIN	IC6
INPUT	20V
GND	0
OUTPUT	12.0

x-Does Not Apply

NOTE 1:
Goes high when MIC Button is pressed.

TERMINAL	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q10	Q11	Q12	Q13	Q14	Q15
C	x	8.1	2.9	10.5	11.2	0	0	0	3.7	5.9	0	0	2.3	.1
B	x	6.5	1.0	11.1	0	0	0	.6	.8	0	9.8	0	.8	.7
E	0	5.9	.4	11.2	1.7	0	0	0	.2	0	0	0	.2	0

TERMINAL	Q16	Q17	Q18	Q20	Q21	Q22
C	0	11.2	11.2	x	x	x
B	0	x	x	x	x	x
E	0	x	x	0	0	0

x-Does Not Apply

	CONNECTOR											
PIN #	F	K	N	O	P	Q	R	S	T	U	V	12
1	AUDIO	0	AUDIO	0	0	0	x	x	0	20	2.5	AUDIO
2	12.2	12.3	AUDIO	AUDIO	0	AUDIO	11.9	x	x	AUDIO	0	0
3	14.5	HI	0		0	AUDIO	x	x	x	0		
4	0	LO			AUDIO	AUDIO	x	x	AUDIO			
5					AUDIO	11.9		x	AUDIO			
6					0	x		NOTE 1				
7					AUDIO			2.0				
8					AUDIO			0				
9					0			0				
10								11.9				

NOTE 1: Goes high when MIC Button is pressed.

MASTER P.C. BOARD VOLTAGE CHARTS (During Message Mode)

PIN#	IC1	IC2	IC3	IC4	IC5
1	0	LO	NC	AUDIO	AUDIO
2	11.9	LO	HI	AUDIO	AUDIO
3	x	HI	LO	AUDIO	AUDIO
4	0	x	LO	AUDIO	AUDIO
5	x	x	HI	HI	LO
6	x	x	LO	x	x
7	x	0	0	0	0
8	x	x	LO	AUDIO	AUDIO
9	x	x	LO	AUDIO	AUDIO
10	NC	x	LO	AUDIO	AUDIO
11	x	x	NOTE 4	AUDIO	AUDIO
12	0	x	LO	x	x
13	x	x	NC	x	x
14	NC	11.9	11.9	11.9	11.9
15	NC				
16	x				
17	x				
18	x				
19	x				
20	x				
21	x				
22	x				
23	x				
24	11.9				

PIN	IC6
INPUT	20V
GND	0
OUTPUT	12.0

x-Does Not Apply

TERMINAL	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q10	Q11	Q12	Q13	Q14	Q15
C	x	8.1	2.9	0	11.2	NOTE 3	NOTE 3	11.8	3.7	4.5	0	0	2.3	11.8
B	x	6.5	1.0	0	NOTE 1	NOTE 1	NOTE 1	0	.8	5.1	9.8	0	.8	0
E	0	5.9	.4	11.2	NOTE 2	0	0	0	.2	4.5	0	0	.2	0

TERMINAL	Q16	Q17	Q18	Q20	Q21	Q22
C	0	11.2	11.2	x	x	x
B	0	x	x	x	x	x
E	0	x	x	0	0	0

NOTE 1: Switches from 0VDC to .6/4.5VDC @ 2 HZ rate.

NOTE 2: Switches from 0VDC to 11.2/4.5 VDC @ 2 HZ rate.

NOTE 3: Switches from 0VDC to 4.5VDC @ 2 HZ rate.

NOTE 4: Goes high when message button is pressed.

x-Does Not Apply

	CONNECTOR											
PIN #	F	K	N	O	P	Q	R	S	T	U	V	12
1	AUDIO	0	AUDIO	0	0	0	x	x	0	20	2.5	AUDIO
2	12.2	12.3	AUDIO	AUDIO	0	AUDIO	11.9	x	x	AUDIO	0	0
3	14.5	HI	0		0	AUDIO	x	x	x	0		
4	0	LO			AUDIO	AUDIO	x	x	AUDIO			
5					AUDIO	11.9		x	AUDIO			
6					0	x		0				
7					AUDIO			NOTE 1				
8					AUDIO			NOTE 2				
9					0			0				
10								11.9				

NOTE 1: Goes high when message button is pressed.

NOTE 2: Switches from 0VDC to 2.0VDC @ HZ rate.

TERMINAL P.C. BOARD VOLTAGE CHARTS

TERMINAL	Q1-Q9
C	NOTE 14
B	NOTE 15
E	0

	CONNECTOR								
PIN #	A1	B	D/10/A	DOOR	M1	M2	R	Rem 1-9	11
1	NOTE 1	NOTE 4	NOTE 1	NOTE 5	NOTE 6	NOTE 7	NOTE 8	NOTE 9	15V
2	0	NOTE 4	0	0	NOTE 6	NOTE 7	NOTE 8	NOTE 10	0
3	NOTE 2	NOTE 4	NOTE 2		NOTE 6	NOTE 7	NOTE 8	NOTE 2	NOTE 11
4	NOTE 3	NOTE 4	NOTE 3		NOTE 6	NOTE 7	NOTE 8	0	NOTE 12
5	5V	NOTE 4	NOTE 3		NOTE 6	NOTE 7	NOTE 8	NOTE 6	NOTE 13
6		NOTE 4	NOTE 3		NOTE 6	NOTE 7	NOTE 8	0	
7		NOTE 4	NOTE 3		NOTE 6	NOTE 7	NOTE 8		
8		NOTE 4	0		NOTE 6	NOTE 7	NOTE 8		
9			NOTE 5		NOTE 6	NOTE 7	NOTE 8		
10		15V							

NOTE 1: Intercom Audio input & output for initiating station only.

NOTE 2: Control line:
Standby Voltage = 12VDC
I/P talk = 3.4VDC
Door talk = 6.6VDC
End Call = 0VDC.

NOTE 3: Source Voltage for Relays RL1 through RL9- measures HI except during "Door listen mode".

NOTE 4 Initiating Station ID line
Standby voltage = 0VDC
Initiating Station voltage = 15VDC.

NOTE 5: Door Speaker Audio input & output line.

NOTE 6: Drive voltage for relays in Remote Speaker
Standby voltage = 0VDC
Intercom listen voltage = 13VDC.
Monitor voltage = 13VDC

NOTE 7: Drive voltage for transistors Q1 through Q9
Standby voltage = 0VDC
Initiating station voltage = 15VDC.

NOTE 8: Program Audio output, non-initiating Remote Audio input during intercom & monitor audio input during monitor.

NOTE 9: Remote Audio input and output line.

NOTE 10: Initiating Station ID Voltage
Standby voltage = 15VDC
Initiating Station ID voltage = .6VDC.

NOTE 11: Latch Drier Voltage on IH410 Module
Standby voltage = 0VDC
I/P voltage = 15VDC.

NOTE 12: Monitor voltage input from IA-410 Module
Standby voltage = 0VDC
During monitor voltage = 15VDC.

NOTE 13: Drive voltage for transistor on IA-410 Module (Terminal Pcr)
Standby voltage = 0VDC
Intercom listen voltage = 13VDC.

NOTE 14: Sink voltage for relays RL1 through RL9
Standby voltage = 15VDC
During Intercom (except door listen) voltage = .6VDC.

NOTE 15: Drive voltage for transistors Q1 through Q9
Standby voltage = 0VDC
Initiating Station voltage = .6VDC.

TUNER P.C. BOARD VOLTAGE CHARTS

PIN	IC1	IC2	IC2
#	FM	FM	AM
1	.8	2.2	1.1
2	1.5	2.2	1.1
3	4.0	2.2	1.1
4	0	0	0
5	0	6.2	6.0
6	4.0	6.2	6.0
7	0	5.8	4.6
8	3.5	4.8/.06 NOTE 1	3.6/.06 NOTE 2
9	4.0	3.7	3.6
10		2.9	3.0
11		1.0	1.0
12		1.5	1.8
13		1.2	0
14		1.1	0
15		2.2	1.1
16		1.5	1.5
17		0	7.5
18		.06	2.0
19		.06	2.0
20		3.8	3.6
21		3.8	3.6
22		2.0	1.5

TERMINAL	Q1	Q1		TERMINAL	Q3
	FM	FM			FM
D	4.0	6.0		C	7.4
G	O	0		B	1.5
S	.13	0		E	.8

CONNECTOR "T"			AM	FM
PIN NO.	1		0	0
	2		0	8.0
	3		7.6	0
	4		0	0
	5		0	0
CONNECTOR "Y"			AM	FM
PIN NO.	1		.8	.8
	2		1.3/8.0 NOTE 3	3.0/8.6 NOTE 4
	3		0	0
	4		0	0
	5		1.5	2.0

NOTE 1: Voltage Measures 4.8 Volts when receiving a weak signal.
Voltage Measures .06 Volts when receiving a strong signal.

NOTE 2: Voltage Measures 3.6 Volts when receiving a weak signal.
Voltage Measures .06 Volts when receiving a strong signal.

NOTE 3 Voltage Measures Approximately 1.3 Volts @ 530 KHZ.
Voltage Measures Approximately 8.0 Volts @ 1620 KHZ.

NOTE 4: Voltage Measures Approximately 3.0 Volts @ 87.9 MHZ.
Voltage Measures Approximately 8.6 Volts @ 107.9 MHZ.

PLL P.C. BOARD VOLTAGE CHARTS

PIN #	IC1	IC2
1	4.2	NOTE 1
2	3.4	NC
3	0	4.7
4	0	NOTE 2
5	2.9	2.4
6	.3	2.2
7	NC	NOTE 3
8	NC	NOTE 4
9		NOTE 5
10		NOTE 5
11		NOTE 5
12		NOTE 5
13		NOTE 5
14		5.0
15		NOTE 6
16		NOTE 6
17		NOTE 6
18		NOTE 6
19		NOTE 6
20		NOTE 6
21		NOTE 6
22		NOTE 7
23		NOTE 7
24		NOTE 7
25		NOTE 7
26		NOTE 8
27		0
28		NOTE 8

TERMINAL	IC3
INPUT	11.9
GND	0
OUTPUT	6

TERMINAL	Q1	Q2	Q3	Q4	Q5	Q6	Q7
C	NOTE 11	NOTE 11	NOTE 3	NOTE 14	NOTE 15	NOTE 14	NOTE 9
B	.6	1.0	NOTE 12	NOTE 13	NOTE 15	NOTE 18	NOTE 10
E	0	.6	0	0	NOTE 16	NOTE 19	5.0

TERMINAL	Q8	Q9	Q10	Q11
C	NOTE 9	NOTE 9	NOTE 9	NOTE 9
B	NOTE 10	NOTE 10	NOTE 10	NOTE 10
E	5.0	5.0	5.0	5.0

	CONNECTOR			
PIN #	R	X	Y	Z1
1	NOTE 20	0	.8	NOTE 7
2	11.9	5.0	NOTE 11	NOTE 7
3	NOTE 14	-26	0	NOTE 7
4	NOTE 21		0	NOTE 7
5			NOTE	NOTE 6
6				NOTE 6
7				NOTE 6
8				NOTE 6
9				NOTE 6
10				NOTE 6
11				NOTE 6
12				NOTE 9
13				NOTE 9
14				NOTE 9
15				NOTE 9
16				NOTE 9

NOTE 1: 100 microseconds positive goes pulses superimposed on 1 Volt DC during AM operation.
40 microseconds positive goes pulse superimposed on 1 Volt DC during FM operation.

NOTE 2: Data used to control division ratio of prescaler IC1, avg. DC Voltage approximately .3 volts.

NOTE 3: Pluses from 0 to +5 Volts DC when Tuner detects a strong station.

NOTE 4: Switches from 0 to +5 Volts during station or band change.

NOTE 5: Switches from +5 Volts to 0 Volts for .8ms @ at 5ms rate, used to drive Transistors Q7-Q11 (Display drivers).

NOTE 6: Switch from +5 Volts to —22 Volts DC for approximately 1.5ms @ a 3ms rate, used to drive fluorescent display and matrix switches (SW1-SW13 on Display/Memory PC Board).

NOTE 7: Measures near 0 Volts DC, used as inputs from matrix switches (SW1-SW13 on Display/Memory PC Board).

NOTE 8: Local oscillator inputs. Pin 28 is for AM, Pin 26 for FM after passing through prescaler IC1.

NOTE 9: Switches from +5 Volts to -22 Volts DC for .8ms @ a 5ms rate, used to sink current from Display.

NOTE 10: Switches from +5 Volts to +4.4 Volts DC for .8ms @ a 5ms rate.

NOTE 11: Measures 1.8 to 8 Volts during AM operation and 3 to 8.5 Volts during FM operation, used to tune AM/FM Tuner.

NOTE 12: Pulses from .6 Volts to 0 Volts DC when Tuner detects a strong station.

NOTE 13: Switches from 0 to .6 Volts during station or band change.

NOTE 14: Switches from 11.6 to 0 Volts during station or band change.

NOTE 15: Switches from 0 to 5 Volts during AM/FM operation. Measures 9 Volts during Phono/Tape mode. (used to select Frequency/Clock Display).

NOTE 16: Switches from 0 to 4.5 Volts during AM/FM operation. Switches from 0 to 5 Volts during Phono/Tape mode (used to select Frequency/Clock Display).

NOTE 17: Switches from 0 to 5 Volts during AM operation. Measures 0 Volts during FM operation.

NOTE 18: Switches from 0 to 5 Volts during AM operation. Measures 11 Volts during FM operation. (Selects AM/FM).

NOTE 19: Switches from 0 to 5 Volts during AM operation. Switches from 2 to 5 Volts during FM operation. (Selects AM/FM).

NOTE 20: Switches from 0 to .9 Volts during AM/FM operation. Measures 9 Volts during Phono/Tape (used to select Frequency/Clock Display).

NOTE 21: Measures 0 Volts during AM operation. Measures 11.9 Volts during FM operation (used to select AM/FM operation).

POWER P.C. BOARD VOLTAGE CHARTS

PIN #	IC1
1	7.5
2	0
3	1.2
4	3.8
5	3.7
6	3.7
7	1.5
8	8.4
9	13.4
10	15.0

TERMINAL	Q1	Q2
C	20	5.0
B	15.5	
E	15.0	5.6

	CONNECTOR								
PIN #	G	H	U	W	X	BATT	CN15	TRANS	Z4
1	AUDIO	AUDIO	20	NOTE 1	0	0	0	NOTE 2	NOTE 4
2	0	0	AUDIO	NOTE 1	5.0	5.6	20	NOTE 2	NOTE 4
3	20		0		–26			NOTE 2	
4								NOTE 3	
5								NOTE 3	

NOTE 1: Measures 3.7 Volts AC across pins 1 & 2, measures -21 Volts between pin 1 to ground or pin 2 to ground.

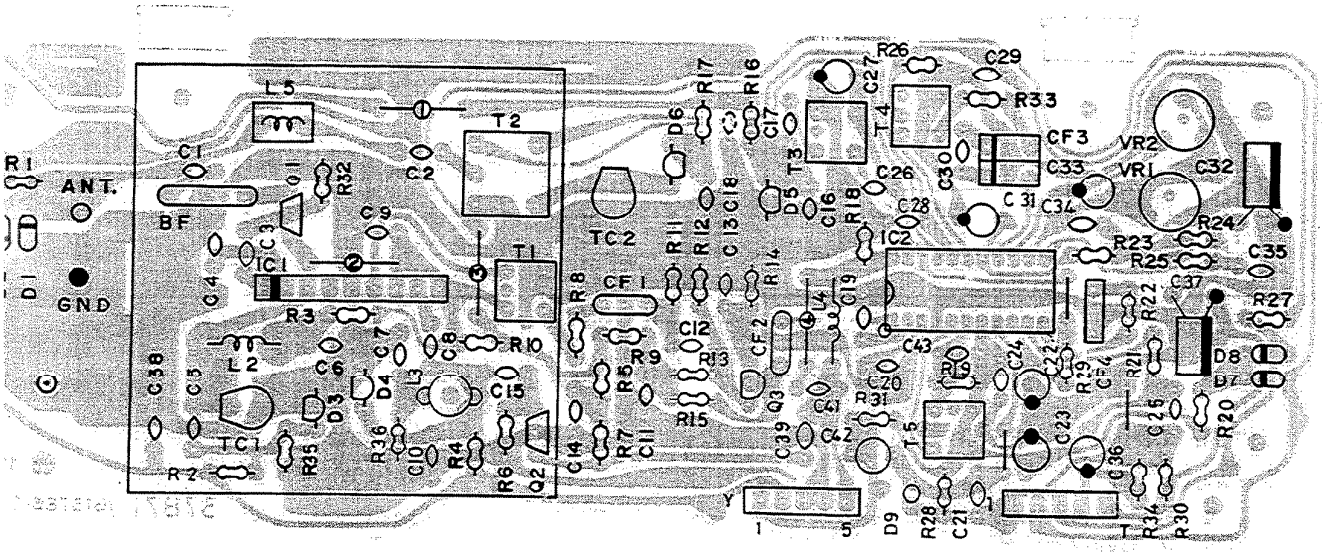
NOTE 2: Measures 3.7 Volts AC across pin 1 & 3 of transformer T1 with pin 2 being center top, measures -21 Volts between pins 1, 2 or 3 to ground.

NOTE 3: Measures 19 Volts AC across pin 4 & 5 of transformer T1.

NOTE 4: Measures 17 Volts AC across Z4 cable.

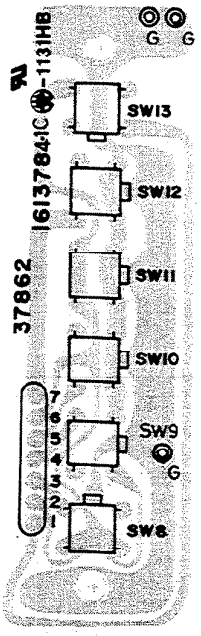
NOTE 5: Measures 9.7 Volts during AC operation, measures 5.0 volts when AC power fails, this causes Q2 to saturate and supply power to retain frequency memory and clock time.

P.C. BOARDS



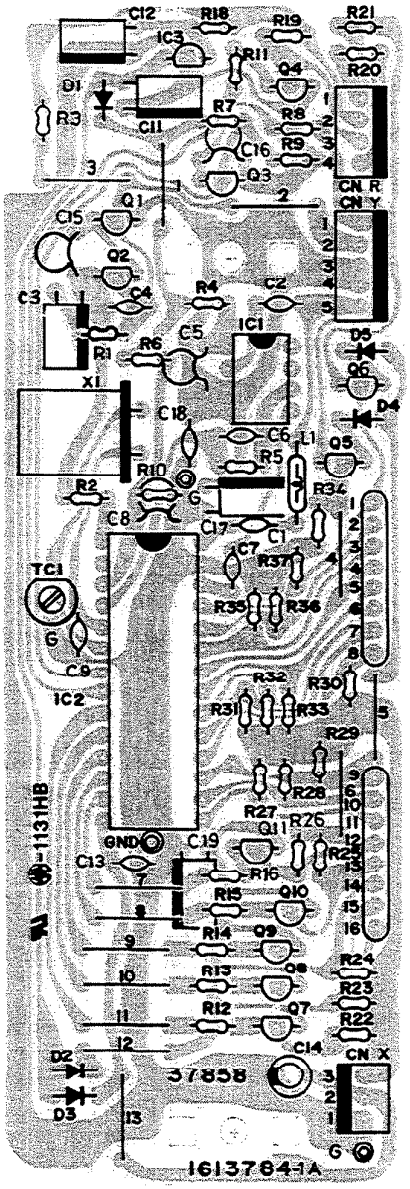
37871

Memory Board



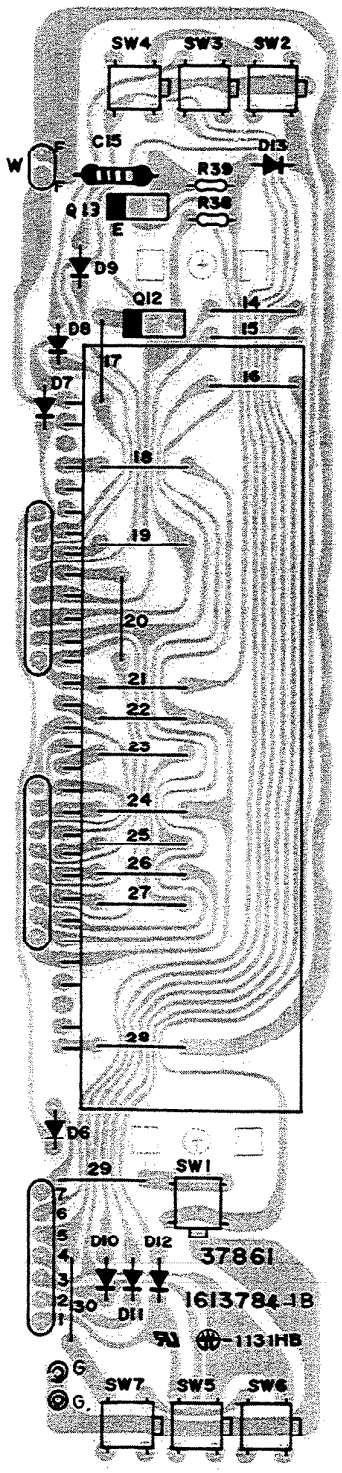
37862

Radio/Clock (Phase Lock Loop) Board



37858

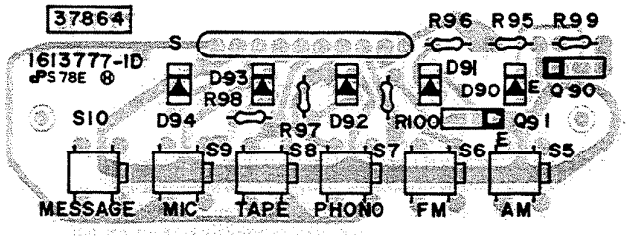
Display Board



37861

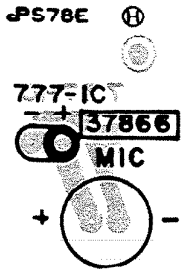
P.C. BOARDS

Function Board



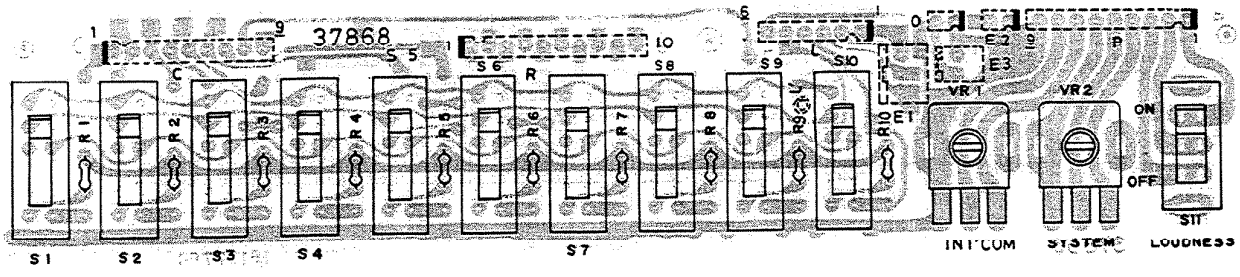
37864

Microphone Board

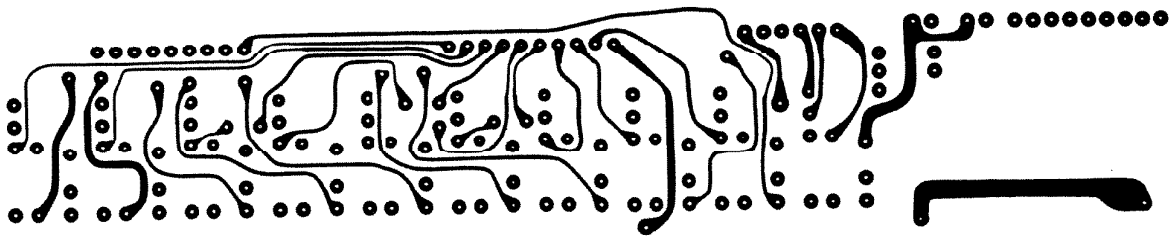


37866

Switch Board

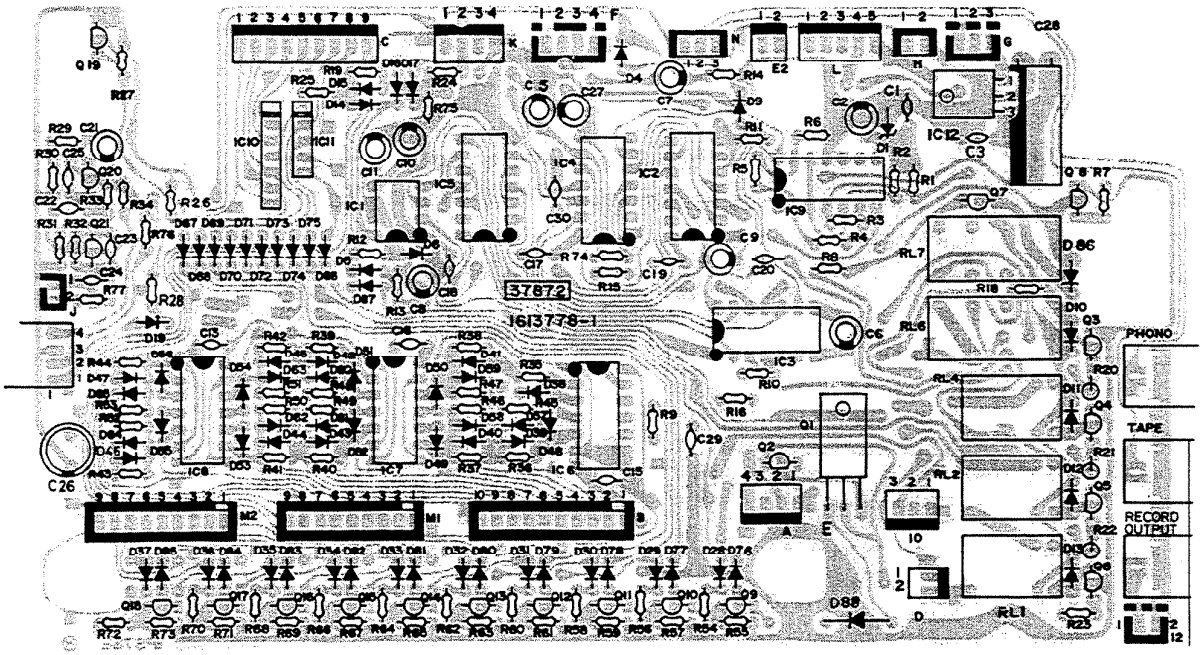


37868
Foil Pattern (component and solder side)

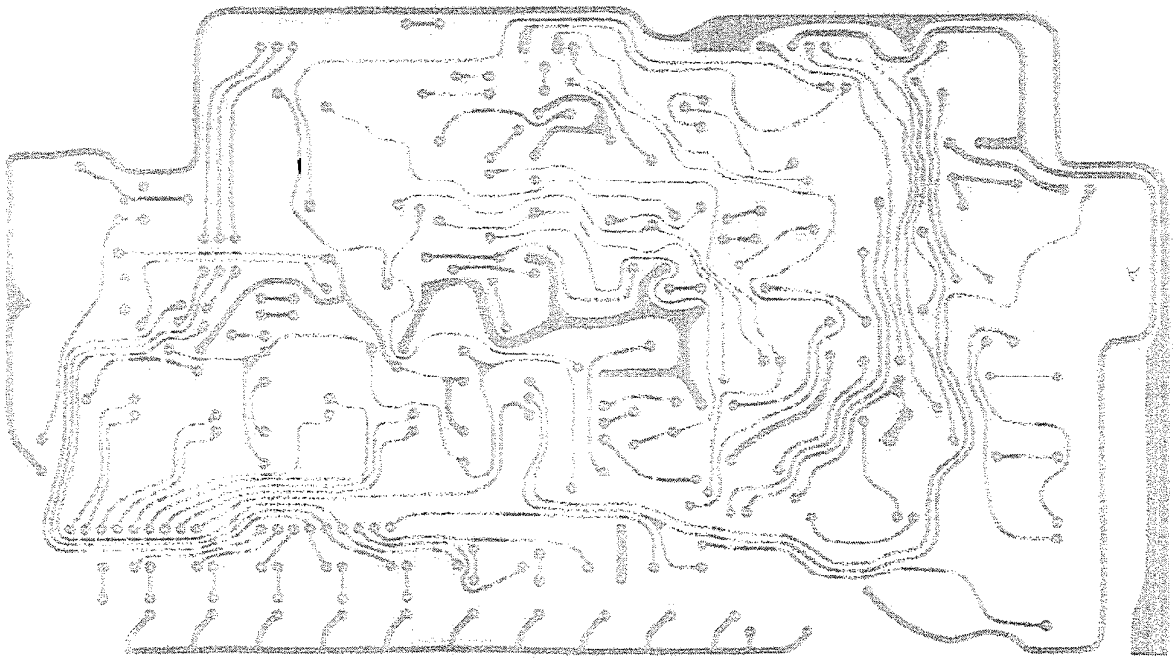


37868
Foil Pattern (component side)

Control Board

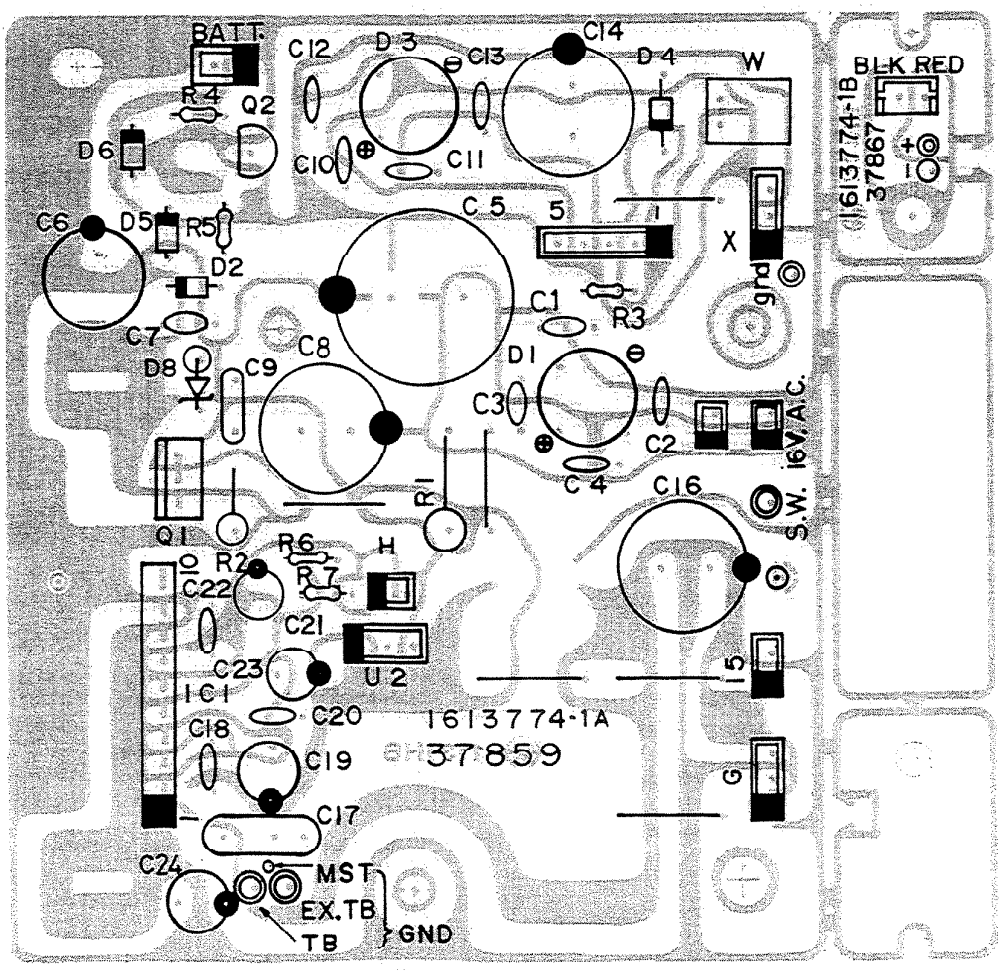


37872
Foil Pattern (component and solder side)



37872
Foil Pattern (component side)

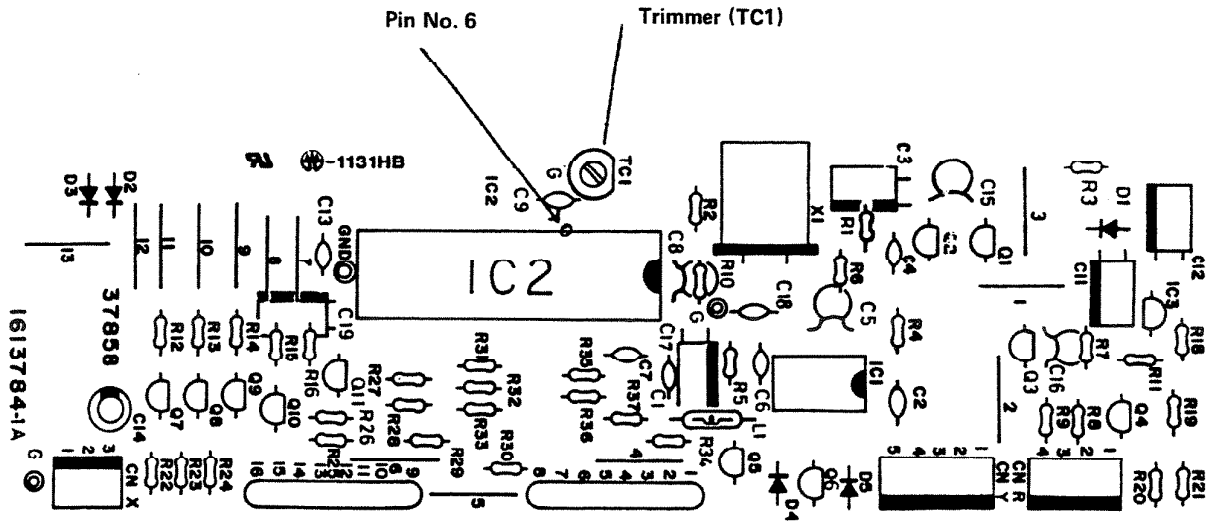
Power Board



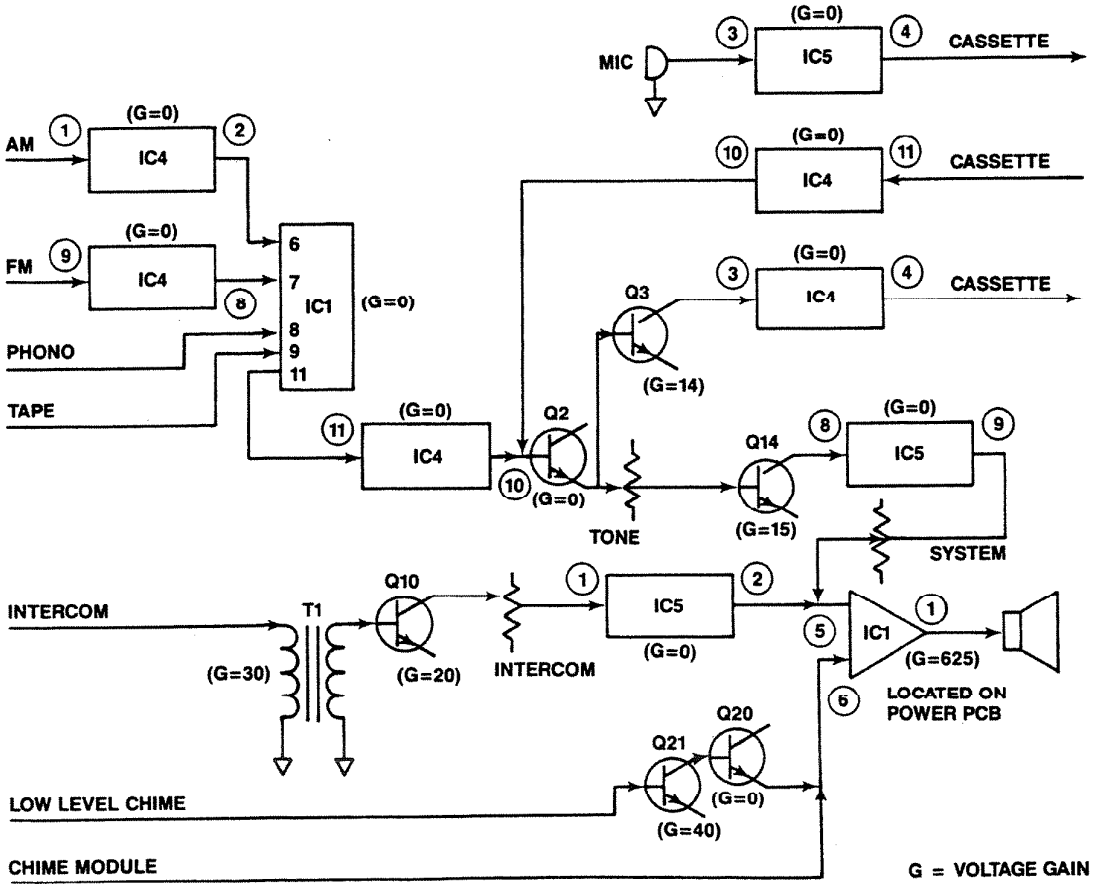
37859

4.5MHz CLOCK ALIGNMENT

Connect a 4pf Capacitor, 10 to 1 scope probe and frequency counter to Pin 6 of IC2 on the Phase/Lock Loop PC Board. Adjust Trimmer TC1 so counter displays a reading of 4.5MHz ± 15Hz.



MASTER/POWER P.C. BOARD AUDIO GAIN CHART

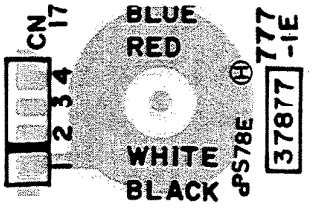


P.C. BOARDS

Power LED Board

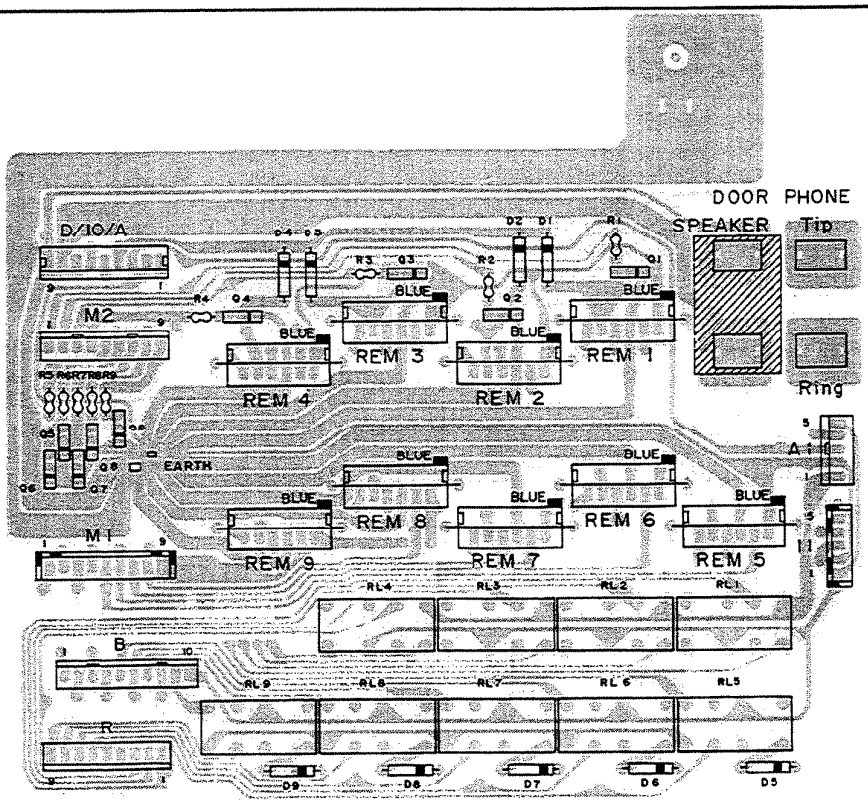
37865

Intercom Transformer Board

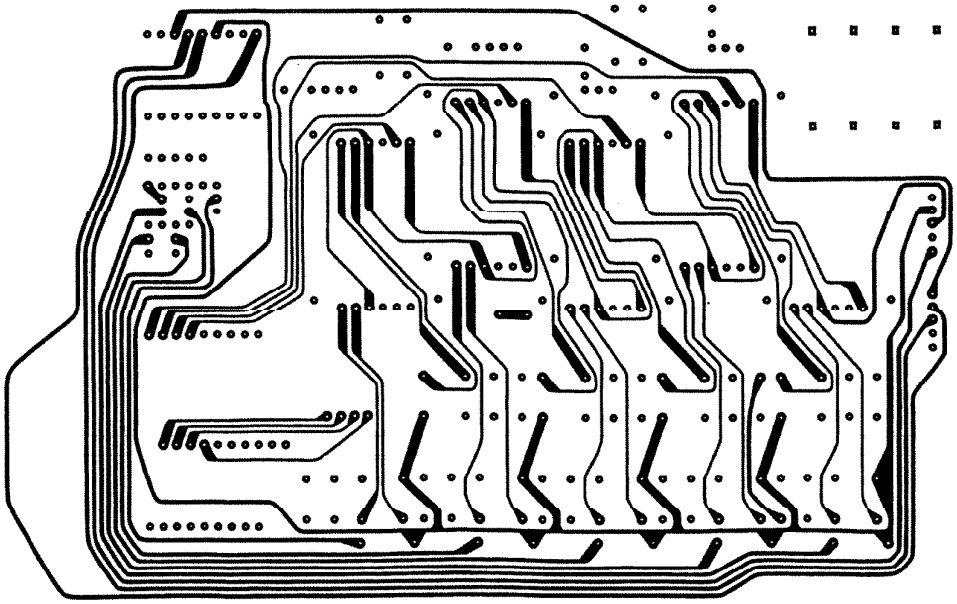


37877

Terminal Board

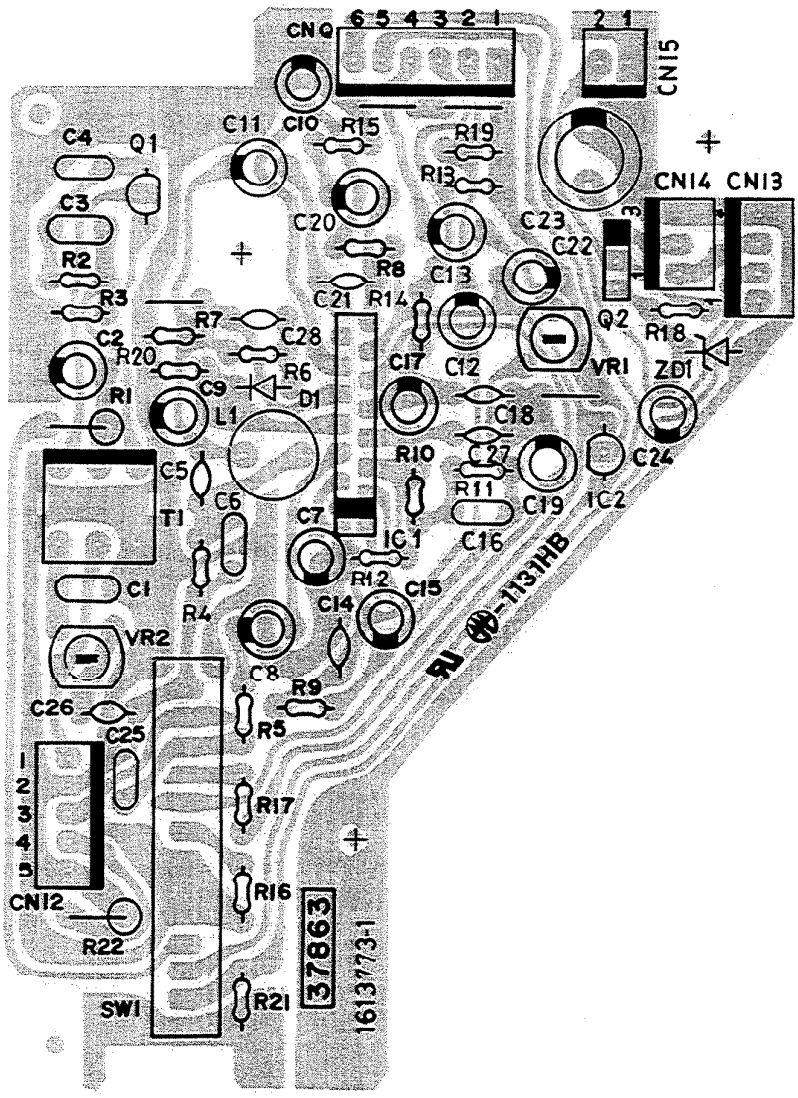


37870
Foil Pattern (component and solder side)



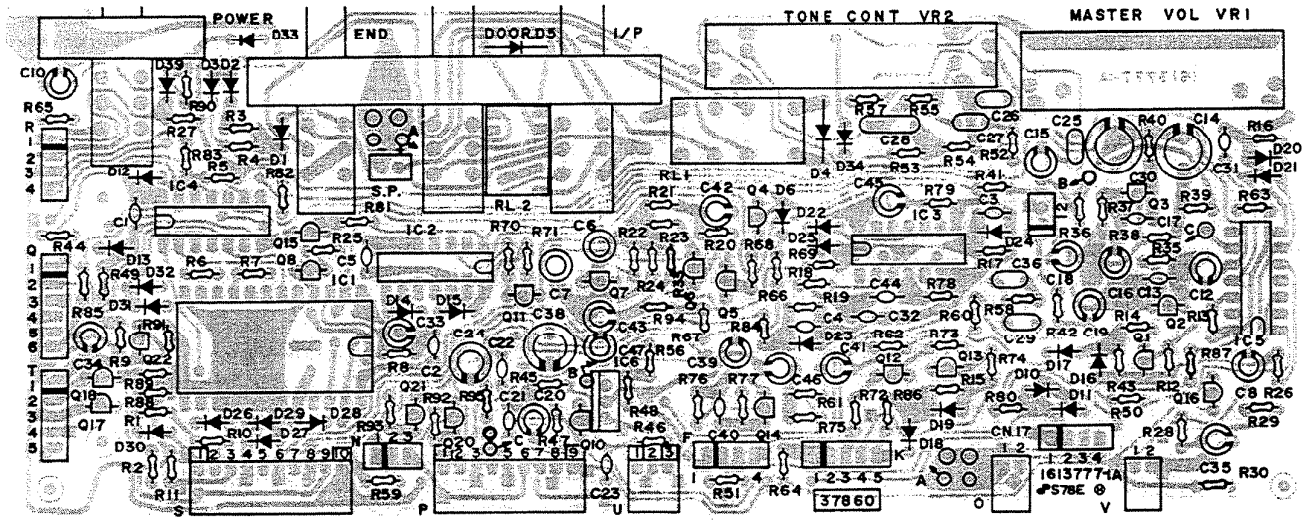
37870
Foil Pattern (component side)

Cassette Board

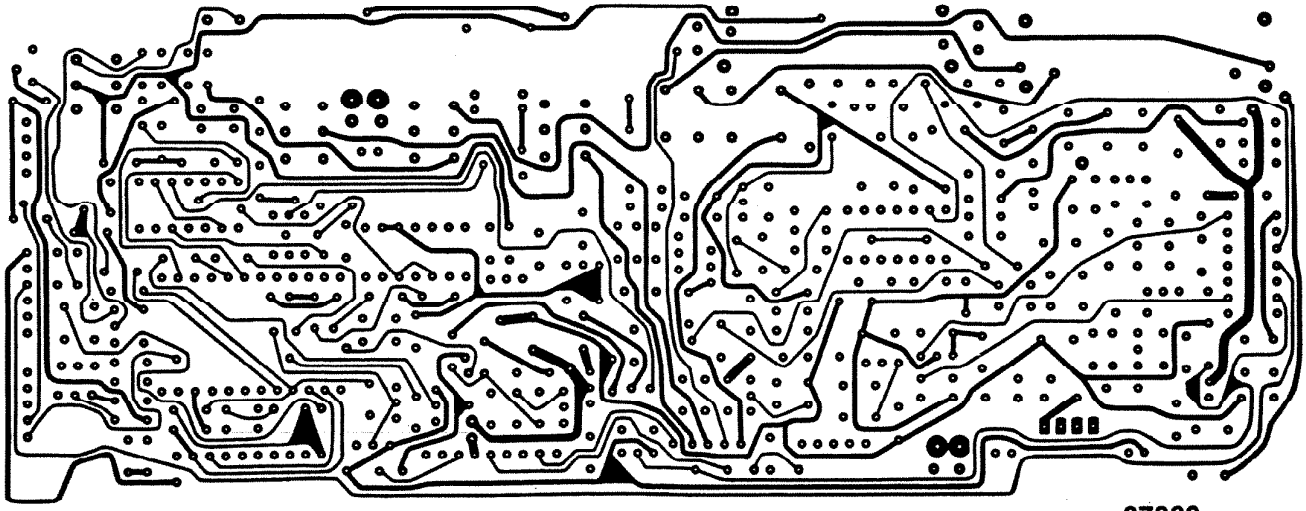


P.C. BOARDS

Master Board



37860
Foil Pattern (component and solder side)



37860
Foil Pattern (component side)

REPLACEMENT PARTS

Capacitors: Value in Micro (10^{-6}) Farads, Other Specifications As Noted.

Resistors: Value In Ohms ± 5%, 1/6 Watt, Other Specifications as Noted.
K = Kilos = 1,000 M = Mega = 1,000,000

Model IM-4006 Radio-Intercom Master Unit

Schematic Symbol	NuTone Part No.	Description
		CASSETTE P.C. BOARD ASSEMBLY
	8526A-000	Cassette P.C. Board Assembly
SW1	8612A-000	Slide Switch
T1	8613A-000	Recorder Bias Coil
L1	8614A-000	Inductor 33MH
VR1	8615A-000	Semi-Fixed Resistor 10K
VR2	8616A-000	Semi-Fixed Resistor 100K
CN-Q	7529A-000	Connector Header 6P
CN-12	8652A-000	Connector Header 5P
CN-13	7317A-000	Connector Header 4P
CN-14	7099A-000	Connector Header 3P
CN-15	7280A-000	Connector Header 2P
IC-1	8617A-000	Integrated Circuit—BA5101
IC-2	8618A-000	Integrated Circuit—AN78L06
Q1	8619A-000	Transistor—2SC1383R
Q2	8620A-000	Transistor—2SC1846S
D1	8621A-000	Diode
ZD1	8622A-000	Diode-Zener—UZ13BH
		Resistors
R1	8623A-000	Carbon 1/6W 180Ω
R2, R4	7697A-000	Carbon 1/6W 22K
R3	8624A-000	Carbon 1/6W 4.7Ω
R5	7717A-000	Carbon 1/6W 1.2K
R6	7712A-000	Carbon 1/6W 100K
R7	7716A-000	Carbon 1/6W 33K
R8, R16, R17	7724A-000	Carbon 1/6W 4.7K
R9, R19, R21	7701A-000	Carbon 1/6W 10K
R10	7704A-000	Carbon 1/6W 12K
R11	8625A-000	Carbon 1/6W 120K
R12	7796A-000	Carbon 1/6W 180Ω
R13	7798A-000	Carbon 1/6W 680Ω
R14	7714A-000	Carbon 1/6W 5.6K
R15	7705A-000	Carbon 1/6W 470Ω
R18	7693A-000	Carbon 1/6W 1.5K
R20	8626A-000	Carbon 1/6W 3.3Meg.
R22	7181A-000	Carbon 1/4W 100Ω
		Capacitors
C1	8627A-000	Mylar (J) .0033uf 100V
C2	7138A-000	Electrolytic 47uf 16V
C3, C4	7779A-000	Mylar 0.01uf (J)
C5	8628A-000	Ceramic 270pf (J)
C6	7767A-000	Mylar (J) .0015uf 50V
C7, C9	7154A-000	Electrolytic 4.7uf 50V
C8, C11, C17, C20	7136A-000	Electrolytic 10uf 10V
C10, C19	7141A-000	Electrolytic 47uf 10V
C12, C13, C15	7125A-000	Electrolytic 1uf 50V
C14, C26	7770A-000	Ceramic SL 100pf (J)
C16	8629A-000	Mylar (J) .012uf 50V
C18, C27	7133A-000	Ceramic (B) .001uf (K)
C21	8630A-000	Ceramic SL 47pf (J)
C22	7141A-000	Electrolytic 47pf 10V
C23	7145A-000	Electrolytic 220uf 16V
C24	7760A-000	Electrolytic 10uf 16V
C25	8631A-000	Mylar (J) 820pf 50V
C28	8632A-000	Ceramic SL 470pf (J)
		POWER AMPLIFIER AND POWER SUPPLY BOARD ASSEMBLY
	8551A-000	Power Amplifier and Power Supply Board Assembly
	8522A-000	Power Supply Board Assembly
CN-W	8633A-000	Connector-Header 2P
IC1	7015A-000	Integrated Circuit—BA532
Q1	8634A-000	Transistor—2SD1266AP
Q2	8635A-000	Transistor—2SA564R
		Diodes
D1, D3	8636A-000	Silicon Rectifier
D2	8637A-000	Zener—UZ-15BM
D4	8638A-000	Zener—UZ-5.1B
D5, D6	8639A-000	Diode
D8	8640A-000	Zener—UZ-7.5BM
		Resistors
R1	8641A-000	Metal Oxide 3W 2.2Ω (J)
R2	7180A-000	Metal Oxide 1W 220Ω
R3	8642A-000	Carbon 1/6W 10K (J)
R4	7721A-000	Carbon 1/6W 1.8K (J)
R5	7787A-000	Carbon 1/6W 150K (J)
R6	7709A-000	Carbon 1/6W 82Ω (J)
R7	7690A-000	Carbon 1/6W 330Ω (J)

REPLACEMENT PARTS

Schematic Symbol	NuTone Part No.	Description
		Capacitors
C1 thru C4, C7, C10 thru C13	7108A-000	Ceramic (ZF) .022uf (Z)
C5	8643A-000	Electrolytic 3300uf 25V
C6	7383A-000	Electrolytic 470uf 16V
C8	7143A-000	Electrolytic 1000uf 16V
C9	8644A-000	Ceramic (ZF) .1uf (Z)
C14	8645A-000	Electrolytic 220uf 35V
C16	7146A-000	Electrolytic 1000uf 10V
C17	8646A-000	Electrolytic .22uf 50V
C18	7135A-000	Ceramic .01uf (Z)
C19, C21	7141A-000	Electrolytic 47uf 10V
C20	8647A-000	Ceramic (B) .001uf (K)
C22	8630A-000	Ceramic SL 47pf (J)
C23	7125A-000	Electrolytic 1uf 50V
C24	7126A-000	Electrolytic 100uf 10V
		POWER SUPPLY BOARD ASSEMBLY
	8530A-000	Power Supply Board Assembly
BATT.	8648A-000	Connector-Header EH 2P
		SWITCH P.C. BOARD ASSEMBLY
	8533A-000	Switch P.C. Board Assembly
S1 thru S10	8649A-000	Slide Switch
S11	8650A-000	Slide Switch
VR1, VR2	8651A-000	Volume Control-Rotary 20K (A)
CN-E1	7099A-000	Connector-Header 3P
CN-E3	7280A-000	Connector-Header 2P
CN-L	8653A-000	Pin-1.3mm Diameter
R1 thru R10	8654A-000	Resistor-Carbon 1/4W 12Ω (J)
		CONTROL P.C. BOARD ASSEMBLY
	8536A-000	Control P.C. Board Assembly
J1 thru J3	7076A-000	RCA Pin Jack
RL1, RL2, RL4	7264A-000	Relay
RL6, RL7	8655A-000	Relay
CN-E2	7280A-000	Connector-Header 2P
CN-K	7317A-000	Connector-Header 4P
CN-L	8652A-000	Connector-Header 5P
CN-C	7282A-000	Connector-Header 9P
CN-R	8656A-000	Connector-Header (XH) 2P
CN-G	8657A-000	Connector-Header (XH) 3P
CN-F	8658A-000	Connector-Header (XH) 4P
CN-H	8659A-000	Connector-Header (EH) 2P

Schematic Symbol	NuTone Part No.	Description
CN-N	8660A-000	Connector-Header (EH) 3P
CN-I	8661A-000	Connector Base (AMP) 4P
IC-1	8662A-000	Integrated Circuit—NJM555
IC-2	8663A-000	Integrated Circuit—TC4069BP
IC-3, IC-6 thru IC-8	8664A-000	Integrated Circuit—TC4081BP
IC-4, IC-5	8665A-000	Integrated Circuit—TC4011BP
IC-9	8666A-000	Integrated Circuit—TA75902
IC-10	8667A-000	Diode Alley—DAN601
IC-11	8668A-000	Diode Alley—DAN401
IC-12	8669A-000	Integrated Circuit (Voltage Regulator)—AN7815
Q1	8634A-000	Transistor—2SD1266AP
Q2, Q9 thru Q18	8670A-000	Transistor—2SA937R
Q3 thru Q5, Q8	8671A-000	Transistor—2SC945R
Q6	8672A-000	Transistor—2SA733R
Q7	8673A-000	Transistor—2SC1383Q
Q19, Q20	8674A-000	Transistor—2SC2021R
Q21	8675A-000	Transistor—2SC1844F
D1	8676A-000	Diode-Zener—UZ-12BM
D4 thru D6, D9, D14, D87	8677A-000	Diode
D10 thru D13, D86, D88	8678A-000	Diode—1N4002
D15 thru D17, D19, D28 thru D72	8677A-000	Diode
D73 thru D85	8679A-000	Diode
		Resistors
R1	7798A-000	Carbon 1/6W (J) 680Ω
R2, R6	8680A-000	Carbon 1/6W (J) 620Ω
R3	7721A-000	Carbon 1/6W (J) 1.8K
R4	7713A-000	Carbon 1/6W (J) 2.7K
R5	8681A-000	Carbon 1/6W (J) 1.6K
R7, R18, R26, R27	7720A-000	Carbon 1/6W (J) 47K
R8, R23	7695A-000	Carbon 1/6W (J) 27K
R9, R10, R45 thru R53	7783A-000	Carbon 1/6W (J) 220K
R11, R13, R14, R32	7688A-000	Carbon 1/6W (J) 1Meg.
R12	8682A-000	Carbon 1/6W (J) 680K
R15, R19 R35, R74, R75	7712A-000	Carbon 1/6W (J) 100K
R16, R36 thru R44	7725A-000	Carbon 1/6W (J) 560K

REPLACEMENT PARTS

Schematic Symbol	NuTone Part No.	Description
R20 thru R22	8683A-000	Carbon 1/6W (J) 47K
R24, R25	7716A-000	Carbon 1/6W (J) 33K
R28	7701A-000	Carbon 1/6W (J) 10K
R29	7728A-000	Carbon 1/6W (J) 220Ω
R30	7694A-000	Carbon 1/6W (J) 2.2K
R31	7706A-000	Carbon 1/6W (J) 100Ω
R33	7707A-000	Carbon 1/6W (J) 330K
R34	7714A-000	Carbon 1/6W (J) 5.6K
R54, R56, R58, R60, R62, R64, R66, R68, R70, R72	8684A-000	Carbon 1/6W (J) 8.2K
R55, R57, R59, R61, R63, R65, R67, R69, R71, R73	8625A-000	Carbon 1/6W (J) 120K
R76	7690A-000	Carbon 1/6W (J) 330Ω
R77	7729A-000	Carbon 1/6W (J) 15Ω
		Capacitors
C1, C3, C13 thru C20	7108A-000	Ceramic (Z) 0.022uf (Z)
C2, C7 thru C10	8685A-000	Electrolytic 1uf 50V
C5	8686A-000	Electrolytic 0.1uf 50V
C6, C27	8687A-000	Electrolytic 0.1uf 50V
C11	8688A-000	Electrolytic 22uf 16V
C21	8689A-000	Electrolytic 1uf 50V
C22, C24, C29, C30	8690A-000	Semi-Conductive 0.033uf (K)
C23, C25	7133A-000	Ceramic (B) 0.001uf (K)
C26	8691A-000	Electrolytic 220uf 16V
C28	7143A-000	Electrolytic 1000uf 16V
		MASTER SWITCH, LED, AND INPUT XFMR BOARD ASSEMBLY
	8549A-000	Master Switch, LED, and Input XFMR Board Assembly
	8523A-000	Master Switch Board Assembly
S1 thru S3	8692A-000	Push Switch
S4	8693A-000	Push Switch
RL1	8655A-000	Relay 2 Pole
RL2	7264A-000	Relay 1 Pole
VR1	8694A-000	Slide Switch-Volume 200Ω (C)
VR2	8695A-000	Slide Switch-Volume 50K (B) 25K (HB)
CN-V, CN-O	8633A-000	Connector-Header 2P
CN-P	8696A-000	Connector-Header 9P
CN-S	8697A-000	Connector-Header 10P
CN-U	8698A-000	Connector-Header (Side) 3P
IC1	8699A-000	Integrated Circuit—TC9152P

Schematic Symbol	NuTone Part No.	Description
IC2	8700A-000	Integrated Circuit—TC4001BP
IC3	8701A-000	Integrated Circuit—TC4013BP
IC4, IC5	8702A-000	Integrated Circuit—TC4066BP
IC6	8703A-000	IC-Voltage Regulator—AN78M12
Q1, Q3	7037A-000	Transistor—2SC945P
Q2, Q10, Q14	7267A-000	Transistor—2SC1844E
Q4, Q12	7748A-000	Transistor—2SA733P
Q5 thru Q8, Q11, Q13, Q15 thru Q22	7073A-000	Transistor—2SC945P
D1 thru D3, D6, D10 thru D34, D39	8639A-000	Diode
D4, D5	8678A-000	Diode—IN4002
		Resistors
R1, R2, R3	7701A-000	Carbon 1/6W (J) 10K
R4	7702A-000	Carbon 1/6W (J) 1K
R5	7690A-000	Carbon 1/6W (J) 330Ω
R6, R7	7782A-000	Carbon 1/6W (J) 470K
R8	7725A-000	Carbon 1/6W (J) 560K
R9	7716A-000	Carbon 1/6W (J) 33K
R10, R11, R12	7698A-000	Carbon 1/6W (J) 22Ω
R13	7782A-000	Carbon 1/6W (J) 470K
R14	7701A-000	Carbon 1/6W (J) 10K
R15, R16, R17	7712A-000	Carbon 1/6W (J) 100K
R18	7782A-000	Carbon 1/6W (J) 470K
R19	7720A-000	Carbon 1/6W (J) 47K
R20	7782A-000	Carbon 1/6W (J) 470K
R21	7787A-000	Carbon 1/6W (J) 150K
R22, R23	7701A-000	Carbon 1/6W (J) 10K
R24	7707A-000	Carbon 1/6W (J) 330K
R25	7701A-000	Carbon 1/6W (J) 10K
R26	7720A-000	Carbon 1/6W (J) 47K
R27	7782A-000	Carbon 1/6W (J) 470K
R28	7712A-000	Carbon 1/6W (J) 100K
R29, R30	7694A-000	Carbon 1/6W (J) 2.2K
R33	7716A-000	Carbon 1/6W (J) 33K
R35	7714A-000	Carbon 1/6W (J) 5.6K
R36	7707A-000	Carbon 1/6W (J) 330K
R37	7694A-000	Carbon 1/4W (J) 2.2K
R38	7725A-000	Carbon 1/4W (J) 560K
R39	7724A-000	Carbon 1/4W (J) 4.7K
R40	7702A-000	Carbon 1/6W (J) 1K
R41	7690A-000	Carbon 1/6W (J) 330Ω
R42	8704A-000	Carbon 1/4W (J) 270K
R43	7702A-000	Carbon 1/6W (J) 1K
R44	7782A-000	Carbon 1/6W (J) 470K
R45	7701A-000	Carbon 1/6W (J) 10K
R46	7688A-000	Carbon 1/6W (J) 1Meg.
R47	8705A-000	Carbon 1/4W (J) 3.3K
R48	8706A-000	Carbon 1/4W (J) 150Ω
R49	7693A-000	Carbon 1/6W (J) 1.5K
R50	7782A-000	Carbon 1/6W (J) 470K
R51	7697A-000	Carbon 1/6W (J) 22K
	7716A-000	Carbon 1/6W (J) 33K

REPLACEMENT PARTS

Schematic Symbol	NuTone Part No.	Description
R52	7724A-000	Carbon 1/6W (J) 4.7K
R53	8707A-000	Carbon 1/4W (J) 6.8K
R54	8708A-000	Carbon 1/4W (J) 560Ω
R55	8709A-000	Carbon 1/4W (J) 3.9K
R56	8710A-000	Carbon 1/5W (J) 1Ω
R57	7714A-000	Carbon 1/6W (J) 5.6K
R58	7701A-000	Carbon 1/6W (J) 10K
R59	7724A-000	Carbon 1/6W (J) 4.7K
R60	8709A-000	Carbon 1/6W (J) 3.9K
R61	7694A-000	Carbon 1/6W (J) 2.2K
R62	7701A-000	Carbon 1/6W (J) 10K
R63	7698A-000	Carbon 1/6W (J) 22Ω
R64	7720A-000	Carbon 1/6W (J) 47K
R65, R66		
R67	7717A-000	Carbon 1/6W (J) 1.2K
R68	7782A-000	Carbon 1/6W (J) 470K
R69	7697A-000	Carbon 1/6W (J) 22K
R70	7720A-000	Carbon 1/6W (J) 47K
R71	7714A-000	Carbon 1/6W (J) 5.6K
R72, R73	7716A-000	Carbon 1/6W (J) 33K
R74	7712A-000	Carbon 1/6W (J) 100K
R75	7724A-000	Carbon 1/6W (J) 4.7K
R76	7725A-000	Carbon 1/6W (J) 560K
R77	8706A-000	Carbon 1/6W (J) 150Ω
R78, R79	7720A-000	Carbon 1/6W (J) 47K
R80	7724A-000	Carbon 1/6W (J) 4.7K
R81	7697A-000	Carbon 1/6W (J) 22K
R82	7724A-000	Carbon 1/6W (J) 4.7K
R83	7701A-000	Carbon 1/6W (J) 10K
R84	7697A-000	Carbon 1/6W (J) 22K
R85	7701A-000	Carbon 1/6W (J) 10K
R86	7720A-000	Carbon 1/6W (J) 47K
R87	7701A-000	Carbon 1/6W (J) 10K
R88	7695A-000	Carbon 1/6W (J) 27K
R89	8711A-000	Carbon 1/6W (J) 39K
R90	7701A-000	Carbon 1/6W (J) 10K
R91	7707A-000	Carbon 1/6W (J) 330K
R92, R93	8712A-000	Carbon 1/6W (J) 56K
R94	7701A-000	Carbon 1/6W (J) 10K
R101	7704A-000	Carbon 1/5W (J) 12K
C1, C2	7108A-000	Ceramic (ZF) 0.022uf 25V
C3	7770A-000	Ceramic (SL) 100pf (J)
C4	8713A-000	Ceramic (SL) 390pf (J)
C5	7108A-000	Ceramic 0.022uf 25V
C6, C7	8714A-000	Electrolytic BP 1uf 50V
C8	8715A-000	Electrolytic 2.2uf 50V
C10	7760A-000	Electrolytic 10uf 16V
C12	8715A-000	Electrolytic 2.2uf 50V
C13	7133A-000	Ceramic B 0.001uf 25V (K)
C14	7145A-000	Electrolytic 220uf 16V
C15, C16	7153A-000	Electrolytic 0.47uf 50V
C17	7133A-000	Ceramic B 0.001uf 25V (K)
C18, C19	7154A-000	Electrolytic 4.7uf 50V
C20	7125A-000	Electrolytic 1uf 50V
C21	7133A-000	Ceramic B 0.001uf 25V (K)
C22	8716A-000	Semi-Conductive 0.01uf 25V (K)
C23	8717A-000	Semi-Conductive 0.056uf 25V (K)
C24	7382A-000	Electrolytic 100uf 16V
C25	8718A-000	Mylar 0.0027uf (J)
C26	8719A-000	Mylar 0.018uf (J)
C27	8720A-000	Mylar 0.068uf (J)
C28	8721A-000	Mylar 0.47uf (J)
C29	8722A-000	Mylar 0.056uf (J)

Schematic Symbol	NuTone Part No.	Description
C31	7145A-000	Electrolytic 220uf 16V
C32	7108A-000	Ceramic (ZF) 0.022uf 25V
C33	7125A-000	Electrolytic 1uf 50V
C34, C35	7138A-000	Electrolytic 47uf 16V
C36	8723A-000	Mylar 0.0022uf (J)
C38	7143A-000	Electrolytic 1000uf 16V
C39	7125A-000	Electrolytic 1uf 50V
C40	7133A-000	Ceramic B 0.001uf 25V (K)
C41	7125A-000	Electrolytic 1uf 50V
C42, C43	7760A-000	Electrolytic 10uf 10V
C44, C45	8724A-000	Semi-Conductive 0.1uf (K)
C46	7138A-000	Electrolytic 47uf 16V
C47	8725A-000	Electrolytic 4.7uf 16V
C48	8726A-000	Electrolytic 0.22uf 50V

POWER LED BOARD ASSEMBLY

	8528A-000	Power LED Board Assembly
D9	7274A-000	LED

INPUT TRANSFORMER BOARD ASSEMBLY

	8532A-000	Input Transformer Board Assembly
T1	8727A-000	Matching Transformer

MODE SELECTOR BOARD ASSEMBLY

	8527A-000	Mode Selector Board Assembly
S5 thru S10	8728A-000	Push Switch
Q90, Q91	8674A-000	Transistor—2SC2021R
D90 thru D94	7274A-000	LED
R95 thru R98	7717A-000	Resistor-Carbon 1/6W (J) 1.2K
R99, R100	7720A-000	Resistor-Carbon 1/6W (J) 47K

MICROPHONE BOARD ASSEMBLY

	8529A-000	Microphone Board Assembly
MK-1	7742A-000	ECM

CLOCK, DISPLAY AND MEMORY BOARD ASSEMBLY

	8550A-000	Clock, Display and Memory Board Assembly
	8521A-000	Radio/Clock Board Assembly
X1	8729A-000	Crystal 4.5MHz

REPLACEMENT PARTS

Schematic Symbol	NuTone Part No.	Description
TC1	8730A-000	Ceramic Trimmer 30pf
L1	8731A-000	Inductor 2.2uH
	8732A-000	Parallel Wire 8P
	8733A-000	Parallel Wire 7P
CN-X	7099A-000	Connector-Header 3P
CN-R	7317A-000	Connector-Header 4P
CN-Y	8652A-000	Connector-Header 5P
IC-1	8734A-000	Integrated Circuit—UPB553AC
IC-2	8735A-000	Integrated Circuit—UPD1703C-013
IC-3	8618A-000	Integrated Circuit-Voltage Regulator
Q1 thru Q3	8674A-000	Transistor—2SC2021R
Q4	7037A-000	Transistor 2SC945P
Q5 thru Q11	7748A-000	Transistor—2SA733P
D1 thru D5	8679A-000	Diode
Resistors		
R1	7693A-000	Carbon 1/6W (J) 1.5K
R2	7724A-000	Carbon 1/6W (J) 4.7K
R3, R7, R8, R19	7701A-000	Carbon 1/6W (J) 10K
R4	7706A-000	Carbon 1/6W (J) 100Ω
R5	7783A-000	Carbon 1/6W (J) 220K
R6	7965A-000	Carbon 1/6W (J) 27K
R9, R10	7782A-000	Carbon 1/6W (J) 470K
R11 thru R16	7720A-000	Carbon 1/6W (J) 47K
R18	7728A-000	Carbon 1/6W (J) 220Ω
R20, R21	7707A-000	Carbon 1/6W (J) 330K
R22 thru R33	7712A-000	Carbon 1/6W (J) 100K
R34 thru R37	7716A-000	Carbon 1/6W (J) 33K
Capacitors		
C1	7133A-000	Ceramic B 0.001uf (K)
C2	8630A-000	Ceramic SL 47pf (J)
C3, C17	7140A-000	Electrolytic 1uf 50V
C4	8690A-000	Semi-Conductive 0.033uf 50V (K)
C5, C7, C13	8716A-000	Semi-Conductive 0.01uf 25V (K)
C6	8736A-000	Ceramic 220pf (J)
C8	8737A-000	Semi-Conductive 0.01uf 25V (K)
C9	8738A-000	Ceramic CH 15pf (J)
C11, C19	7141A-000	Electrolytic 47uf 10V
C12	7138A-000	Electrolytic 47uf 16V
C14	8739A-000	Electrolytic 330uf 10V
C15	8740A-000	Semi-Conductive 0.047uf 25V (K)
C16	8741A-000	Semi-Conductive 0.039uf 25V (K)
DISPLAY BOARD ASSEMBLY		
	8524A-000	Display Board Assembly
FL-1	8742A-000	Display

Schematic Symbol	NuTone Part No.	Description
SW1 thru SW7	8743A-000	Push Switch
Q12	8674A-000	Transistor—2SC2021R
Q13	8670A-000	Transistor—2SA937R
D6 thru D13	8679A-000	Diode
R38, R39	8682A-000	Resistor-Carbon 1/6W (J) 680K
C20	8744A-000	Axial Cap SL 100pf (J)
MEMORY SWITCH BOARD ASSEMBLY		
	8525A-000	Memory Switch Board Assembly
SW8 thru SW13	8743A-000	Push Switch
TUNER P.C. BOARD ASSEMBLY		
	8535A-000	Tuner P.C. Board Assembly
T1	8745A-000	FM IFT
T2	8746A-000	AM PF
T3	8747A-000	AM Local Osc.
T4	8748A-000	AM IFT
T5	8749A-000	FM Demod.
L2	8750A-000	FM RF
L3	8751A-000	FM Local Osc.
L4	8752A-000	Inductor 4.7uH
L5	8731A-000	Inductor 2.2uH
TC1, TC2	8753A-000	Ceramic Trimmer 20pf
BF1	8754A-000	BPF
CF1, CF2	8755A-000	Ceramic Filter SFE 10.7
CF3	8756A-000	Ceramic Filter SFZ 450B
CF4	8757A-000	Ceramic Filter SFU 450
VR1	8758A-000	Resistor-Semifixed 30K
VR2	8759A-000	Resistor-Semifixed 10K
ANT PIN	8760A-000	Wrapping Pin
CN-T	8761A-000	Connector-Header 5P
	8762A-000	Board Support
IC1	8763A-000	Integrated Circuit—LA1186N
IC2	8764A-000	Integrated Circuit—LA1265
Q1, Q2	7025A-000	Transistor—2SK212E
Q3	7283A-000	Transistor—2SC1675L
D1, D2, D7, D8	8679A-000	Diode
D3, D4	8765A-000	Varicap

REPLACEMENT PARTS

Schematic Symbol	NuTone Part No.	Description
D5, D6	8766A-000	Varicap
D9	8767A-000	LED
		Resistors
R1	7688A-000	Carbon 1/6W (J) 1Meg.
R2, R4	7716A-000	Carbon 1/6W (J) 33K
R3, R22	7698A-000	Carbon 1/6W (J) 22Ω
R5, R10, R15	7705A-000	Carbon 1/6W (J) 470Ω
R6, R16, R17	7712A-000	Carbon 1/6W (J) 100K
R7, R8	8706A-000	Carbon 1/6W (J) 150Ω
R9	7728A-000	Carbon 1/6W (J) 220Ω
R11	7786A-000	Carbon 1/6W (J) 560Ω
R12, R25	7703A-000	Carbon 1/6W (J) 18K
R13, R26	8768A-000	Carbon 1/6W (J) 68K
R14, R28, R33	7702A-000	Carbon 1/6W (J) 1K
R18	7717A-000	Carbon 1/6W (J) 1.2K
R19, R23, R24, R30, R34	7701A-000	Carbon 1/6W (J) 10K
R20, R32	8769A-000	Carbon 1/6W (J) 47Ω
R21	7697A-000	Carbon 1/6W (J) 22K
R27	7706A-000	Carbon 1/6W (J) 100Ω
R29	7789A-000	Carbon 1/6W (J) 15K
R31	7783A-000	Carbon 1/6W (J) 220K
R35, R36	7792A-000	Carbon 1/6W (J) 56K
		Capacitors
C1	7110A-000	Ceramic SL 22pf (J)
C2	8770A-000	Ceramic B 560pf (J)
C3, C5, C35	7133A-000	Ceramic B 0.001uf (K)
C4, C6, C7, C9, C11 thru C14, C38	8716A-000	Semi-Conductive 0.01uf (K)
C8	8771A-000	Ceramic CH 30pf
C10	7111A-000	Ceramic CH 5pf
C15	8772A-000	Ceramic CH 6pf
C16	8773A-000	Ceramic CH 22pf
C17	8774A-000	Styrol 470pf (J)
C18 thru C21, C24, C26, C28, C29, C34	7108A-000	Ceramic ZF 0.022uf (Z)
C22	8715A-000	Electrolytic 2.2uf 50V
C23	7138A-000	Electrolytic 47uf 16V
C25	8775A-000	Semi-Conductive 0.0082uf (K)
C27, C33	7760A-000	Electrolytic 10uf 10V
C31	7154A-000	Electrolytic 4.7uf 50V
C32	8776A-000	Electrolytic 3.3uf 50V
C33	7760A-000	Electrolytic 10uf 50V
C36, C37	7140A-000	Electrolytic 1uf 50V
C39	8630A-000	Ceramic CH 47pf
C41	8777A-000	Semi-Conductive 0.0047uf (K)
C42	8714A-000	Electrolytic BP 1uf 50V
C43	8778A-000	Ceramic CH 4pf

Schematic Symbol	NuTone Part No.	Description
		TERMINAL BOARD ASSEMBLY
	8531A-000	Terminal Board Assembly
RL1 thru RL9	8655A-000	Relay 2 Pole
CN-A1	8652A-000	Connector-Header 5 Pin
CN-M2	7282A-000	Connector-Header 9 Pin
CN-B	7923A-000	Connector-Header 10 Pin
CN-R	8779A-000	Connector-Header (NH) 9 Pin
CN-11	8780A-000	Connector-Header (XH) 5 Pin
CN-M1	8781A-000	Connector-Header (XH) 9 Pin
CN-D/10/A	8782A-000	Connector-Header (EH) 9 Pin
	8783A-000	Connector Pin
CN-REM1 thru CN-REM9	8784A-000	Connector-Header (AMP) 6 Pin
Q1 thru Q9	8674A-000	Transistor—2SC2021R
D1 thru D9	8678A-000	Diode—IN4002
R1 thru R9	7720A-000	Resistor-Carbon 1/6W (J) 47K
	8604A-000	Cassette Tape-Blank
	8571A-000	Drive Belt-Cassette
	8572A-000	Pulley Belt-Cassette
B13	8898A-000	Switch P.C. Board Holder
		CASSETTE DECK ASSEMBLY
1	8967A-000	Cassette Case—PBE166404
2		Keep Plate—PBE14715
3		Mechanism Cover—PBD2327
4		Button Shaft—PBE15901
5	8968A-000	Button Lever—PBE2960
6		Spring—PBE6354
7		Bush—PBE14927
8		Felt Washer—PBE16459
9	8969A-000	R/P Head—165M278
10	8970A-000	Erase Head—1665M279
11		C. Spring—PBE13666
12		Head Base—PBC1145
13		Spring—PBE6508
14		F.R. Lever—PBE15920
15		Nut—PGNH22A20
16		P. Idler Assembly—PBE03245
17		Spring—PBE6384
18		Reset Lever—PBE15577
19		Washer—PGWM16X04020
20		T. Reel Assembly—PBE02161
21	8971A-000	Interlock Plate—PBD1801
22		S. Reel Mail—PBD10612
23		F.R. Unlock Lever—PBD15574
24		Spring—PBE6557
25		P. Unlock Lever—PBE15576

REPLACEMENT PARTS

Schematic Symbol	NuTone Part No.	Description
26		P.L. Lock Plate—PBE1796
27		Spring—PBE6349
28		F.R. Lock Plate—PBD1797
29	8972A-000	Dumper Assembly—PBD0785
30		Recorder Cover Plate—PBE15578
31		C. Spring—PBE6517
32		Spring—PBE6350
33		F. Idler Gear—PBE15585
34		Senser Cam—PBE15589
35		A.S. Gear—PBE15582
36		Cassette Holder—PBE15945
37	8973A-000	Eject Cam—PBE15565
38	8974A-000	Latch Lever—PBD1805
39	8975A-000	Pinch Arm Assembly—PBE02164
40		Spring—PBE6394
41		Earth Lug—PBE15570
42		Spring—PBB6386
43		S. Reel Gear—PBE17295
44		Chassis Assembly—PBD0783
45		S.E. Lever—PBE15557
46		Pause Lever—PBD1793
47		F.P. Lever—PBE15923
48		Rew. Lever—PBE15924
49		P.L. Lever—PBE15558
50		Rec. Level—PBD1798
51		
52		Spring—PBE6552
53		
54		Earth Lug—PBE14710
55		Spacer—PBE14966 or PBE14996
56		
57		
58		Lock Pin—PBE15801
59		Capstan Support—PBE15939
60		
61	8976A-000	Belt—PBE5083
62		
63	8977A-000	Fly Wheel Assembly—PBD0782
64		Washer—PGWP21X040013
65		Gear Holder—PBE15561
66		
67	8978A-000	Motor—EG-500AD-2B
68		Motor Plate—PBE15938

Schematic Symbol	NuTone Part No.	Description
69	8979A-000	Pully—PBE15599
70		
71	8980A-000	F.R. Idler Arm Assembly—PBD0818
72		Spring—PBE6620
73		Assist Gear "A"—PBD1791
74		Assist Gear "B"—PBE15955
75		Spring—PBE6342
76		P. Cam Lever—PBE15566
77		
78		
79		C.R. Cam Lever—PBD1792
80		Spring—PBE6344
81		F.R. Start Lever—PBD1833
82		F.R.S. Lever—PBD1834
83		Protect Plate—PBE15588
84		Spring—PBE6343
85		Recorder Joint Plate—PBE15569
86		Spring—PBE634
87		
88		
89		T. Spring—PBE6355
90		Recorder Change Plate—PBE15563
91		P.L. Start Lever—PBE15562
92		
93		Spring—PBE6348
94		Dumper Holder—PBE16650
95		Rev. Support Plate—PBE15948
96		R.S.W. Lever—PBE15571
97	8981A-000	Leaf Switch—MSW1498
98	8982A-000	Leaf Switch—H580714
99		M.S.W. Lever—PBE15579
100		Support Plate—PBE15893
101		Adhesive Tape—PBE17574
102	8983A-000	Connector Assembly
103	8984A-000	Connector Assembly
201	8985A-000	Tapping Screw
202	8986A-000	Tapping Screw
203	8987A-000	Screw
204	8988A-000	F. Tapping Screw
205	8989A-000	Screw
206	8990A-000	D. Screw
207	8991A-000	F. Tapping Screw

REPLACEMENT PARTS

Model IC-401
Inside Remote Control Panel

Schematic Symbol	NuTone Part No.	Description
	35577-000	Remote Control Panel
	43215-000	P.C. Board Assembly
a-a, b-b	33085-000	Resistor—0 OHM
R2	33082-331	Resistor—Film ¼W 330
R1	33082-102	Resistor—Film ¼W 1K
R3	34059-000	Potentiometer—Volume Control
D1, D2, D3, D4	36549-000	Diode-Rectifier
SW1	34697-000	Switch—Latching, DPDT
SW2, SW3, SW4	34698-000	Switch—Momentary, DPDT
J1	39967-000	Right Angle Header—6 POS.
K1	8368A-000	Relay—12 VDC, DPDT
	L2607-000	Screw—#8 x ⅜ PH. PAN. HD. "25"
	35473-000	Knob-Switch
	35506-000	Knob-Volume Control
	52872-000	Screw—#8 x 2" PH. FILL. HD. "A"
	39965-000	Receptacle-6 POS.

Model IC-401 WH
Inside Remote Control Panel

Schematic Symbol	NuTone Part No.	Description
	35826-000	Remote Control Panel
	43215-000	P.C. Board Assembly
a-a, b-b	33085-000	Resistor—0 OHM
R2	33082-331	Resistor—Film ¼W 330
R1	33082-102	Resistor—Film ¼W 1K
R3	34059-000	Potentiometer-Volume Control
D1, D2, D3, D4	36549-000	Diode-Rectifier
SW1	34697-000	Switch—Latching, DPDT
SW2, SW3, SW4	34698-000	Switch—Momentary, DPDT
J1	39967-000	Right Angle Header—6 POS.
K1	8368A-000	Relay—12 VDC, DPDT
	L2607-000	Screw—#8 x ¾ PH. PAN. HD. "25"
	35473-000	Knob—Switch
	35827-000	Knob—Volume Control
	52872-000	Screw—#8 x 2" PH. FIL. HD. "A"
	39965-000	Receptacle—6 POS.

Model IC-401 W
Outside Remote Control Panel

Schematic Symbol	NuTone Part No.	Description
	35577-000	Remote Control Panel
	8369A-000	Rain Shield
	31967-000	Cable Clamp
	43233-000	P.C. Board Assembly
a-a, b-b	33085-000	Resistor—0 OHM
R2	33082-331	Resistor—Film ¼W 330
R1	33082-102	Resistor—Film ¼W 1K
R3	34059-000	Potentiometer—Volume Control
D1, D2, D3, D4	36549-000	Diode-Rectifier
SW1	34697-000	Switch—Latching, DPDT
SW2, SW3, SW4	34698-000	Switch—Momentary DPDT
J1	39967-000	Right Angle Header—6 POS.
K1	8368A-000	Relay—12 VDC (Sealed) DPDT
	L2607-000	Screw—#8 x ⅜ PH. PAN. HD. "25"
	35473-000	Knob-Switch
	35506-000	Knob-Volume Control
	66731-000	Screw—#8 x ¾ PH. FIL. HD. "25"
	35351-000	Gasket
	39965-000	Receptacle—6 POS.
	39890-000	Surface Mount Bezel

Models IS-405D and IS-405L
5" Remote Speaker Panel

Schematic Symbol	NuTone Part No.	Description
	35578-000	Remote Speaker Panel (IS-405D)
	35579-000	Remote Speaker Panel (IS-405L)
	36090-000	Speaker—5"
	L2607-000	Screw—#8 x ⅜ PH. PAN. HD. "25"
	43215-000	P.C. Board Assembly
AA1, AA2	33085-000	Resistor—0 OHM
R2	33082-331	Resistor—Film ¼W 330
R1	33082-102	Resistor—Film ¼W 1K
R3	34059-000	Potentiometer—Volume Control
D1, D2, D3, D4	36549-000	Diode—Rectifier
SW1	34697-000	Switch—Latching, DPDT
SW2, SW3, SW4	34698-000	Switch—Momentary, DPDT
J1	39967-000	Right Angle Header—6 POS.
K1	8368A-000	Relay—12 VDC, DPDT
	L2607-000	Screw—#8 x ⅜ PH. PAN. HD. "25"
	35473-000	Knob—Switch
	35506-000	Knob—Volume Control (IS-405L)
	35475-000	Knob—Volume Control (IS-405D)
	39941-000	Screw—#8 x 2½ PH. FIL. HD. "A" (IS-405D-068)
	39941-000	Screw—#8 x 2½ PH. FIL. HD. "A" (IS-405L-039)
	39965-000	Receptacle—6 POS.

REPLACEMENT PARTS

Model IS-405 WH
5″ Remote Speaker Panel

Schematic Symbol	NuTone Part No.	Description
	35829-000	Remote Speaker Panel
	36090-000	Speaker—5″
	L2607-000	Screw—#8 x ⅜ PH. PAN. HD. "25"
	43215-000	P.C. Board Assembly
A-A1, A-A2	33085-000	Resistor—0 OHM
R2	33082-331	Resistor—Film ¼W 330
R1	33082-102	Resistor—Film ¼W 1K
R3	34059-000	Potentiometer—Volume Control
D1, D2, D3, D4	36549-000	Diode—Rectifier
SW1	34697-000	Switch—Latching, DPDT
SW2, SW3, SW4	34698-000	Switch—Momentary, DPDT
J1	39967-000	Right Angle Header—6 POS.
K1	8368A-000	Relay—12 VDC, DPDT
	L2607-000	Screw—#8 x ⅜ PH. PAN. HD. "25"
	35473-000	Knob-Switch
	35827-000	Knob-Volume Control
	39941-000	Screw—#8 x 2½ PH. FIL. HD. "A"
	39965-000	Receptacle—6 POS.

Model IS-408 WH
8″ Remote Speaker Panel

Schematic Symbol	NuTone Part No.	Description
	35828-000	Speaker Panel
	43215-000	P.C. Board Assembly
A-A1, A-A2	33085-000	Resistor—0 OHM
R2	33082-331	Resistor—Film ¼W 330
R1	33082-102	Resistor—Film ¼W 1K
R3	34059-000	Potentiometer—Volume Control
D1, D2, D3, D4	36549-000	Diode-Rectifier
SW1	34697-000	Switch-Latching, DPDT
SW2, SW3, SW4	34698-000	Switch—Momentary, DPDT
J1	39967-000	Right Angle Header—6 POS.
K1	8368A-000	Relay—12 VDC, DPDT
	L2607-000	Screw—#8 x ⅜ PH. PAN. HD. "25"
	35473-000	Knob—Switch
	35827-000	Knob—Volume Control
	39941-000	Screw—#8 x 2½ PH. FIL. HD. "A"
	39965-000	Receptacle—6 POS.

Model IR-310 Rough-In Frame

Schematic Symbol	NuTone Part No.	Description
	43079-000	Frame Assembly
	35570-000	Housing—Transformer
	08701-910	Transformer (Ref. Model 310T)
	43080-000	Cover Assembly—Transformer
	52789-000	Screw—#6 x ⅜ COMB. PH. SLT. OV. "25"
	43012-000	F.M. Antenna Assembly—COMP.

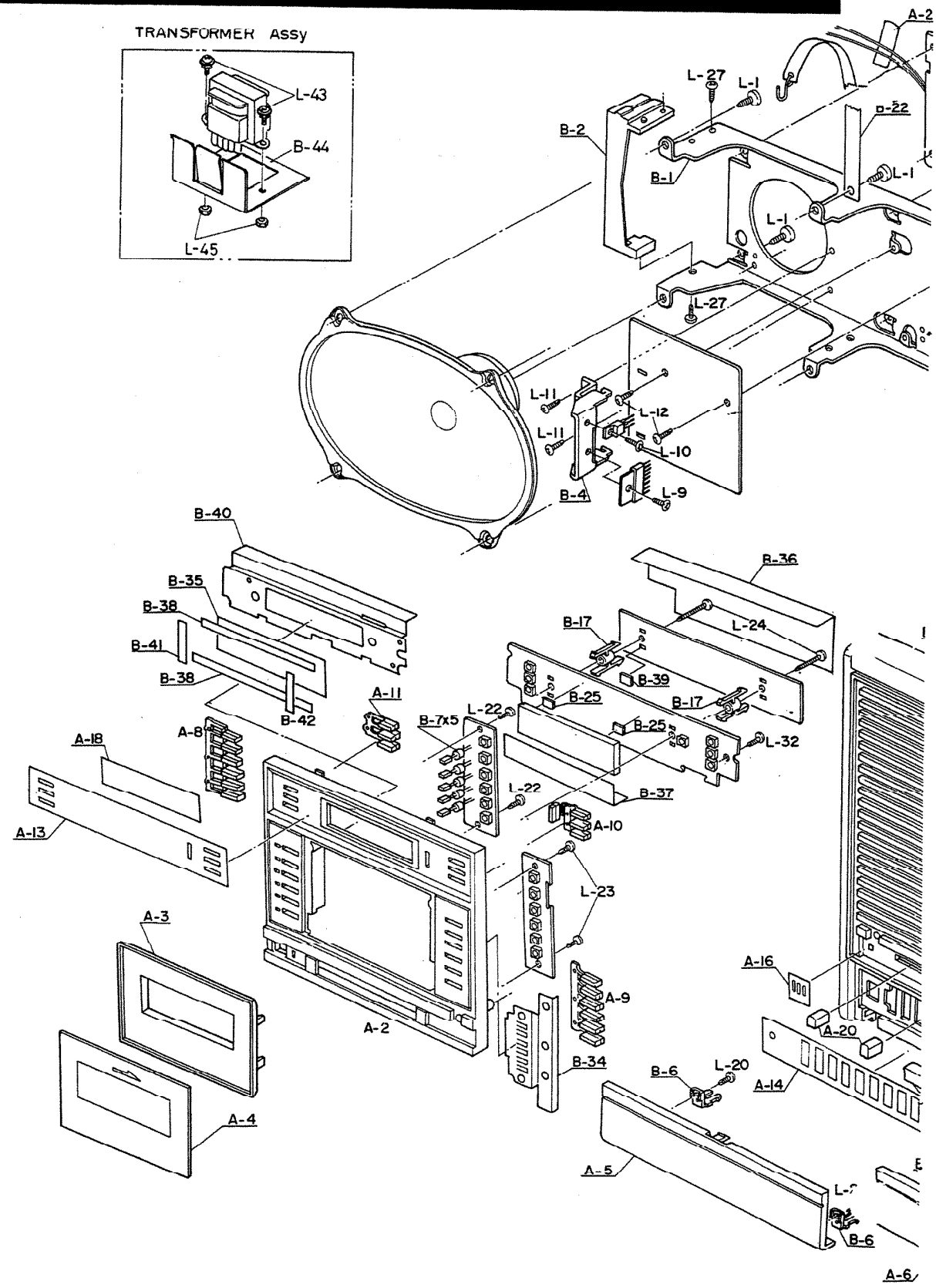
Models IS-408D and IS-408L
8″ Remote Speaker Panel

Schematic Symbol	NuTone Part No.	Description
	35581-000	Remote Speaker Panel (IS-408D)
	35582-000	Remote Speaker Panel (IS-408L)
	36089-000	Speaker—8″
	L2607-000	Screw—#8 x ⅜ PH. PAN. HD. "25"
	43215-000	P.C. Board Assembly
AA1, AA2	33085-000	Resistor—0 OHM
R2	33082-331	Resistor—Film ¼W 330
R1	33082-102	Resistor—Film ¼W 1K
R3	34059-000	Potentiometer—Volume Control
D1, D2, D3, D4	36549-000	Diode—Rectifier
SW1	34697-000	Switch—Latching, DPDT
SW2, SW3, SW4	34698-000	Switch—Momentary, DPDT
J1	39967-000	Right Angle Header—6 POS.
K1	8368A-000	Relay—12 VDC, DPDT.
	L2607-000	Screw—#8 x ⅜ PH. PAN. HD. "25"
	35473-000	Knob—Switch
	35475-000	Knob—Volume Control (IS-408D)
	35506-000	Knob—Volume Control (IS-408L)
	39941-000	Screw—#8 x 2½ PH. FIL. HD. "A" (IS-408D-068)
	39941-000	Screw—#8 x 2½ PH. FIL. HD. "A" (IS-408L-039)
	39965-000	Receptacle—6 POS.

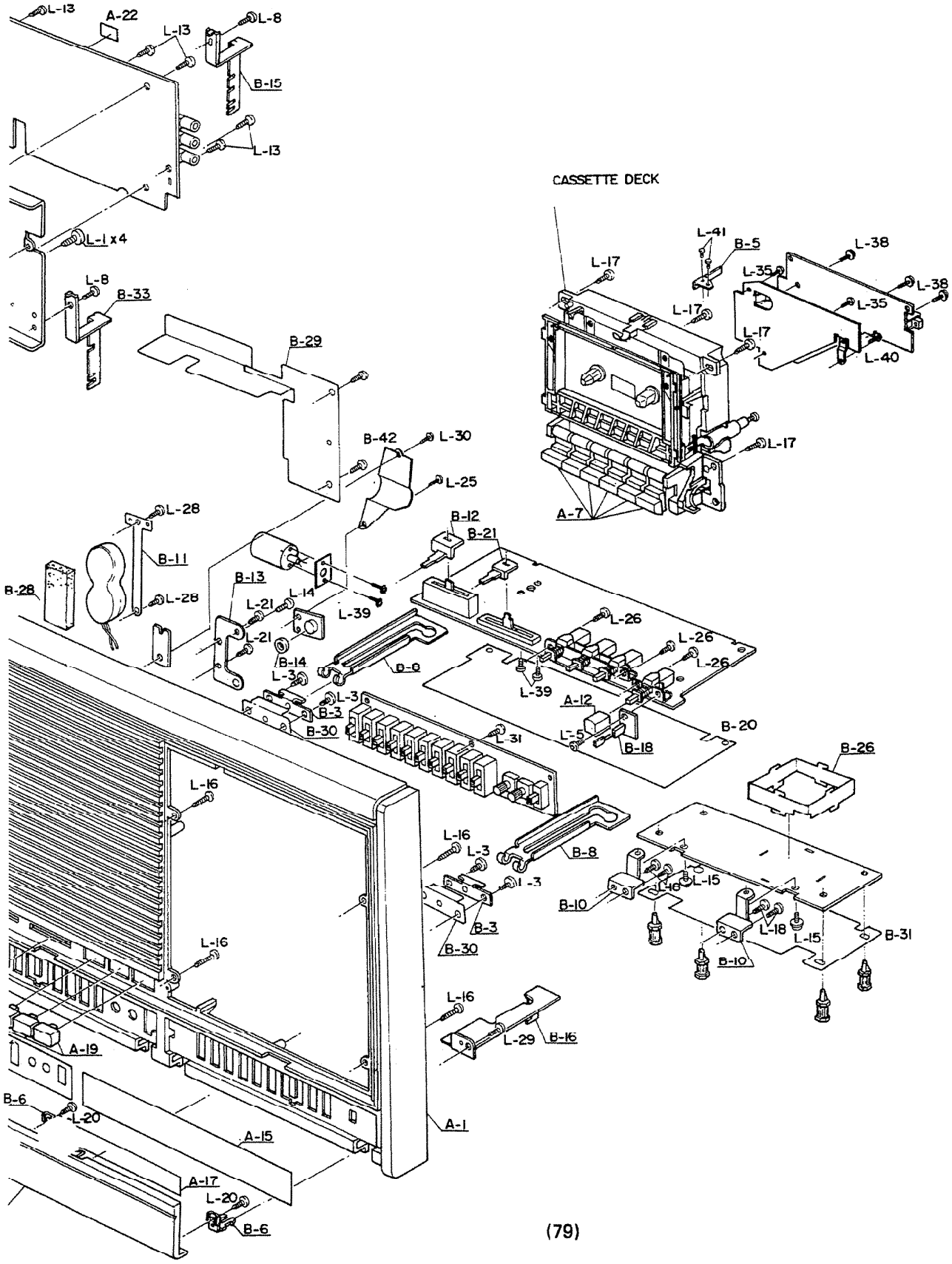
Model IS-409
5″ Outside Remote Speaker

Schematic Symbol	NuTone Part No.	Description
	35580-000	Remote Speaker Panel
	36108-000	Speakers—5″ (Weatherproof)
	12607-000	Screw—#8 x ⅜ PH. PAN. HD. "25"
	8369A-000	Rain Shield
	31967-000	Cable Clamp
	43233-000	P.C. Board Assembly
AA1, AA2	33085-000	Resistor—0 OHM
R2	33082-331	Resistor—Film ¼W 330
R1	33082-102	Resistor—Film ¼W 1K
R3	34059-000	Potentiometer—Volume Control
D1, D2, D3, D4,	36549-000	Diode—Rectifier
SW1	34697-000	Switch—Latching, DPDT
SW2, SW3, SW4	34698-000	Switch—Momentary, DPDT
J1	39967-000	Right Angle Header—6 POS.
K1	8368A-000	Relay—12 VDC (Sealed) DPDT
	L2607-000	Screw—#8 x ⅜ PH. PAN. HD. "25"
	35473-000	Knob-Switch
	35506-000	Knob-Volume Control
	35496-000	Surface Mount Frame
	52872-000	Screw—#8 x 2 PH. FIL. HD. "25"
	52807-000	Screw—#6-32 x 1¼ PH. OV. HD.
	35491-000	Gasket
	39965-000	Receptacle—6 POS.

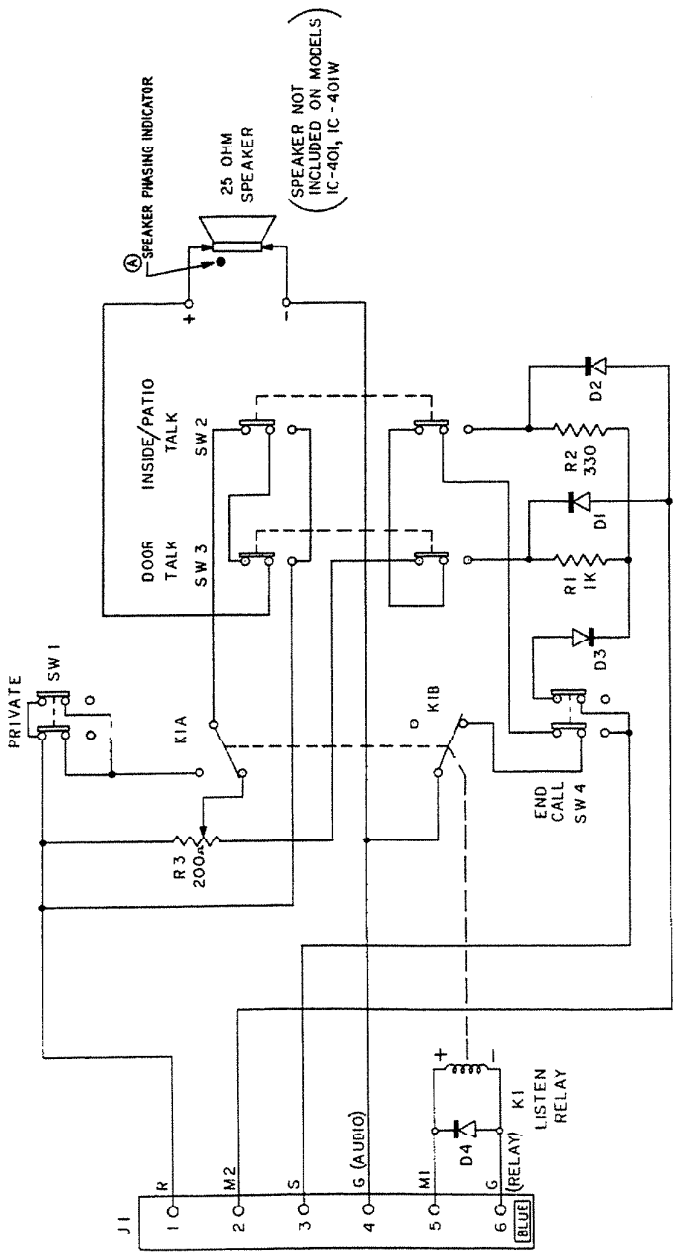
EXPLODED VIEW



EXPLODED VIEW



MODEL IS-405 SCHEMATIC

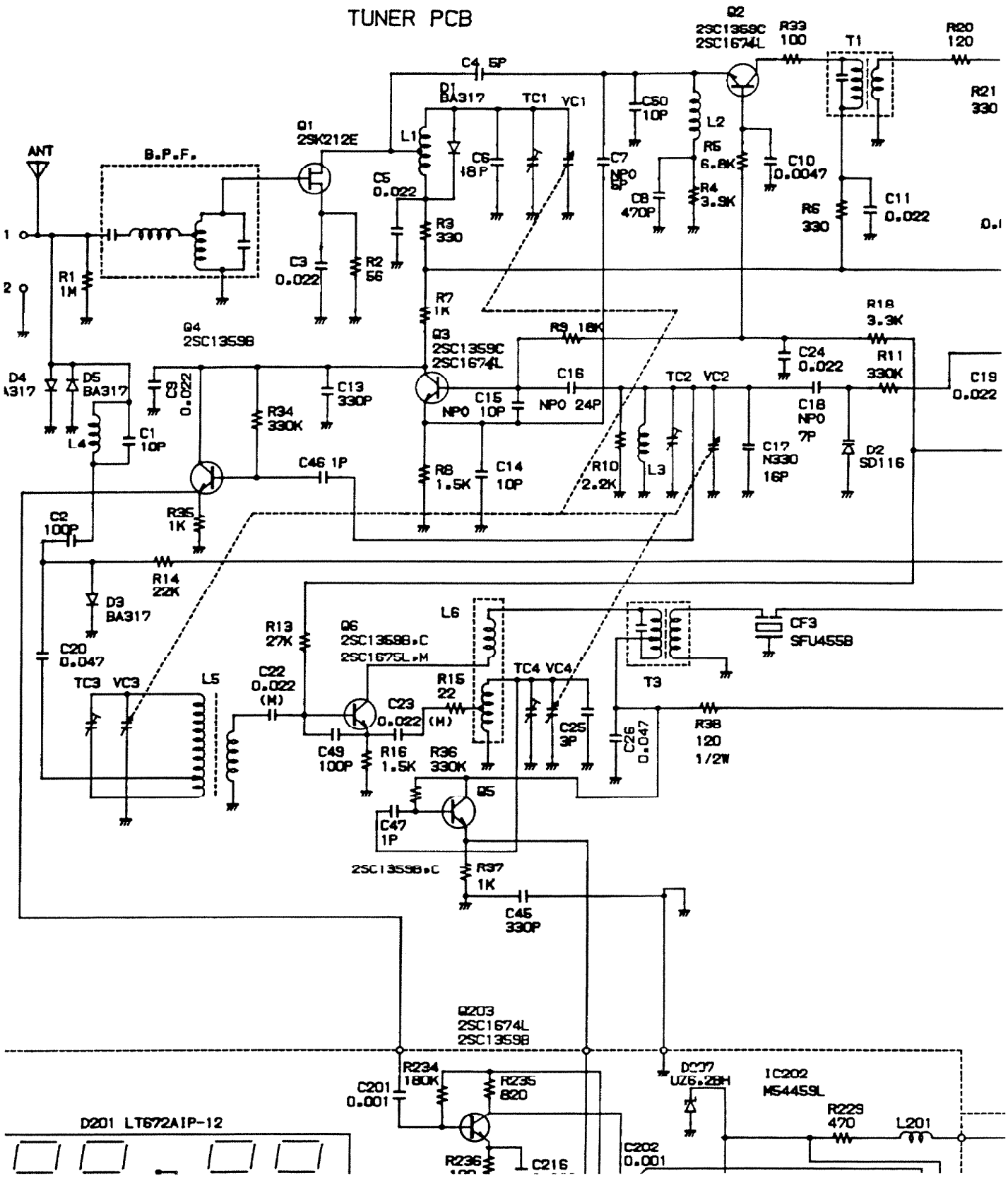


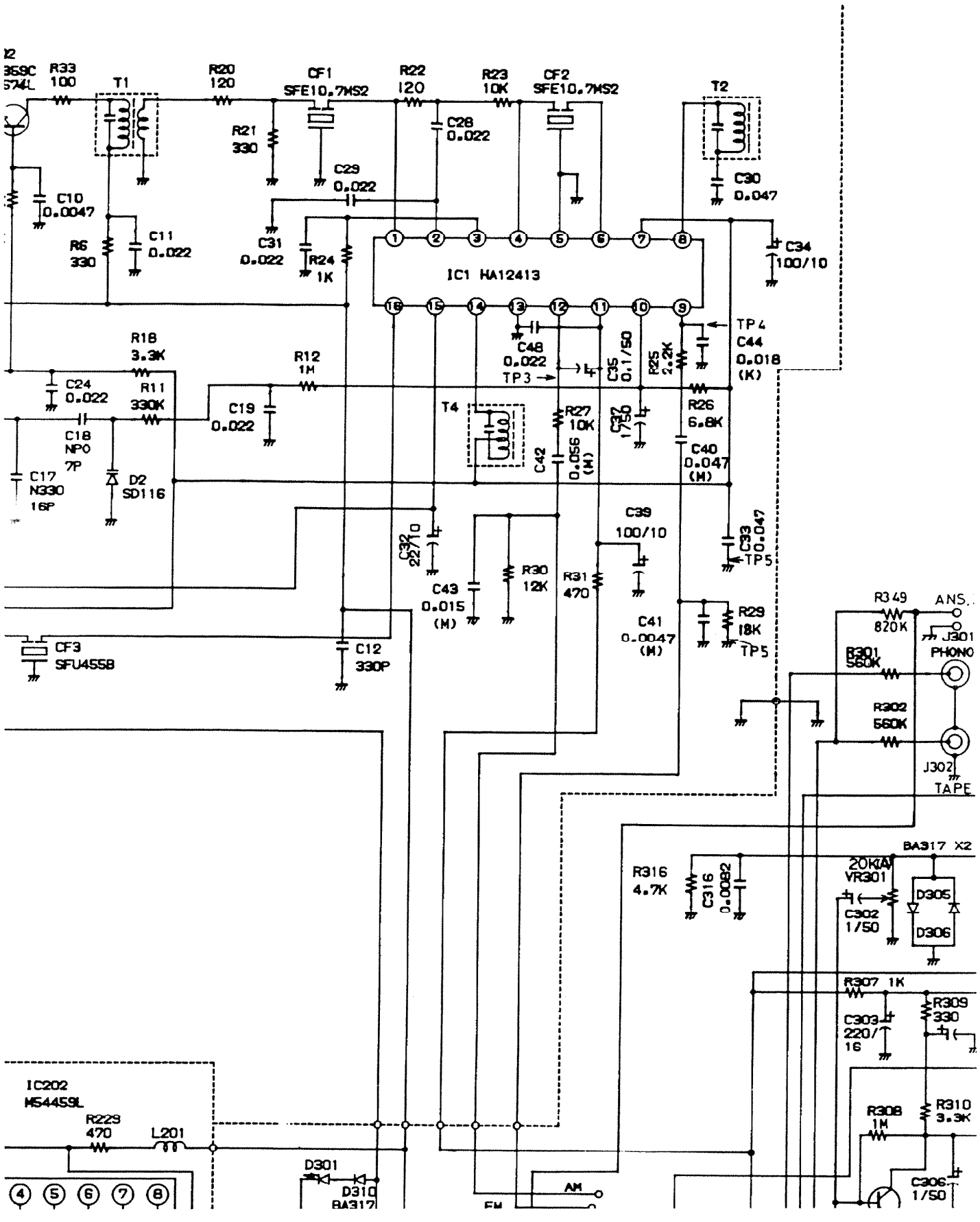
Product specifications subject to change without notice.

NuTone

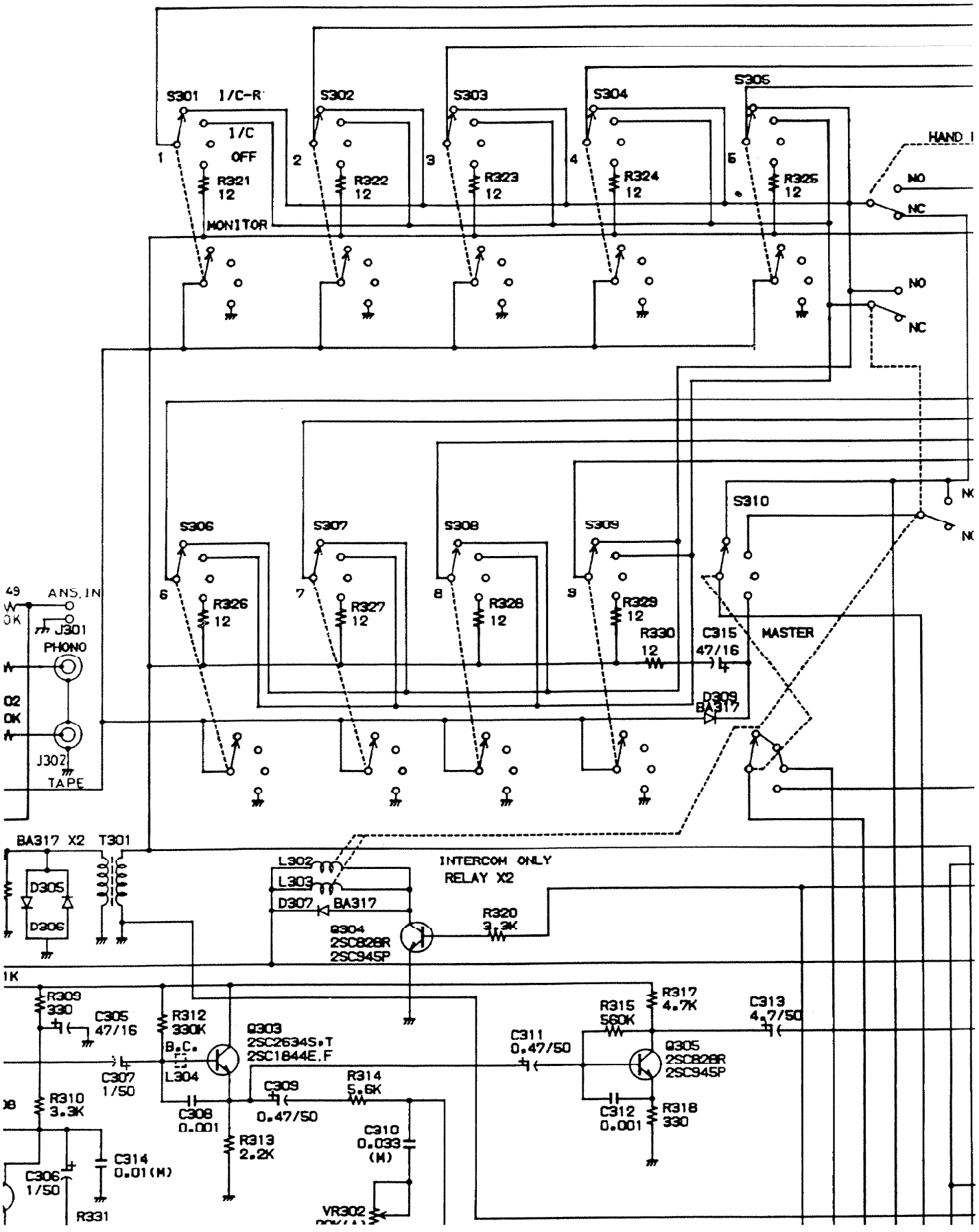
Madison and Red Bank Roads, Cincinnati, Ohio 45227
Printed in U.S.A. 12/88, Part No. FS-1550

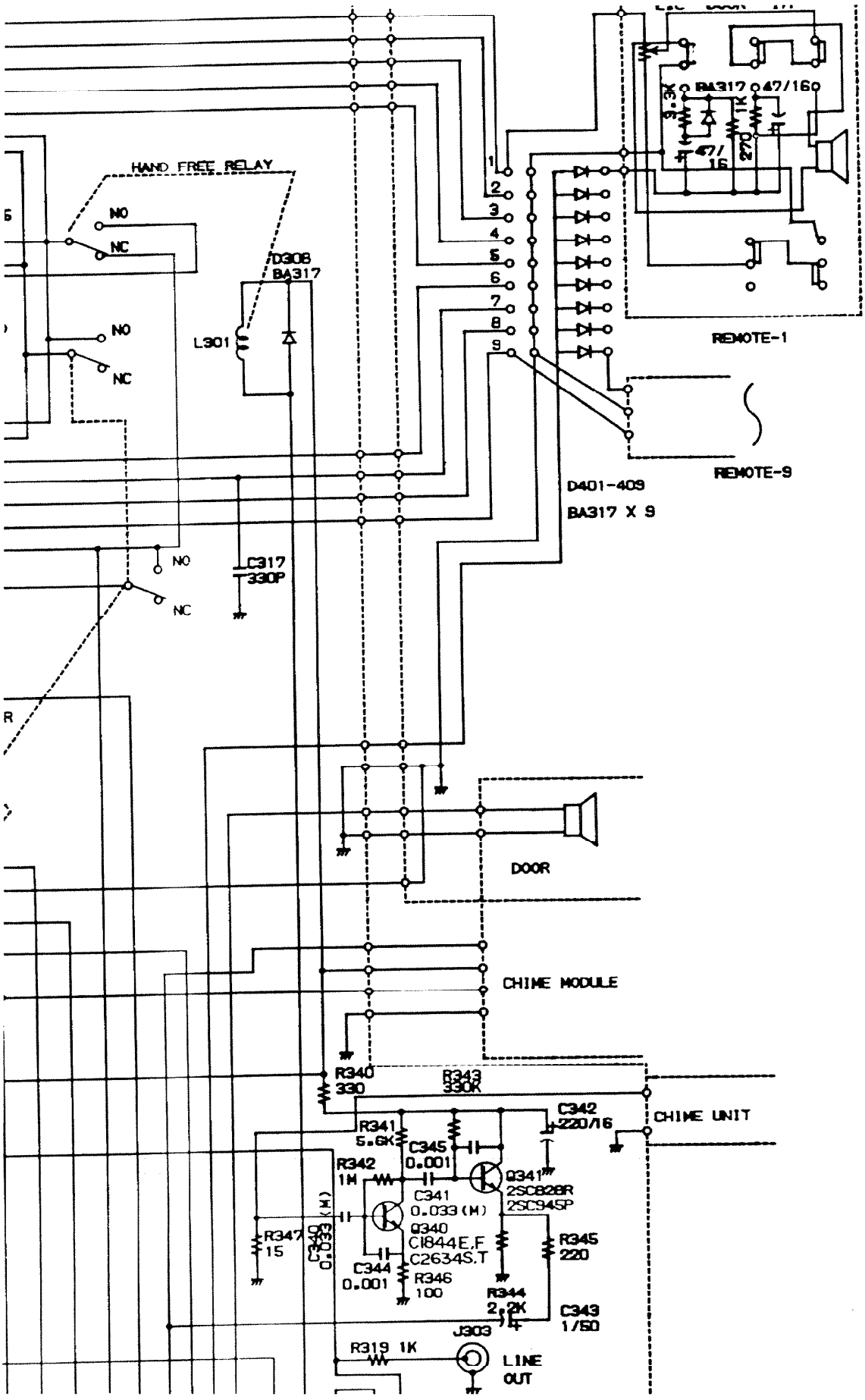
INTERCOM SCHEMATIC




R33 100
T1
R20 120
CF1 SFE10.7MS2
R22 120
R23 10K
CF2 SFE10.7MS2
T2
R21 330
C28 0.022
C29 0.022
C30 0.047
C10 0.0047
R6 330
C11 0.022
C31 0.022
R24 1K
IC1 HA12413
C34 100/10
C48 0.022
TP3
C35 0.1/50
R25 2.2K
TP4
C44 0.018 (K)
R18 3.3K
R12 1M
C24 0.022
R11 330K
C19 0.022
T4
R27 10K
C37 1750
R26 6.8K
C18 NPO 7P
C42 0.056 (M)
C40 0.047 (M)
C17 N330 16P
D2 SD116
C39 100/10
C32 2270
C33 0.047
TP5
C43 0.015 (M)
R30 12K
R31 470
C41 0.0047 (M)
R29 18K
TP5
CF3 SFU455B
C12 330P
R349 820K
ANS.
J301 PHONO
R301 560K
R302 560K
J302 TAPE
BA317 X2
R316 4.7K
C316 0.0082
20KA VR301
C302 1/50
D305
D306
R307 1K
R309 330
C303 220/16
IC202 M54459L
R229 470
L201
R308 1M
R310 3.3K
C306 1/50
D301
D310 BA317
AM
FM

SWITCH PCB


S301 I/C-R
I/C
OFF
MONITOR
S302
S303
S304
S305
S306
S307
S308
S309
S310
R321 12
R322 12
R323 12
R324 12
R325 12
R326 12
R327 12
R328 12
R329 12
R330 12
C315 47/16
MASTER
D309 BA317
HAND I
NO
NC
NK
49 ANS.IN
OK
J301
PHONO
02
OK
J302
TAPE
BA317 X2
T301
D305
D306
L302
L303
D307 BA317
INTERCOM ONLY
RELAY X2
Q304 2SC828R 2SC945P
R320 3.3K
R309 330
C305 47/16
R312 330K
B.C.
L304
Q303 2SC2634S.T 2SC1844E.F
C307 1/50
C308 0.001
C309 0.47/50
R314 5.6K
R310 3.3K
R313 2.2K
C310 0.033 (M)
C314 0.01(M)
C306 1/50
R331
VR302
R315 560K
R317 4.7K
C311 0.47/50
Q305 2SC828R 2SC945P
C312 0.001
R318 330
C313 4.7/50



NuTone

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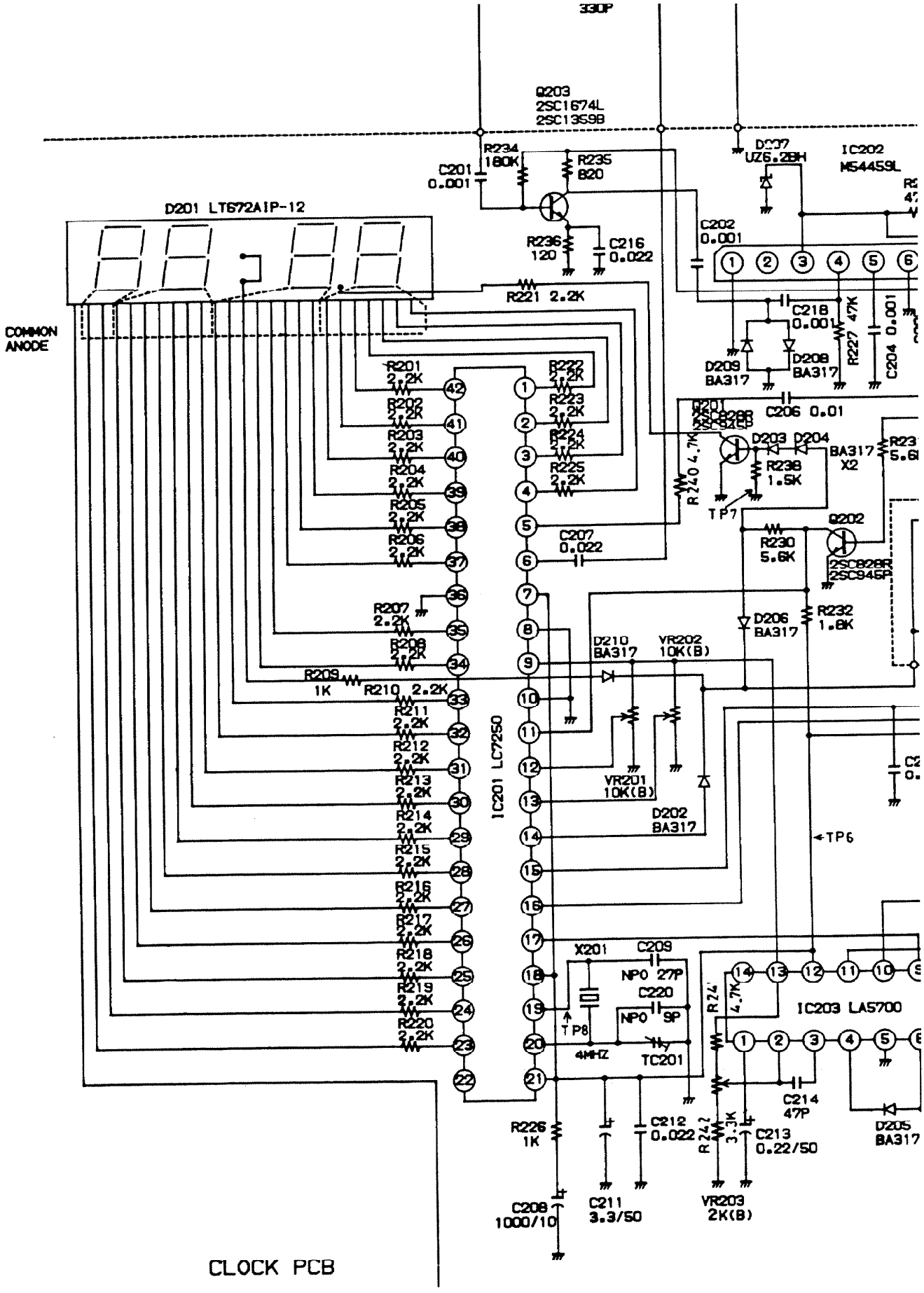
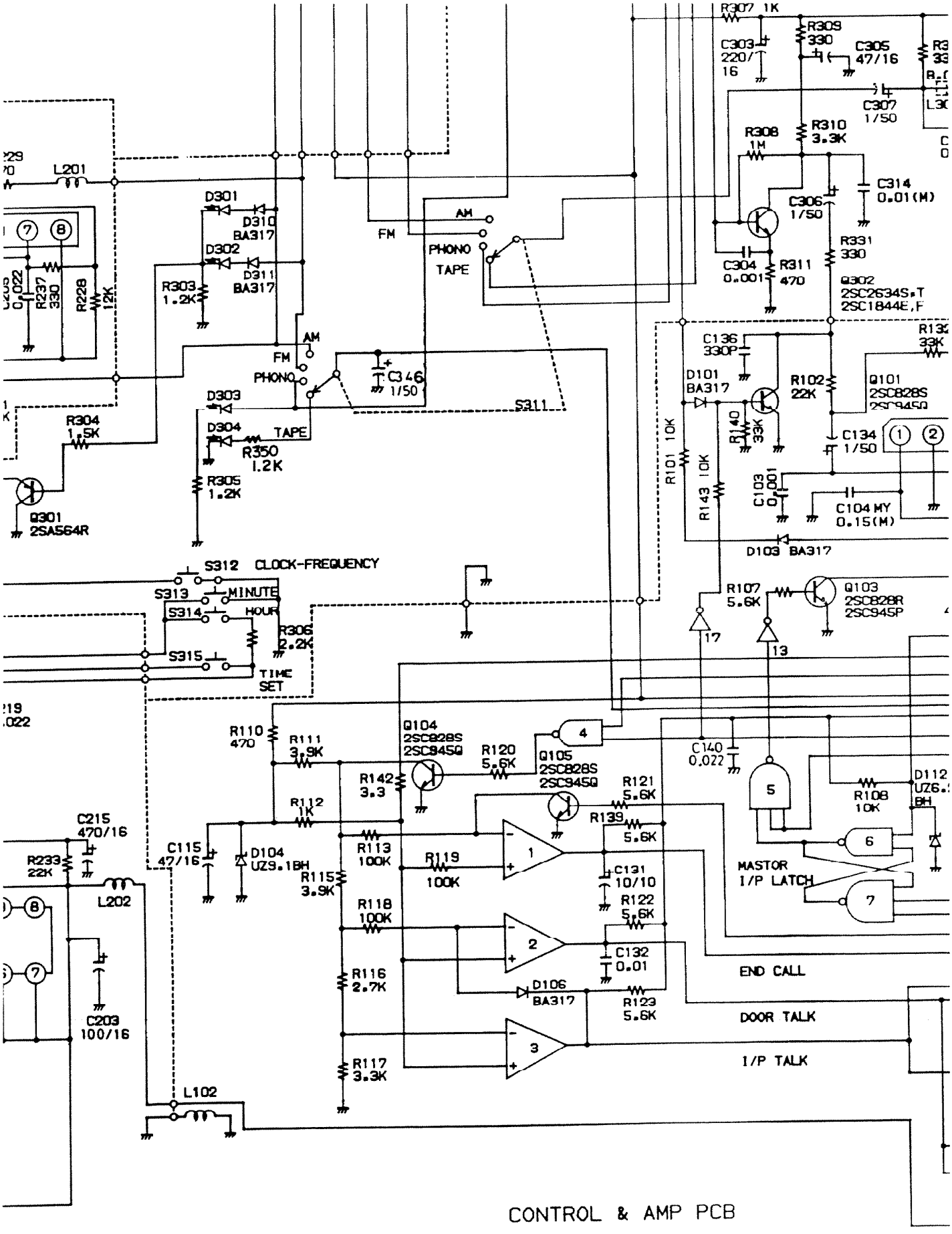
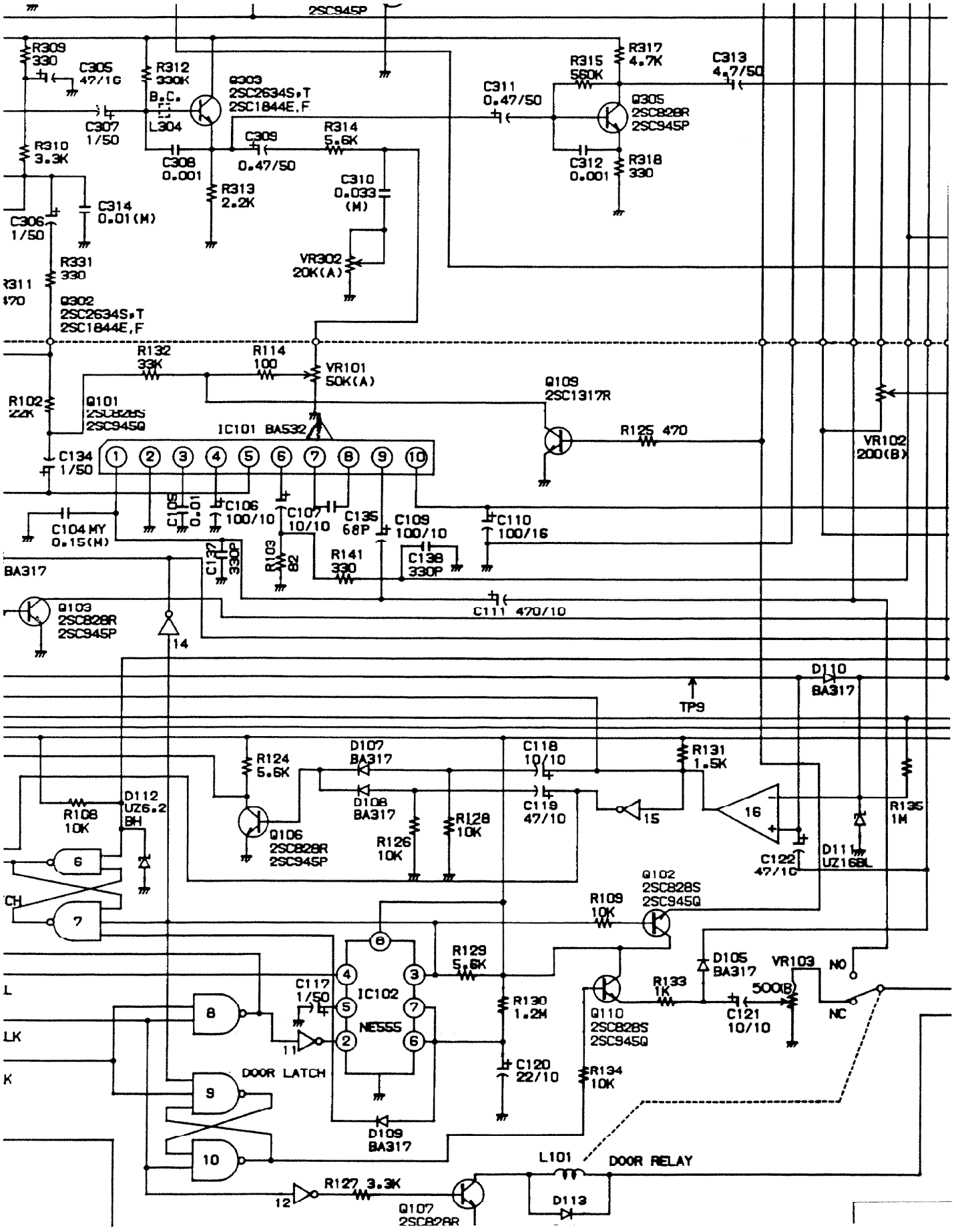
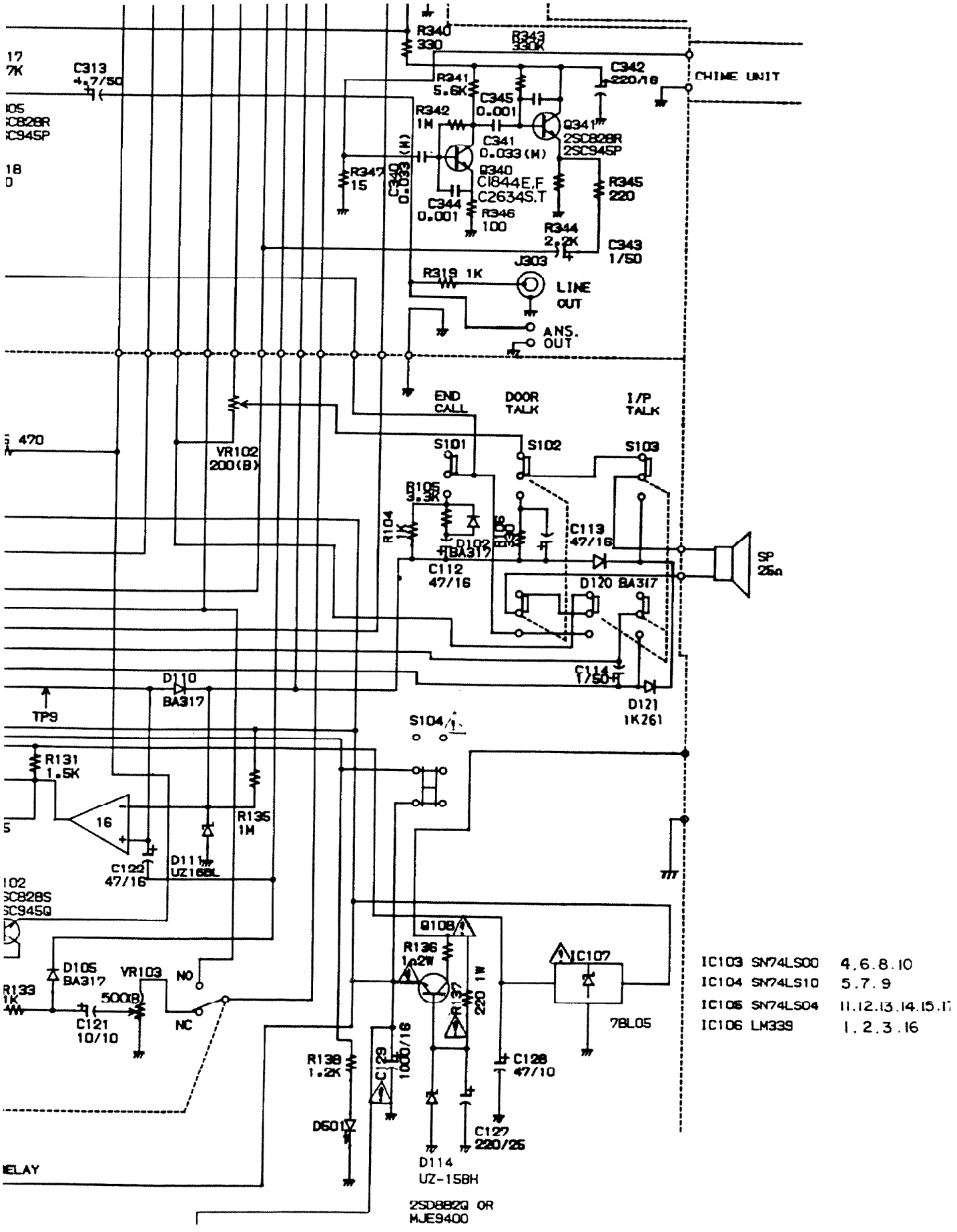

330P
Q203
2SC1674L
2SC1359B
R234
180K
R235
820
C201
0.001
D207
UZ6.2BH
IC202
M54459L
D201 LT672AIP-12
R236
120
C216
0.022
C202
0.001
R221 2.2K
C218
0.001
R227 47K
C204 0.001
COMMON
ANODE
D209
BA317
D208
BA317
C206 0.01
R201 2.2K
R202 2.2K
R203 2.2K
R204 2.2K
R205 2.2K
R206 2.2K
R207 2.2K
R208 2.2K
R209
1K
R210 2.2K
R211 2.2K
R212 2.2K
R213 2.2K
R214 2.2K
R215 2.2K
R216 2.2K
R217 2.2K
R218 2.2K
R219 2.2K
R220 2.2K
R222 2.2K
R223 2.2K
R224 2.2K
R225 2.2K
C207
0.022
R240 4.7K
D203
D204
BA317
X2
R238
1.5K
TP7
Q202
R230
5.6K
2SC828R
2SC945P
D206
BA317
R232
1.8K
D210
BA317
VR202
10K(B)
VR201
10K(B)
D202
BA317
IC201 LC7250
TP6
X201
C209
NP0 27P
C220
NP0 9P
TP8
4MHZ
TC201
IC203 LA5700
R241
4.7K
C214
47P
D205
BA317
R226
1K
C212
0.022
R242
3.3K
C213
0.22/50
C208
1000/10
C211
3.3/50
VR203
2K(B)

CLOCK PCB



CONTROL & AMP PCB


2SC945P
R309 330
C305 47/16
R312 330K
B.C.
L304
Q303 2SC2634S,T 2SC1844E,F
C307 1/50
C308 0.001
C309 0.47/50
R314 5.6K
R310 3.3K
R313 2.2K
C310 0.033 (M)
C306 1/50
C314 0.01(M)
VR302 20K(A)
R331 330
Q302 2SC2634S,T 2SC1844E,F
C311 0.47/50
R315 560K
R317 4.7K
C313 4.7/50
Q305 2SC828R 2SC945P
C312 0.001
R318 330
R132 33K
R114 100
VR101 50K(A)
R102 22K
Q101 2SC828S 2SC945Q
IC101 BA532
Q109 2SC1317R
R125 470
VR102 200(B)
C134 1/50
C105 0.01
C106 100/10
C107 10/10
C135 68P
C109 100/10
C110 100/16
C104 MY 0.15(M)
C137 330P
R103 82
R141 330
C136 330P
C111 470/10
BA317
Q103 2SC828R 2SC945P
14
TP9
D110 BA317
R124 5.6K
D107 BA317
D108 BA317
C118 10/10
C119 47/10
R131 1.5K
R135 1M
D112 UZ6.2 BH
R108 10K
Q106 2SC828R 2SC945P
R126 10K
R128 10K
15
16
C122 47/16
D111 UZ16BL
Q102 2SC828S 2SC945Q
R109 10K
R129 5.6K
D105 BA317
VR103 500(B)
NO
NC
C117 1/50
IC102 NE555
R130 1.2M
R133 1K
C121 10/10
Q110 2SC828S 2SC945Q
C120 22/10
R134 10K
DOOR LATCH
D109 BA317
L101
DOOR RELAY
R127 3.3K
Q107 2SC828R
D113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330
R343
330K
C342
220/16
CHIME UNIT
C313
4.7/50
R341
5.6K
C345
0.001
Q341
2SC828R
2SC945P
R342
1M
C341
0.033(M)
Q340
CI844E,F
C2634S,T
R347
15
C344
0.001
R346
100
R345
220
R344
2.2K
C343
1/50
J303
R319 1K
LINE
OUT
ANS.
OUT
END
CALL
DOOR
TALK
I/P
TALK
S101
S102
S103
VR102
200(B)
R105
3.3K
R104
1K
D102
BA317
C113
47/16
C112
47/16
SP
25Ω
D120 BA317
C114
1/50
D121
1K261
D110
BA317
TP9
S104
R131
1.5K
R135
1M
C122
47/16
D111
UZ16BL
Q108
R136
1Ω2W
IC107
7BL05
D105
BA317
VR103
500(B)
C121
10/10
NO
NC
R138
1.2K
C129
1000/16
C128
47/10
D601
C127
220/25
D114
UZ-15BH
2SD882Q OR
MJE9400
IC103 SN74LS00 4.6.8.10
IC104 SN74LS10 5.7.9
IC105 SN74LS04 11.12.13.14.15.17
IC106 LM339 1.2.3.16